



AF500S PLASTIC INJECTION MOLDING MACHINE

MANUAL BOOK

NINGBO ALFA MACHINERY MANUFACTURING CO., LTD

TEL: 0086-574-86235936

FAX: 0086-574-86230908

E-mail: Sales@nbairfa.com

Http://www.nbairfa.com

P. C: 315821

ADDRESS: ZHU TIAN XIAOGANG NINGBO

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2.1 general safety regulations

Person sufficiently qualified in their particular field and who have specific knowledge of injection moulding machinery should carry out Service, maintenance & repair work. They should be versed in the maintenance of industrial health and safety standards and they should be familiar with the construction and functioning of the necessary safety equipment in the machine.

If necessary, enlist the help of our service department.



warning !

The safety equipment fitted on the machine is there for your safety and that of the production of goods.

The machine should only be operated when all safety equipment is in working order.

To remove, by-pass, or render safety equipment inoperative is therefore not permitted.

The safety equipment also includes the safety program contained in the software. Don't carry out any changes to this program.

If the safety equipment malfunctions or a fault occurs on it, the machine must be immediately shut down:

- ▶ Actuate emergency stop button;
- ▶ Main power switch-off;
- ▶ Close down the cooling water supply after about 20min

The person in charge must be informed at once.

Before putting the machine back into operation, the causes of the fault must be eliminated.

2.1.1 Maintenance and repair work



warning !

All repair and maintenance work should only be undertaken when the main switch on the injection molding machine is switched to "0" if necessary, is locking by padlock.

It is the employer's duty to instruct the machine operator in the construction operation and function of the safety equipment as well as on the correct attitude to health and safety at work.



warning !

Any process that impairs safety on the machine should be stopped.

The employer must ensure that no unauthorized personnel work on the machine.

No safety equipment whatever should be taken off the machine or put off action. If it is essential to remove safety equipment in order to carry out repair work, then it should ensure safety. As soon as the repair work is completed, the safety equipment must be refitted and its effectiveness checked.



warning !

No unauthorized conversion or modification of the safety equipment on the injection machine is allowed!

2.1.2 Toxic fumes

Some plastics materials give off toxic fumes when heated to excess. This applies particularly to PTEE, POM and PVC. If these types of fumes can not be eliminated by means of expedient machine setting, it is recommended that an effective extractor fan be installed to divert these

hazardous fumes. In addition of that, it is required that the extractor fan switch and injection molding machine main switch should be interlocked.



notice:

If the extraction facility fastened directly on the machine, we would recommend that the extraction facility should be installed on the fixed mould.

2.1.3 Explosive decomposition

When exposed to prolonged heating, some plastic materials have a tendency to react by decomposing and becoming explosive. In particular, these are POM and PVC. The type of plastic that react in this way should only be processed using nozzles which are apart from mould when pressure builds up and then the air caused by decomposition can be flowed out from nozzles.

Prevention of accidents by:

- ▶ Adhering strictly the prescribed parameters of the plastics materials, in particular, processing temperature and dwell time in the plasticizing barrel in line with the material manufacturers specification.
- ▶ when processing heat sensitive plastics, the dwell time of the material in the plasticizing barrel should be reduced, when there are intermissions in production or there is a material change, PE should be used for purging (to cleanse the plasticizing barrel of any sensitive material) and then the heating switched off.

2.1.4 Prevent accidents caused by exceeding charge

In general, setting weight of charging higher 15% of product weight is reasonable. Exceeding charging would cause mush of high pressure and temperature melting plastics leaving in the barrel and heating passage after injection step. When charging with high backpressure is end, thus high pressure would remain in the barrel. In case of manual cleaning or repairing mold, the

energy caused by high pressure have a chance to release suddenly and severe injury the operator.



Notice:

We strongly stress that it must retract the nozzle to leave the mold, stop pump motor and open the guard before you enter the clamping space to clean or repair

2.2 Safety equipment

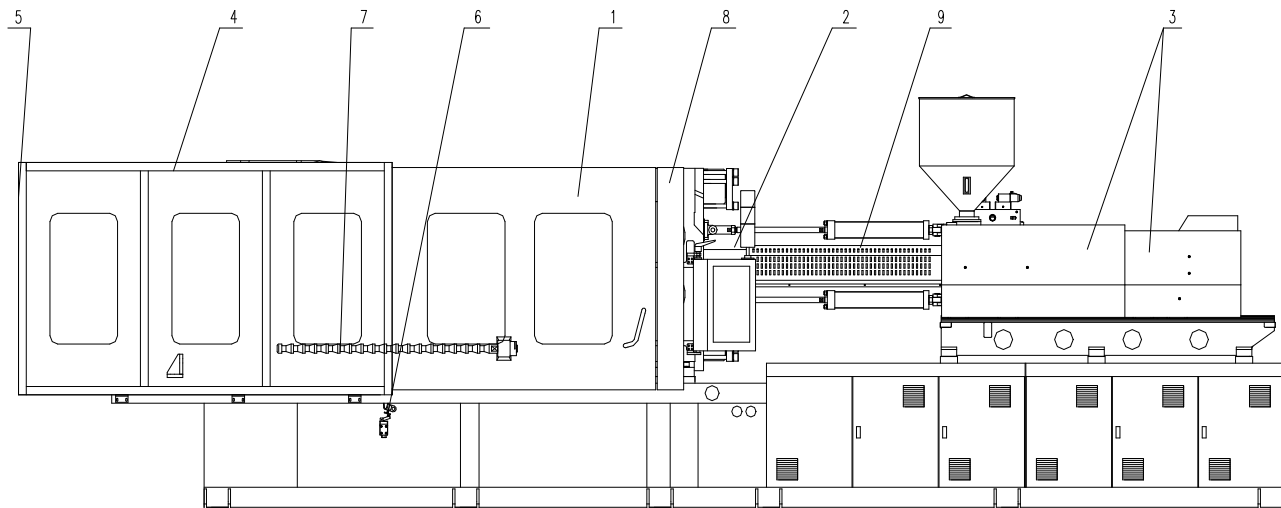
2.2.1 General equipment

The safety equipment consists of guarding and locking mechanisms.

- ▶ The guard panels prevent access to the danger areas and protect personnel from plasticizing melt spurting out.
- ▶ When a particular guard panel is opened; locking mechanisms interrupted any dangerous machine movement.

The measurements for the moveable guarding in the mould area and for the component ejection opening are designed in such a way that there is sufficient safety margin, for the larger moulds are concerned, the measurements of the guarding panels are required to be added relatively.

2.2.2 Safety equipment (illustration only for reference, actual machine may be differ with it)



Position	Description
1	Movable guarding in the mould area—operator side/non operator side
2	Nozzle guarding
3	Fixed guarding on the injection unit—operator side
4	Fixed guarding on the clamping unit — operator side/ non operator side
5	Fixed guarding on the clamping unit—side
6	Hydraulic safety valve
7	Mechanism locking units
8	Electric safety units
9	Barrel heating guarding

2.2.3 Moveable guarding in the mould area

The operator side is that from which a machine cycle can be initiated.

The moveable guarding in the mould cavity area form a canopy over both the operator and non-operator side on the mould cavity area. There is a cover plate in top of the canopy that can be removed to allow for the insertion of handling equipment. (No cover platen on top of the canopy for large and middle type machine.)

The moveable guarding in the mould area is fitted with three locking mechanism, one is mechanism locking unit, second is hydraulic and third is electrical.

When the moveable guarding is opened, three locking units are automatically system and injection unit as well. (main motor doesn't work when electric safety function actuated for the machine which sales overseas.)

Mechanism locking unit makes mechanism locking blocks to be fallen down by means of moving mechanism locking striking pieces, so that can block movements of the mechanism locking lever and block clamping actuation.

Hydraulic protection safety valve is acted directly by means of interrupting clamping oil pipes. By actuating safety stroke switch, all possible movements are blocked in the electrical system.

Error message:

If the machine is started up and a movable guard is left open, an error message appears on the operating screen: "guard door not closed".

Error elimination:

Close guard door

Keep check stroke switch or adjust, repair stroke switch until the error message cancels.

Error message can automatic canceled when all error messages eliminated.

2.2.4 Nozzle guarding

The nozzle canopy on the operator side (injection unit) consists of a sliding canopy with viewing window which installed guard canopy safety stroke switch.

When opening the nozzle guard canopy, "move in injection carriage forward" "move injection carriage return"," injection", "pre-plasticizing" are completely stopped, automatic or

semi-automatic operation will be cancelled.

Error message:

If an attempt is made to start the action before the nozzle canopy is closed, an error message appears on the screen displaying “nozzle guard canopy not closed”

When guard canopy is closed, then the message disappear, operation can be started.



warning !

It is forbidden to step on the machine bed or the injection unit for maintenance and installation purposes or for feeding the pallet hopper. This is a risk of injury through burns and tripping over.

Please only use facilities that stand on the floor such as a pair of steps or a platform. User should provide auxiliary feeding loader and it must locate with feed inlet when operating. It stops working simultaneity when pull the feeding hopper open.

2.2.5 Fixed guarding

Fixed guard is screwed on tightly and can only be released using appropriated tooling. It's removal is only permitted for repair or modification work.



warning !

It is not permitted to operate the machine with the fixed guarding removal

Fixed guarding is to be found on the operator and non-operator side of the clamping area, on the front or side of injection unit.

Other fixed guarding: protection against reaching the clamping unit on the fixed mould and protection against touching heat insulation on the plasticizing cylinder.

2.2.6 Other gangers when nozzle guarding is open

If the hopper is moved and the material feed supply is interrupted, the heating up of the cylinder means a fire risk at the feed opening.

There is a risk of fire in the nozzle area because of the hot nozzle and because of nozzle heater bands being heated up and the melt being squirted out.



warning !

protective gloves and safety glasses must be worn when working in the plasticizing barrel area.

2.3 Hydraulic safety equipment

The hydraulic safety equipment consists of pressure relief valves, which the manufacturer has set to the maximum permissible value and then sealed. The valves are actuated when the pressure exceeds that which has been set in accordance with the specified value.

Pressure relief valve limits hydraulic system pressure and this protects the operator and the hose and pipe connections from excessive pressure. This prevents damage as damage as a result of faults in the hydraulic system. Pressure relief valve protects the variable pumps in the hydraulic driver from overloading.



warning !

Under no circumstances must pressure relief valves be adjusted.

2.4 Electrical safety equipment

The electrical safety equipment consists basically of the ground connections and the emergency

stop button.

Earth wire connections on all electrical equipment on the machine particularly electrical heating equipment, heater bands must be checked periodically.

The emergency stop button is located on operating plate and non-operating fixed mould guarding plate.

If you pressure the button, various movements of the machine are immediately halted. Both the pump motor and any handling equipment fitted via the standard interface will also switch off.

For safety reasons, once the emergency-stop button has been actuated, the machine will remain in the stop position.

The error message “emergency-stop appears on the operating plate screen”

The button is released by turning the knob a quarter turn. The cycle can then be restarted and the error message disappears.

Breaker has under-voltage protection.

2.5 checking the safety equipment



warning:

When a customer accepts a machine, the responsibility for servicing and testing the safety equipment passes to him.

If the fault is discovered on the safety equipment, the machine must be taken out of service immediately.

The causes of the faults must be eliminated before the machine goes back into operation.

We recommend the following checks be made on the safety equipment:

- ▶ Both operating personnel and setter when adjusting the machine should check movable units on the machine and sundries that may obstruct machine running

carefully. Ensure all in good condition, and then close movable guarding. ◦

- ▶ Open movable guarding, visual examine whether the safety pawl drop freely and block clamping motion.
- ▶ There should be no clamping motion when press clamping button in inch manual. If clamping function is actuated, then must checking and readjusting the hydraulic safety switch. (See diagram 2.2.2 position 6)
- ▶ there should be no ejection, injection and charging motion when press corresponding button in inch manual. If these functions are actuated, then must checking and readjusting the electric safety switch. (See diagram 2.2.2 position 8)
- ▶ close movable guarding, mechanical stops can make safety pawl lifting, and to press the electric safety switch. The hydraulic safety switch will pop synchronously. At that time all control button on the operating panel should be available.

After a specialist technician eliminates all the faults, periodically checking and testing need.



warning:

The above items should check every month.

Safety equipment checking list:

- ▶ if the rigidity of the executive device is on good condition;
- ▶ if the safety devices are fasten tightly with the machine;
- ▶ if all wires are connected with the safety switch.;
- ▶ if individual safety devices and limited switch are usable



warning:

Checking nozzle canopy stroke switch, protective glass must be worn in order to prevent the melt being squirted out which will cause damage.

If faults are discovered on the safety equipment, the machine should be shut down immediately! Before putting into the machine back into service, the faults and the causes of the faults must be eliminated.



warning:

It is the customer's duty to consult specialist of MINGZHEN when modifications are made or peripheral units are added on.

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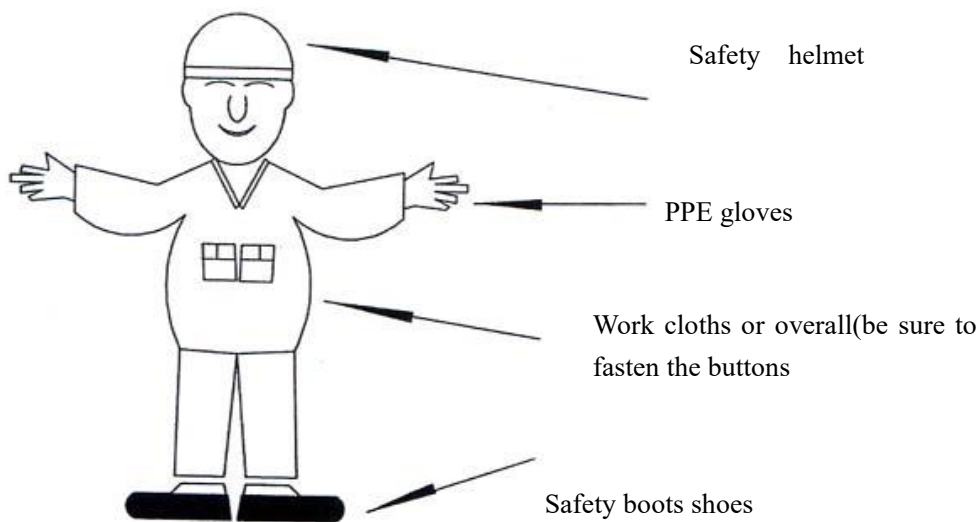
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3.1 Preparatory work



Note: Before operating the machine, please read Chapter 9 carefully to get familiar with the way of operation to the controlling system. Only after that may come to the following debugging and adjustment.

3.1.1 Correct clothing



3.1.2 Necessary jobs before testing the machine

- ▶ Check and ensure that the machine has been well installed, including correct leveling, correct connection of the parts, electrical cables and oil pipes removed during transportation, removal of the additional parts for transportation and lifting.
- ▶ Check the power supply and earth lines have been properly connected, cooling water properly connected and opened for use.
- ▶ Check the hydraulic oil has reached above the middle line of the oil lever meter and maintained for more than 3 hours.
- ▶ Check the surfaces of all the motional parts have been cleaned and lubricated.

3.2 Testing and adjusting the new machine

3.2.1 Power on

After voltage and frequency complying with the request of main motor is checked. Connect the power supply line; set the power switch on the machine upward to position ON to power the machine.

There some protective switches in the electric cabinet. Open the door of the cabinet put all the mini circuit breaker (see chapter 8 component layout) upwards in the cabinet to connect all circuit. If LCD screen displays menu means the controller is in working condition and can next steps.

3.2.2 To start running the electric motor.

Push the motor start key on the operating panel to start the oil pump motor. (For adjusting the running direction of the motor, see Chapter 2). Check the running direction of each motor if there are several motors. The motor could run if these are no deviant sounds.

3.2.3 To start heating system

Enter the temperature-setting image to set temperatures for different zones. (For 5-zones temperature control system, set 180, 180, 160, 140 respectively, starting from the nozzle; for 4-zones temperature-setting system set 180, 180, 160, 140 respectively. Different plastic material requires different temperature, refer to 4.1.1.)

Push the heating key to start heating the barrel. Under the normal circumstances it should takes around 30 minutes for the temperature to reach the set point.



warning!

It is strictly forbidden to operate the injection unit when the temperature has not reached the set point.

3.2.4 To operate the machine manually.

Follow computer operation instruction; enter the data-setting image for every motion to set up a group of data at a lower pressure and slower speed for each motion. Holding the manual operation mode, push every motion key and observe of each motion goes firmly and steadily and confirm the normality of each functional part.

Reset data to each motion image according to the normal motion requirements.

Holding the manual operation mode, push every motion key and observe of each motion is normal. No finding of problem indicates the normality of the manual operation.



warning !

Observe the oil lever of the hydraulic oil tank after closure of the mould, completion of plastic injection and retract of the screw. Stop the motor and fill the tank with oil up to above the middle line of the oil meter in case the oil lever has dropped down under the middle line.

3.2.5 Semi-automatic and full automatic operation of the machine

After full normality of all the manual motions are confirmed, pushes the semi-automatic key, Switch on and off the safety door at one push and release, start the semi-automatic model. At the end of one circulation, if no abnormality occurs re –switch on/off for another time to enter another round of circulation.

After 3-5 circulation of normal work in the semi-automatic model, at the end of the mould closure, push the time automatic key to give the fully automatic work mode to the machine and observe if the machine works normally.

Normal results of all the a/m tests indicate the completion of tests and possibility to conduct the plastic injection and molding.

3.3 Procedure of the mould installation

3.3.1 Preparation

Measure the length, width and height of the mould. Compare the measured data with those in the parameters (see chapter 5) and determine if the mould can be set on the machine.

Measure the diameter of the mould-locating ring to make sure it can fit the installation hole in the fixed platen.

Measure the flow gate dimension distance between flow gate and installation plane of fixed platen. Check whether it can match to the nozzle of the machine.

Measure mould ejection platen; check it can match to relative parameters (see chapter5) on the machine

In manual thick adjusting mode, adjusting the mould height available according to mould's actual height. You can Set opening stroke according to the space distance that products can drop freely, and set ejector stroke to ensure the mould would not be damaged by adjusting the mould height. Clamping plate, filling block for the clamping plate, forcing bolts, nuts, flat washers, spring washers, wrenches and pipes, etc. Should be prepared before mould installation.

3.3.2 Procedure of mould installation



warning !

The whole work to installing the mould shall be done manually; the follow mentioned mechanical operations should be done in the manual mode or the mould-adjustment mode. Before starting manual operation, the pump motor must turn off to ensure the operator's safety.

Step 1: Start the oil pump motor.

Step 2: Open the moving platen.

Step 3: Move the injection base backward.

Step 4: Turn off the oil pump motor.



Notice:

If the moving plate is on the position “mould open stop”, step 1-step 4 can be skipped.

Step5: Adjust the position and number of the ejectors to suit them to the mould.

Step6: Suspend the mould: Position the mould by means of inserting the mold flow gate bushing in the locating ring hole on the fixed platen side. Pay special attention to avoid collision between the mould and the tie bar or other units.



warning !

Make sure that the two petals of the mould would not separate from each other during lifting.

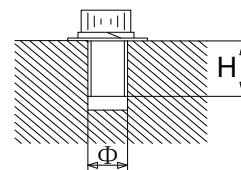
Step7: Use the bolts, mould clamping plate, filling block of the clamping plate, flat washers, spring washers, etc. to install fixed section of the mould on the fixed plate. In such case it's no need to apply a very big tightening force.



Notice:

For the size of the bolt see the mechanical drawing in

Chapter5. Depth H of the bolt shall be 1.5~1.8 times as large as its diameter Φ .



Step8: Start running the oil pump motor.

Step9: Close the mould in way of step move to let the mobile part of the mould approaches the fixed part until a tight fitting is achieved.

Step10: After full closure of the mould, align nozzle center to ensure nozzle center aim at mould flow gate center. Aligning procedure as follows: (see Fig1.2)

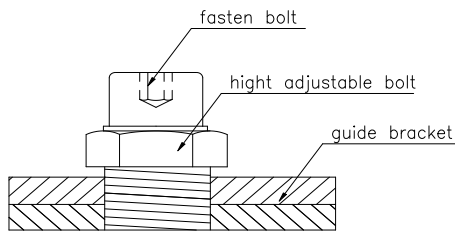


Figure 1

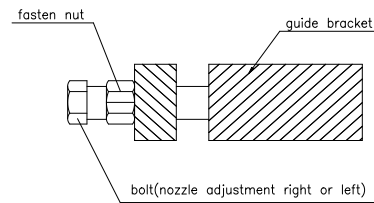


Figure 2

- ▶ Unscrew the fastening bolt (Fig.1) and locking nut (Fig2)
- ▶ adjusting nozzle height by adjusting nozzle bolt.
- ▶ Adjusting nozzle right or left direction by right or left adjusting bolt.
- ▶ After end of alignment, Tighten fastening bolt and locking nut.



warning:

Before moving the nozzle observe its length and the depth of the material, if there is any conflict that may lead to a damage of the nozzle or the heating coil.

Step11: Turn off the oil pump motor.

Step12: Tighten up the clamping bolt to mounting fixed parts of mould to fixed platen firmly.

Step13: Tighten up the clamping bolt to mounting movable parts of mould to movable platen firmly as the same way.



warning !

The bolt shall be firmly tightened to avoid mould dropping at the opening of the platens.

Step14: Remove the belt or steel cable used during the lifting and setting.

Step15: Set up each position, pressure and speed for the mould- opening and closing, especially set up a high pressure for the mould locking that is required by the product molding.

Step16: Start the oil pump motor.

Step17: Open the mould to extremity; adjust Mould 1 slow position bigger than high-pressure position of the mould closure.

Step18: Set the data of mould opening/closure and mould adjustment.

Step19: Close the safety door, push secondarily mould-adjustment function key to enter the automatic mould-adjustment status.

Step20: Once again open and close the safety door, at which the machine will adjust the mould by itself. After completion of the mould adjustment the machine will return to the manual mode.

Step21: Push the mould-closing key to conduct the mould-closing operation. After the mould is closed, turn off the oil pump motor.

Step22: fasten all the bolts

Step23: Connect other mould-related pipeline, such as the cooling water pipeline. Up to now the mould has been set up.

3.4 Procedure of the plastic injection

3.4.1 Notes before the plastic injection

- ▶ In order to protect the screw, it shall be operated only after 15-30 minutes from the moment when every sect of temperature in the heating barrel reaches the setting temperature.
- ▶ To avoid damage on the screw, it is necessary to conduct a test run of the screw at a speed lower than 60 rpm in the unloaded condition.
- ▶ Don't let man's face and hands approach the tip of the nozzle. The mould setting up shall be completed before starting the plastic injection.
- ▶ Not annotated steps in next paragraph of the plastic injection work shall be all done in the

manual mode.

3.4.2 Temperature of the hydraulic oil

The optimal working temperature is 45°C. The viscosity of the oil will be too high if lower than 40°C. The viscosity of the oil will be too low if temp higher than 55°C.

In order to have an optimal condition of the machine immediately at the beginning of the plastic injection, it is necessary to add a pre-heating to the hydraulic oil if its temperature is lower than 40°C. May start to run the oil pump motor only with no load, for the heating. May also exercise some motion, for example, to drive the core in and out. Set a certain pressure and flow this will result in a quicker rise of the oil temperature.

3.4.3 Procedure of the plastic injection

Step1: Set the heating temperature of the material barrel to a point suitable for the material to be used. And start next step only after 15minutes from the moment when the temperature of the material reaches the set point.

Step2: open the cover of the material hopper; pour the plastic material into the latter. Replace the cover (follow the operation instruction if there is an automatic material loading device)

Step3: Roughly set up the position of the end, and speed of the material storage, pressure of charging backpressure valve according to the weight of the product and the specific weight of the material. And set up the corresponding parameter of injection and holding pressure.

Adjustment of charging backpressure has two different methods according to machines type.

notice:



Too big backpressure may increase the energy consumption during the charging process.

step4: Press the start key of the motor to start running the motor;

step5: Press the mould-closing key to do the mould-closing motion until the end of mould

closure.

step6: Press the advancing key of the injection base to advance the injection base until the nozzle is in contact with the injection orifice of the mould.



notice:

For different plastic materials and moulds, the order of step5 and step6 can be inverted

Step7: Press the charge key, at which the screw rotates and gradually moves back to the set position. After that charge stops automatically. May also press charge key again to stop charging.

Step8: Press the injection key to start injection action and holding pressure action.

Step9: At the end of the holding pressure action release the injection key; press the charge key to next charging process.

Step10: After end of charging and sufficient time for cooling is estimated; press mould open key to open the mould.

Step11: After the mould-opening finishes conduct the eject action, open the safety door and take out the product.

Step12: Observe the quality of the product and carry out an adaptation setting of the relevant data.

Repeat step4 to step12 until qualified product is completed.

Step13: After acceptance or the qualified product, press the semi-or full automation mode keys to enter the full automatic work mode.

3.5 To stop the plastic injection

3.5.1 Press the heating switch before completion of molding or a temporary termination. And

turn off the heating system on the material barrel. Close the apron of the material hopper.



notice:

Don't turn off the heating system on the barrel if an only temporary short time stop.

3.5.2 To stop the injection at finishing of material or completion of work pieces or at necessity to turn off the heating system. If the injection machine is fitted with a temperature adjuster for adjusting the nozzle temperature, turn the adjuster to “0” position to disconnect it.

Not only to heat up the barrel as quickly as possible in next work, but also to prevent the molten resin from remaining in the barrel. It is necessary to clean the remaining materials off the heating barrel thoroughly (injection several times without mounting mould)

Clamping mould in the manual mode (do not use high pressure locking mould function) and move the injection base and screw to the STOP position, turn off the oil pump motor and main power switch of the plastic injection machine.

3.6 To remove the mould



notice:

Following operations must be done only in manual mode.

Step1: Start running the oil pump motor.

Step2: clamping the mould completely.

Step3: Turn off/stop the oil pump motor.

Step4: Open the safety door fit the mould with bolts and draw in the steel cable for lifting.



warning!

Shall assure of non-separation of the tow parts of the mould when open the injection machine.

Step5: Remove the entire clamping and connecting pipeline.

Step6: Start running the oil pump motor.

Step7: Press the mould-opening button to open the mould.

Step8: Switch off/stop the oil pump motor after completion of the mould opening.

Step9: Lift the mould out of the injection machine and place it in an appropriate position.

3.7 To remove the screw and the heating barrel

For re-assembling them, precede the steps for removal in reverse order and set up corresponding parts.

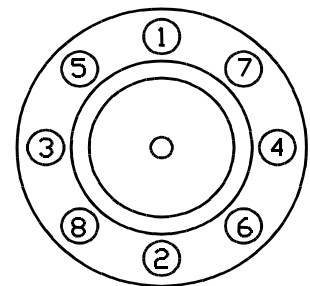


notice:

Although it is very easy for one or two persons to do this work and finish it very quickly, it is very essential for them always to warn each other of safety regulations during the assembling, removal and operating the injection machine.

Attentions for tightening the bolts on the material barrel:

- ▶ Must use grade 12.9 qualified bolt and cover the bolt surface heatproof grease.(for example:MoS2)
- ▶ Evenly tighten up the diagonal bolts. Tighten them for a few cycles each only following the order as shown in the right figure
- ▶ Use an appropriate torque wrench (torque value can be found in chapter 4.9.3.2)
- ▶ Tighten up all the bolts finally.
- ▶ Too tighten of the bolts may lead to damage on them. But too loosely may lead to leakage of material.



3.7.1 Before removal

Because of a high viscosity of PC and UPVC, these materials may stick to the screw and the

barrel when cooling down. Especially it will be very likely to destroy the metallic surface when stripping carelessly it. If these materials are used, it is necessary to clean the screw and barrel with PS, PE or other detergents prior to starting the work so as to simplify the cleaning and removal of the screw. (Injection without mounting mould several times)

Necessary materials apart from tools:

- (1) 4 or 5 wooden bars or steel rods (diameter<that of the screw) × (length<injection stroke).
- (2) 4 or 5 sections of square wood (100mm × 300mm).
- (3) Clamping tools
- (4) Waste wadding or ragged clothes.

3.7.2 To move the plastic injection unit aside (mini type machine is not apply)

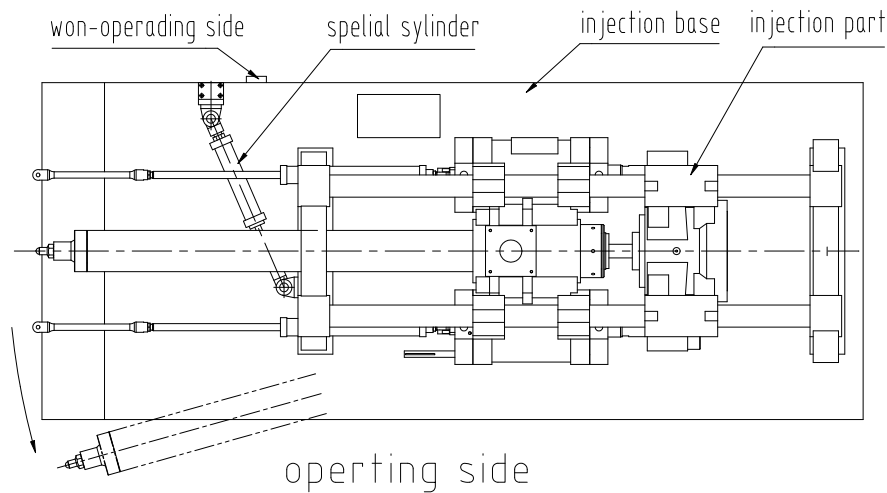
For large type machine

Step1: To move the injection unit backward until it cannot move any more.

Step2: Remove the bolt that restrains the sliding of the injection unit.

Step3: Dismantle straight pin which connecting carriage cylinder with screw barrel base and disconnect them.

Step4: Use special cylinder that mounted on the non-operating side to push the screw drive assembly rotating toward operating side until screw and barrel can withdraw freely. Pay attention to the hoses and wires not tensed too tight.



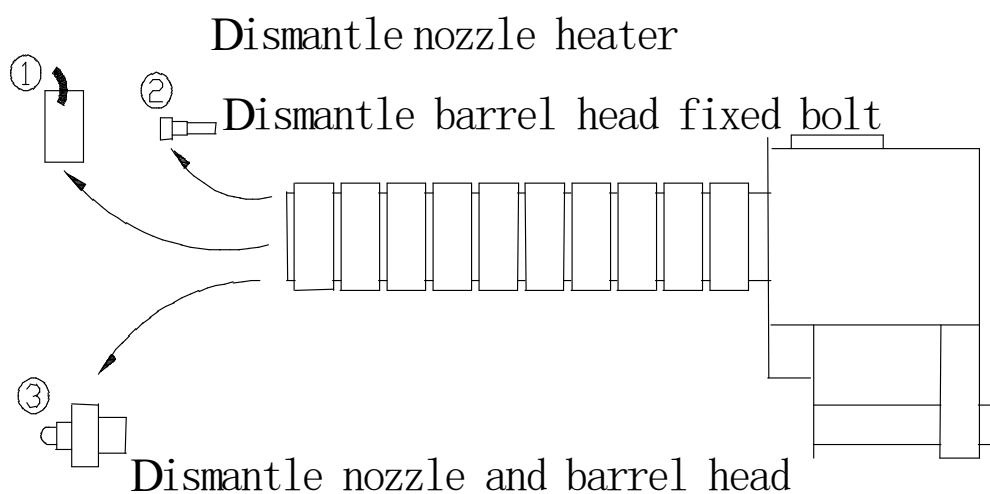
3.7.3 Remove relative parts

Step1: Regulate the temperature of the heating barrel in an approximation to the maximum value for the resin used; then turn off the power of the heater.

Step2: Regulate down the speed and pressure of injection; for the injection machines with multi-step control on the speed and pressure of injection it is necessary to regulate all the speeds and pressures of injection in approximation to 0.

Step3: Make the screw (injection piston) return at full stroke and let it stop there

Step4: Remove the barrel end cap and nozzle (numbers in circles indicate the order of removal).

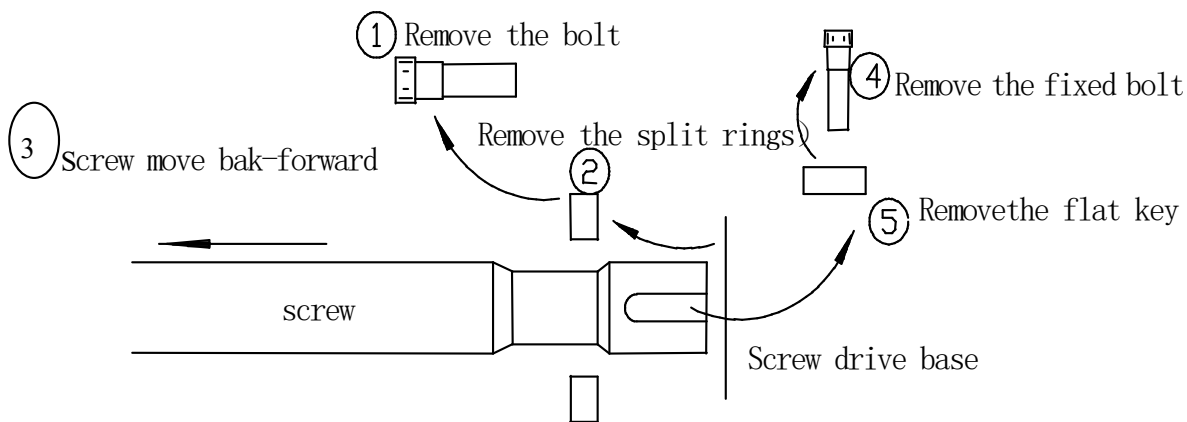




notice:

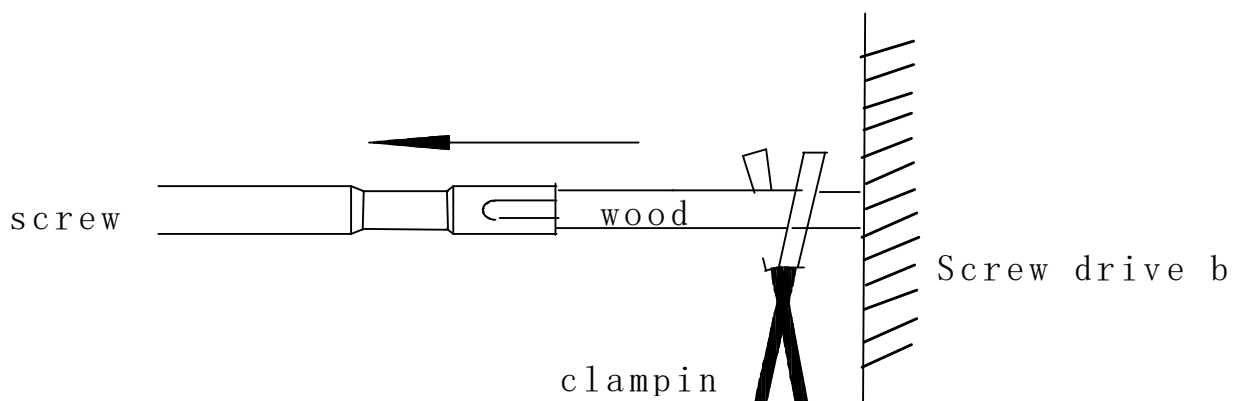
Shall remove down the nozzle first when the nozzle needs cleaning.

Step5: Proceed the removal of other connecting parts of the screw according to the order shown in the figure. Place the bolt for screw fixed ring separation from other bolts to avoid confusion.



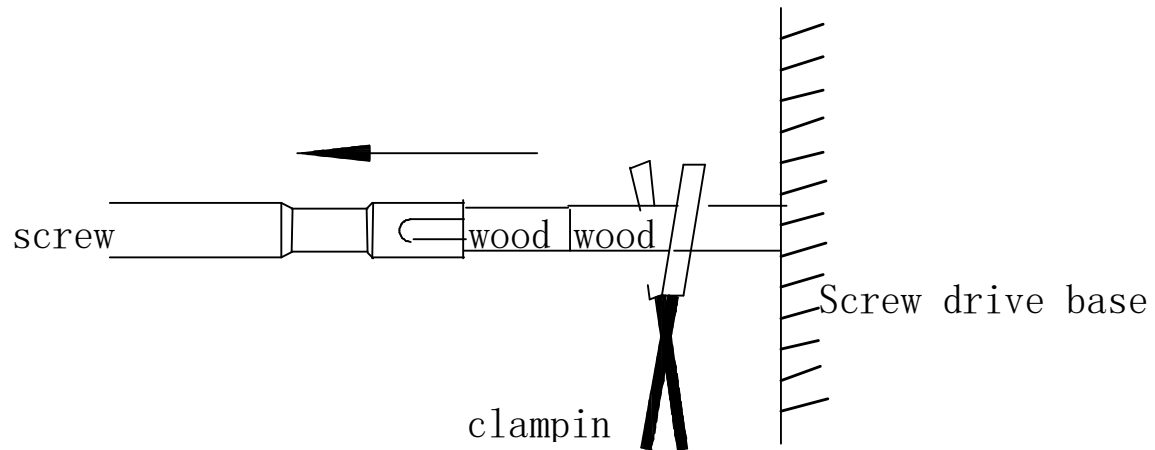
3.7.4 Removing the screw (with assurance of already down-adjusted speed and pressure of injection)

Step1: Put a section of wood on the end of the injection screw (see the sketch); support the wood with clamping/jig instead of hands



Step2: Move the screw forward; at the same time remove the clamping.

Step3: Press “suck back” key to make the screw drive base retracted fully after screw traveling forward to end.



Step4: Wad another wood; repeat step1 to step3, it is possible to remove screw by hand.



warning!

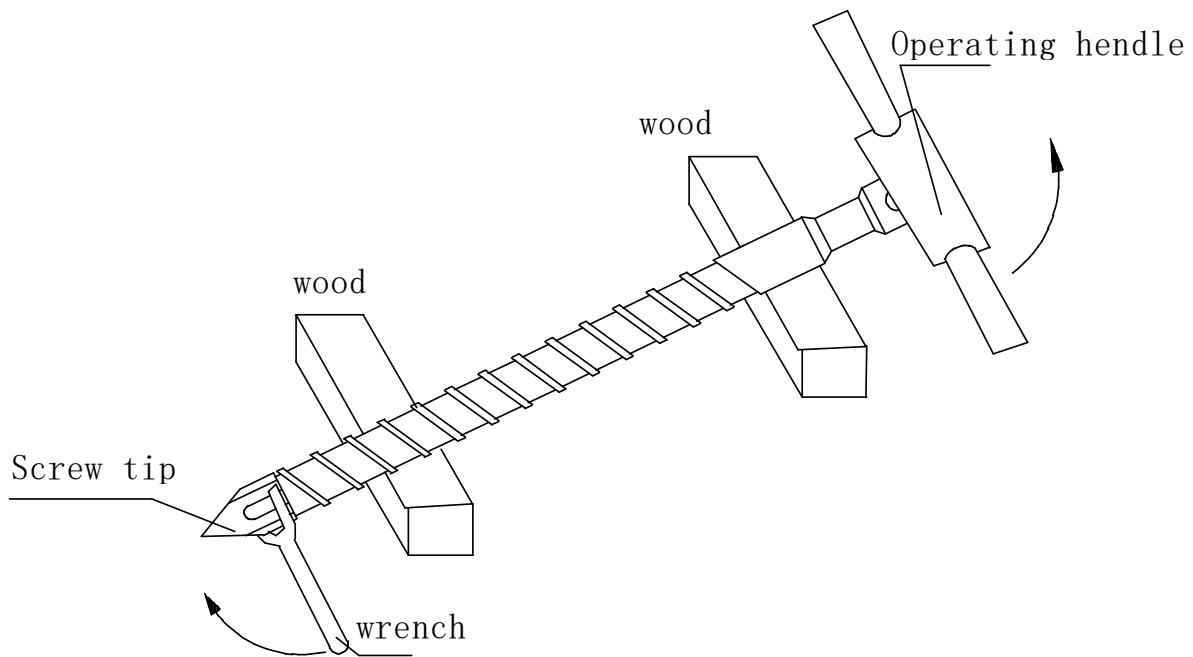
The screw is still over-heated; don't take the screw with bare hands. Large screw must be suspended by hook when the screw is pushed about its 1/2 length.

Step5: Place the screw on a piece of wood or wooden rack to avoid being bended. It is best to hang vertical if it need storage for a long time.

3.7.5 Removing the screw tip (this paragraph is for reference only)

Fit the slotted part of the screw with the screw handle, hole the screw tip with special spanner, and turn it in the direction shown in the sketch to separate it from the screw.

Note: The screw tip is in turn-to-left thread.

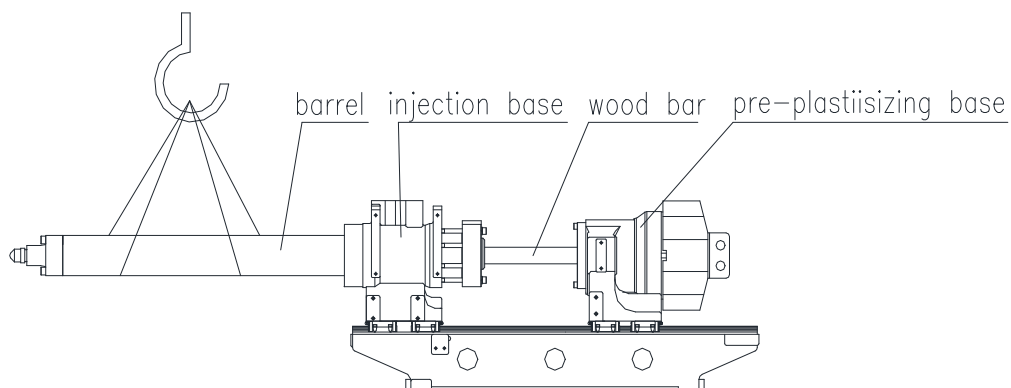


3.7.6 Removing the heating barrel

Step1: Remove the entire heating band off the barrel (also remove their frame if necessary)

Step2: Remove the barrel-fixture bolts:

Step3: Lift up the barrel in suspension for time being as shown in the figure



Step4: Press screw ret key to make screw drive base retract to end position.

Step5: Insert a wooden bar between the screw drive base and the end of barrel. Remember to use pliers for clamping the wood instead of using the hands only. Shown in the sketch.

Step6: Assure to have the speed and pressure of injection regulated down, then do injection motion to push the barrel go ahead.

Step7: After the barrel goes forward full stroke, do injection ret motion to make screw drive base ret to end position again.

Step8: Repeat step5-step7.

Step9: Lifting height should be adjusted when barrel be pushed about 50 percent from screw barrel base.

Step10: Repeat step5-step7. Disconnect the heating barrel fully from the screw drive unit.



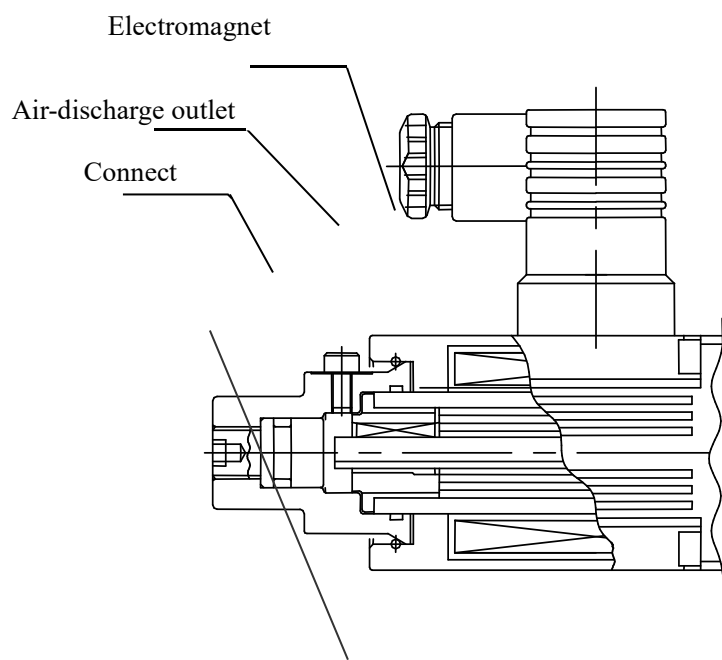
notice!

Remember the heating barrel do not cool after barrel full separated from screw drive unit.

3.8 To discharge air from the proportional valve.

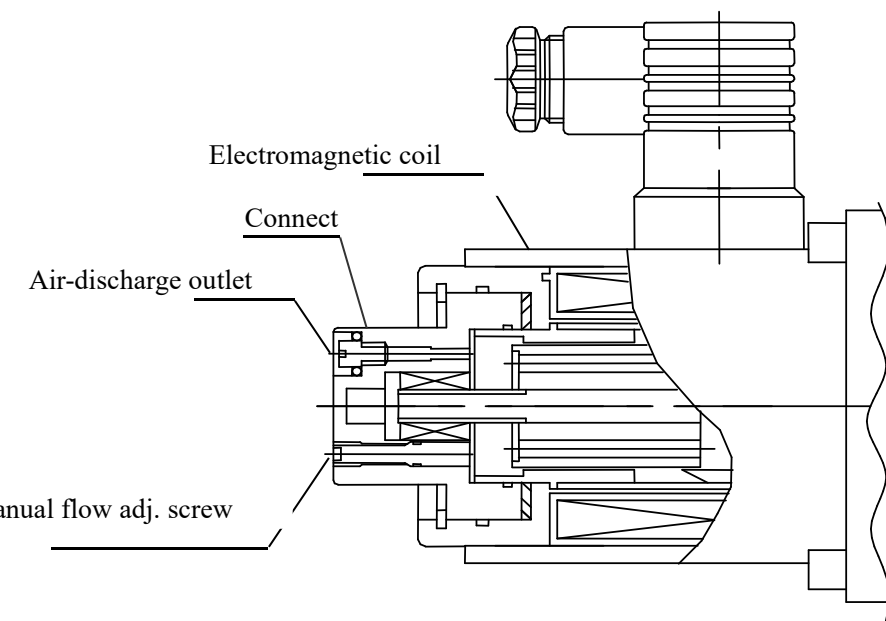
When the pressure system is not stable, there may like be air inside it. In that case it is necessary to discharge the air to keep the pressure stable. (This is seen always with new machine at the beginning of use.) for this purpose concrete procedure goes as follows:

First set up the pressure and flow of core at 15 respectively, do core motion to loose the air-discharge outlet gradually until the pressure doesn't cause trembling any more. Tighten the screw at the air outlet and see if the pressure system has become stable. If not yet, repeat this operation again until normality is attained. After that restore originally set values of the core pressure and flow. The air-discharge outlet is located at the end of the coil of the proportional valve. For the details see the following figure:



Manual pressure adj.screw or
manual flow adj. screw

10 Ω series electromagnet



40 Ω series Electromagnet

Chapter 4 maintenance

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4.1 maintenances scheme

inspection cycle	maintenances	Chapter no.
The screen indicated “filter error” when filter net was blocked	Replacing the oil condenser	4.6
Every 500 running hours	Inspect the oil volume by the meter	1.6
Every six months; every one month in case of poor water quality	Inspect and clean the condenser	4.5
The first 1000 running hours	Replacing or cleaning oil condenser	4.6
Every 2000 running hour	Replacing the filtrate net of the oil condenser	4.7
Within 2000 running hour	Replacing bypass-filter	-
Every 5000 running hours or within one year	Replacing hydraulic oil	4.6
	Replacing and purging the condenser	4.6

	Inspect high-press soft pipe	4.8
	Inspect electric equipments	-
Every 20000 running hour or at least 5 years	Replacing seal rings and piston rings	-
	Replacing high-press pipes	4.8
every three years	Replacing battery of the controller	-
every five years	Replacing battery in the control panel	-



notice !

Replace all the high-press pipes every 5 years to resist dangerous owing to speed up aging reasons.

4.2 Lubrication oil and hydraulic oil

The following lubricant oil is recommended:

Lubricant	Classification	Remark
hydraulic oil	viscosity: 68CST/40°C Mobil DTE26 、 Shell Tellus Oil 68 、 shuanghai68 oil	For the whole system used in cylinder, high-press pipes...ect.
Lubricating grease	No.150 EP gear oil (prior to use) No.68 anti-wearable lubrication	For relative point on clamping unit of thin oil lubrication machine type and moving, platen and screw drive base lubrication of large machine type
Special grease	LIFP00 No.1 lubrication No.3 lubrication	For relative point on injection and clamping unit of grease lubrication machine type

note: specification with lubrication, refer to page 4-5



notice: Conduct periodical check on lubricating condition to keep proper oil level in the tank. If find

lubricate out of order, be sure to lubricate in time and inspect each lubricated point for a good condition; conduct proper flux and temperature of the cooling water to retain the floating of system oil ,the data should be within $45\pm 5^{\circ}\text{C}$



notice:

Any refit in hydraulic components should be cleanout thoroughly when they are assembled (core or nozzle ect.) These oil consuming devices, in any case, cannot affect the quality-standard of oil specification which should be audited strictly according to the NAS 1638(level 7 to level 9).Inpouring through a Proper filter if the hydraulic oil was slightly pollution.



warning:

Do not conduct direct contact with the oil which contains some ingredients harmful to human.

ation and maintenance

The machine is equipped with lubrication distribution in movable parts to ensure working order of machine (referring to lubrication diagrams), especially for clamping system. Steel bushing lubrication is used in this machine; the following contents will introduce the lubrication of the clamping system.

4.3.1 Composition and characteristics of lubrication system:

Lubrication system consists of lubrication pump, lubrication pipeline and lubrication distribution. The oil, flowing to distributors through the pump, reaches each grease point so as to lubricate each moving part of the machine. The system performs under computer control. The computer monitors the pressure relay to control lubrication of the system. When the tank is short of oil, leaking, or there happens the blocked filter of inadequate pressure, the computer may alarm. Please check to find reasons and supply grease or repair in time to ensure proper lubrication.

4.3.2 Attentions for lubrication

Please refer to the instruction manual for the oil recommended to the system.

Principles of lubrication

(1) For injection molding machine with fixed-damping lubrication

The machine is equipped with damping distributor. When the pump runs, lubrication oil from pump to the pipeline accumulates under the action of the damping gear, reaching the set value of pressure by the relay. When it exceeds the damping differential pressure, the oil will get over

the damping before flowing to each grease point till terminative time. Because the variable damping gear ensure distribution according to need, damping-type distributor ensures that the oil may evenly flow to grease points. If the oil fails to reach the set value of pressure by the relay, the machine will alarm that the system has trouble for servicing.

(2) For injection molding machine with pressurized lubrication

The machine is equipped with pressurized distributor. When the pump runs, the pump pressurizes each distributor, making the oil flow to each lubricated point for a smooth lubrication. When the oil pipeline achieves the set value of pressure by the relay within lubrication time, the pump stops running, the computer begins delayed lubrication timing, and distributors relieve pressure with automatic replenishment from the pipeline. After the timing is finished, the pump restarts in this way till the total lubrication time is over. The variable capacity of distributor ensures distribution according to need. When the pressure of pipeline within lubrication time (Here “lubrication time” refers to lubrication alarming time). Fails to reach the set value by the relay, the machine may alarm that the system has troubles for servicing.

4.3.3 Maintenance of lubricating system



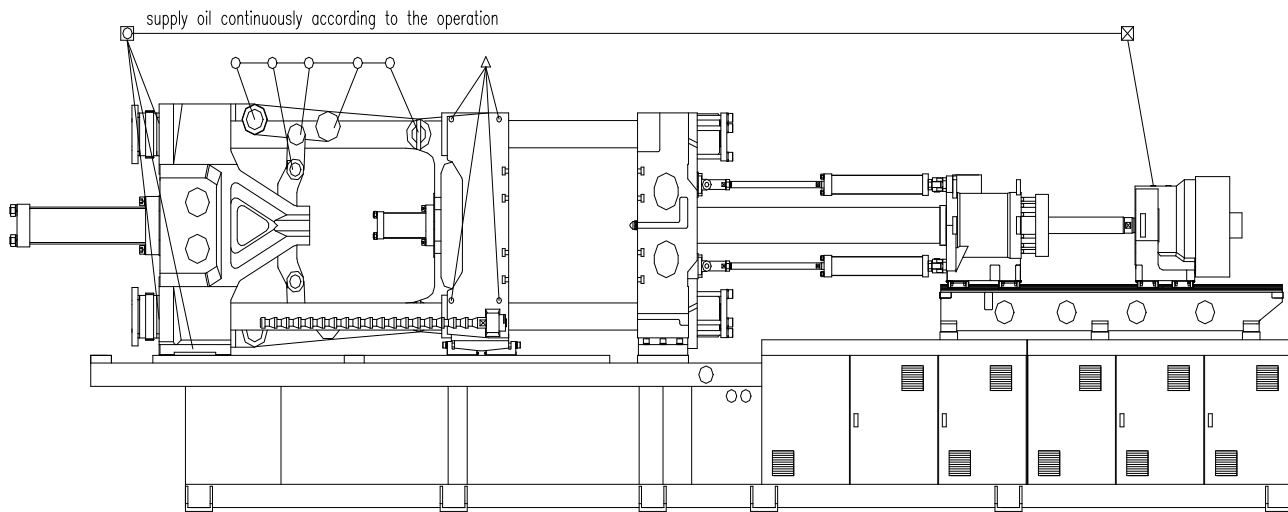
notice:

Do not use grease contaminated by moisture, vapor, dust or sunlight.

4.3.31 It is necessary to check periodically if each grease point is normal. Please note that lubrication time is adequate to ensure well lubricated at each grease point of the whole system. Since the lubricating intervals and lubrication time are functioned through the reasonable data set-up by the computer, casual modification of relevant lubrication data set-up is not encouraging. (The machine has been set up reasonably before shipment, customers may, however, make some changes according to the actual conditions. Generally, the new machine can be set less within 6 months, large machine set less as well). For machines with pressurized lubrication, the lubrication time is actually alarming time. It is recommended that every lubrication should be set a little longer to have enough time for pressurizing the relay, thus mal-alarming due to short time is evitable.

4.3.32 Conduct periodical check on lubricating condition to keep proper oil level in the tank. If find lubricate out of order, be sure to lubricate in time and inspect each lubricated point for a good condition,

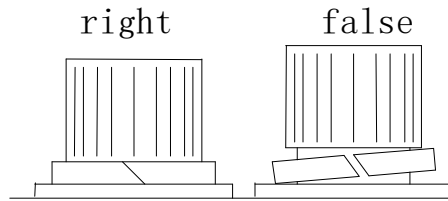
Lubrication diagraph



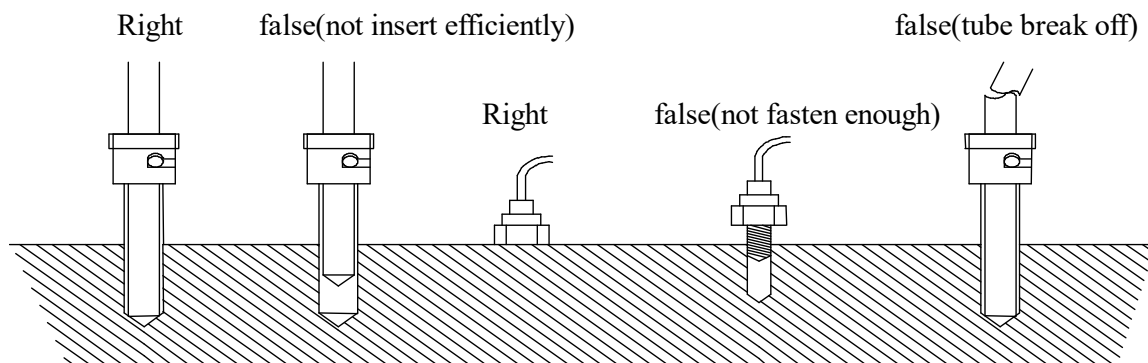
- ⊗ 3# grease is recommend
- △ Grease lubrication type: LIEP00# Grease for small machines, supplied by machine auto lubricating system
150#EP gear oil or 68# anti-wear hydraulic oil larger machines, supplied by moving platen auto lubricating system
- △ Thin oil lubricating type: 150#EP gear oil or 68#anti-wear hydraulic oil for small machines, supplied by machine auto lubricating system .
- ⊗ 1# grease is recommend
- △ Grease lubrication type: We recommend 150#Ep gear oil or 68#anti-wear hydraulic oil for large machines, supplied by moving platen auto lubricating system
- △ Thin oil lubricating type: 150#EP gear oil or 68#anti-wear hydraulic oil for small machines, supplied by machine auto lubricating system . 150#Ep gear oil or 68#anti-wear hydraulic oil for large machines, supplied by moving platen auto lubricating system

4.4 daily checkage

4.4.1 fasten in time if there's anything loose(especially in mould and other movable component)



4.4.2 make sure the thermocouple is fixed up. (the thermocouple system used according to the diversification of different models of the machine)



4.4.3 Inspect circuit of heater and temp rising time till it reaches the data prior to avoid danger by incorrect conduct of barrel heating, thermocouple and contactor fuse.

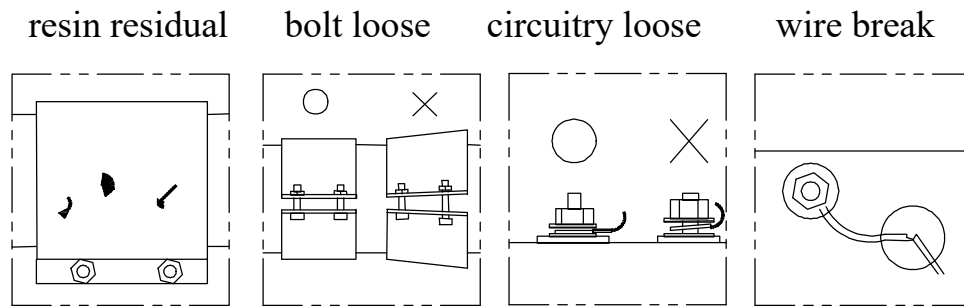
4.4.4 inspect movable guarding and other stroke switch (hydraulic system, electric system, mechanical system)

4.4.5 Inspect the water flux of oil condenser to obviate leakage

4.4.6 Assure sufficient lubrication on each moving surface ,refit it if necessary.

4.4.7 inspect connection of hydraulic devices to obviate leaking; check the motor, pump, hydraulic motor ,heater and mechanical device to see if there is loud noise during operation.

4.4.8 surface status of heaters



It is good to keep the whole machine clean

4.5 condenser

Oil condenser exchange the heat through high-temp oil and low-temp water to lower the system temperature.

4.5.1 structure of condenser

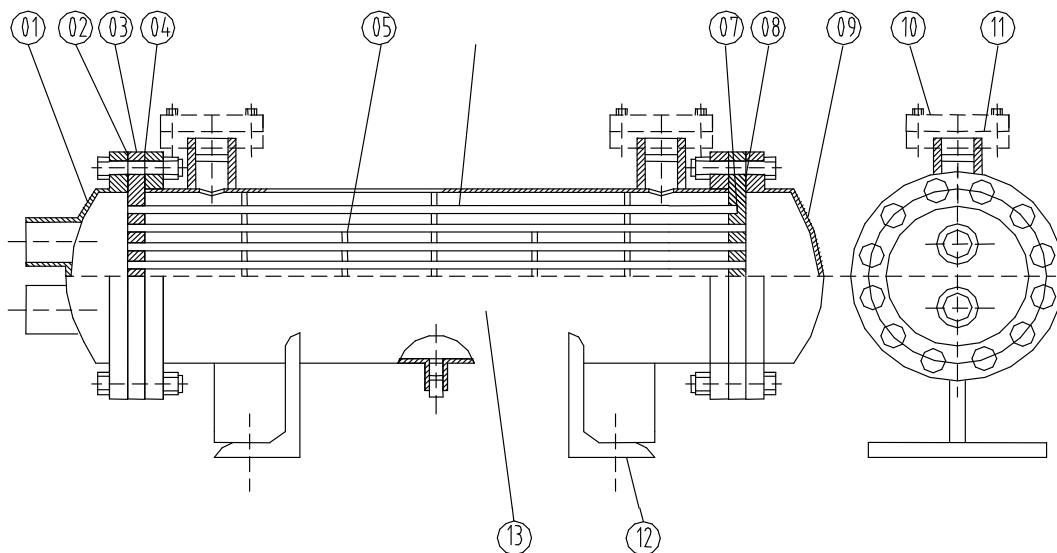


Figure1

01-water-in cover 02-seal ring 03-fixed block 04-seal washer 05-distribution board 06-heat exchange tube 07-movable platen 08-"o" ring 09-water-back cover 10-flangers 11-seal washer 12-base 13-frame

4.5.2 Attention for operation the condenser



notice:

Do not overload the condenser (pressure and temperature) to the specification marked beforehand.

The only medium for cooling we recommend is fresh water unless specific liquid.

standard of fresh water

item	unit	Cooling water	reinforce water
PH (25°)		6.5-8.0	6.0-8.0
Conductivity (25°)	μ S/m	<800	<200
CaCO ₃	mg/l	<200	<50
CaCO ₃	mg/l	<100	<50
Cl ⁻	mg/l	<200	<50
SO ₄ ²⁻	mg/l	<200	<50
Fe	mg/l	<1.0	<0.3
SiO ₂	mg/l	<50	<30
S ²⁻	mg/l	0	0
NH ₄ ⁺	mg/l	<1.0	<0.2

4.5.3 inspection, maintenance and purging of the condenser

4.5.3.1 inspection of the condenser

Dismantle and inspect according with the requirement in section 4.5.4.1:

- 1) Check the condenser both inside and outside to see if the spare parts are rusted
- 2) Check the seal rings to see if it is damaged
- 3) Check if there's impurity in the condenser

Remove the condenser from the machine ,thus convenient for inspection. Check the water supply every 6 months with common water while industrial water and underground water should be checked every one month. The inspection is subject to alteration according to the actual status.

4.5.3.2 maintenance of the condenser



notice:

Discharge the cooling water from the condenser after long-time break, the water will freeze under low-temp.

4.5.3.3 clean the condenser

Disassemble the tube cap both-sides to check whether there's any impurity which will impair the function of the condenser.

For inter-layers which are difficult to clean , alkalescent detergent can be used to clean the main body and conducting tubes until they are clean.



notice:

Do not remain any detergent inside the condenser.

4.5.4 disassemble and assemble sketch

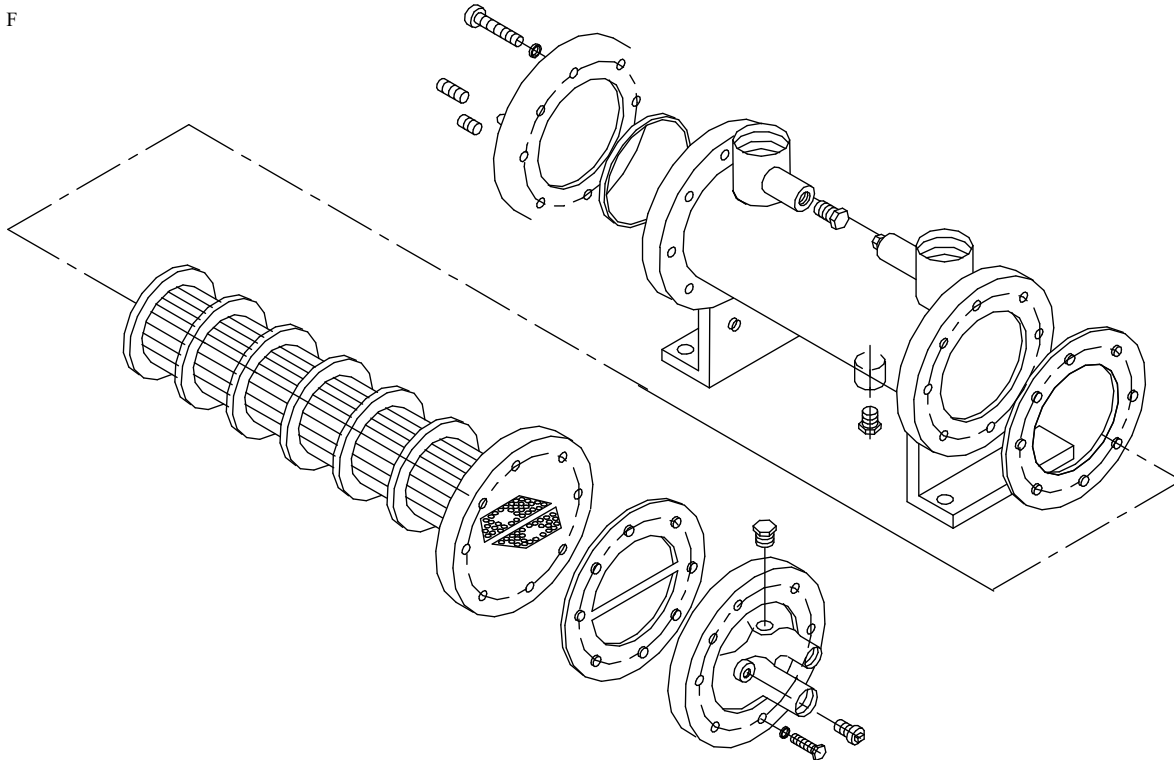


Figure 2 disassemble and assemble sketch

4.5.4.1 disassemble

The procedure of disassemble the condenser(refer to figure 2)

- 1) Closedown the input and output of the condenser.
- 2) discharge the water and oil thoroughly inside the condenser and the tube connected to the condenser
- 3) dismantle the other parts connected to the condenser
- 4) mark the spare parts for assemble

- 5) take “o” ring out from the back cover.
- 6) remove the intake cover for seal washer;
- 7) Take out the cooling tube from the body.

4.5.4.2 assemble the condenser



notice:

the procedure of assemble is opposite of disassemble。



notice:

Wipe off the chemical remained and dry inter-layer of condenser before reassemble

4.6 oil filter

The filter installed aside the oil tank is especially for oil filtering. The instruction below is recommend for replacing the filter core.

4.6.1 disassemble

Dismantle the cover and release the fully .Pull out the core and separate the magnet piece.

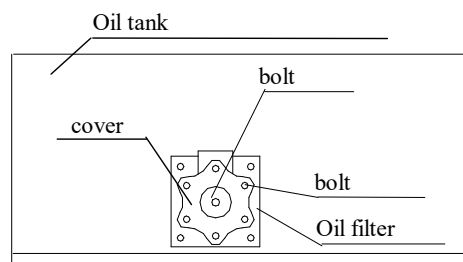
4.6.2 cleaning

Wipe off all the dust stick to the filar

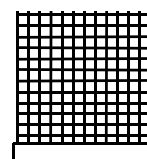
metal by gasoline and remove all the

metal from the magnetic blocks. Blow from the inside

by compressor.



bolt
core with



method

cleaning

Blow away the dust by compressor from the inside.

4.6.3 assemble

Put the core inside the filter, then screw the bolts

4.6.4 notice

- (1) Must not drive the hydraulic motor without the oil filter.
- (2) Use an appropriate force of the compressor when blowing
- (3) Replacing the filter in case of any damage of filter metal.
- (4) Take care of the filter metal during assemble and disassemble.
- (5) Check to see if the bolts are screwed tight before driving the motor.
- (6) Before electric loading, it is better to make an empty drive for the oil pump for about 10 minutes after installing the filter

4.6.5 procedure of replacing the hydraulic oil

Release the discharging bolt at the bottom of the oil tank to discharge the residual oil



notice:

Empty all the oil in the oil tank, condenser and pipeline. Mixed oil will speed the aging of fresh oil.

Dismantle the oil tank and clean it, refer to chapter 4.6.2

Replace a new or clean filter, fasten the discharging bolt and recover it, fill in the hydraulic oil to ordered in chapter 1.6

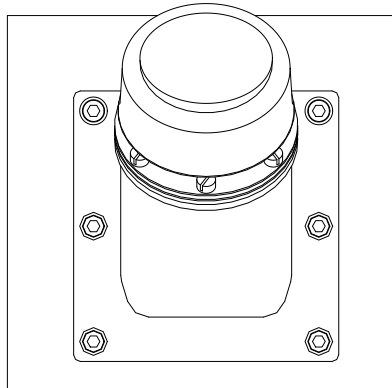


notice:

pollution restrictions: Properly dispose of used oil. Return the used oil and filter to the supply. Oil filter can be recycled.

4.7 air filter

Release the cap and insert the core inside the air cleaner and screw the cap tight when cleaning.



notice:

The air filter is a very important component conduct strictly maintenance

Screw the cap tight to avoid of spurting

The air filter should be fixed firmly before operation

The core can not be recycled

Contact with company after-sales service department for replacing new core.

4.8 inspection of the pipeline

Set a plan to maintain the pipeline according to chapter4.1

Conduct Pipeline tests to avoid the following situation, in any conditions for the replacement according to the table in chapter4.1

- Surface and inner cracks (Friction marks, racks, cutting marks)
- The tube is crisp.
- Distortion of the tube and pipeline
- Crack
- Tube escaped.
- The ringer is damaged by rusting
- maximum allowable storage time exceeded (refer to chapter4.1)。



notice:

pay attention to the storage time which can not exceeded 2 years after manufacturing.



warning!

Do use new tube.

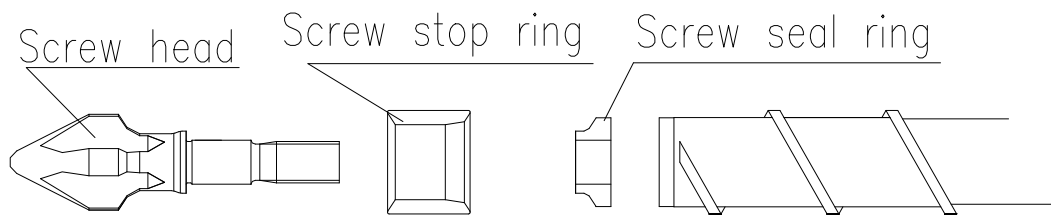
4.9 inspection and cleaning of screw and

remove the screw ,clean and check it if necessary .

4.9.1 cleaning and inspection of screw

4.9.1.1 cleaning of screw

- (1) Wipe off most of the remaining resin by layers-rags



- (2) Heat the screw for a while which is easier for cleaning the sediments
- (3) clean the screw head and other rings by the same way above
- (4) Wipe away the waste oil with apyrous liquor after the screw cooled



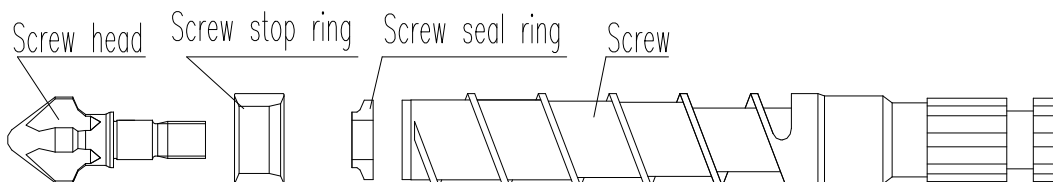
notice:

avoid of attrition during cleaning.

Before installation, Lubricate evenly on the screw thread with SiO_2 grease.

Don't have direct contact with fog for protection

4.9.1.2 screw inspection



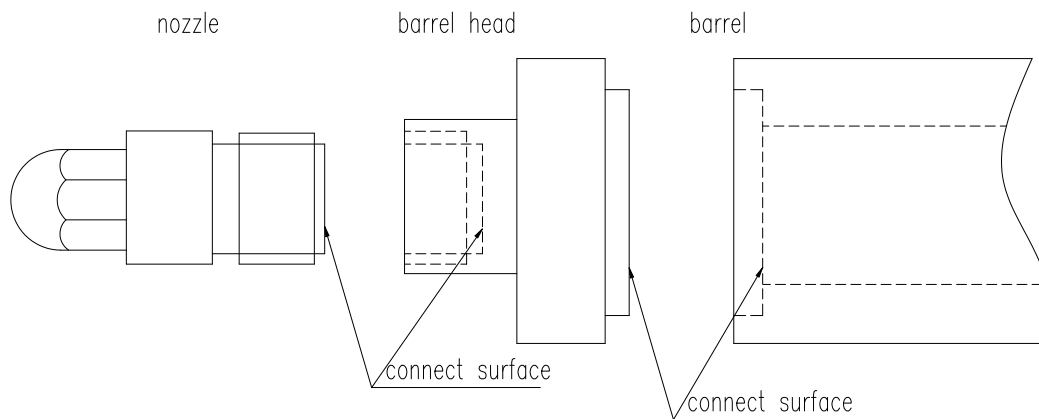
- (1) Check surface
- (2) Check the plating-layer
- (3) Check the screw thread
- (4) Check the screw stop ring and screw seal ring. the products will be spoiled if there's

anything wrong with it.

4.9.2 cleaning and inspection of barrel

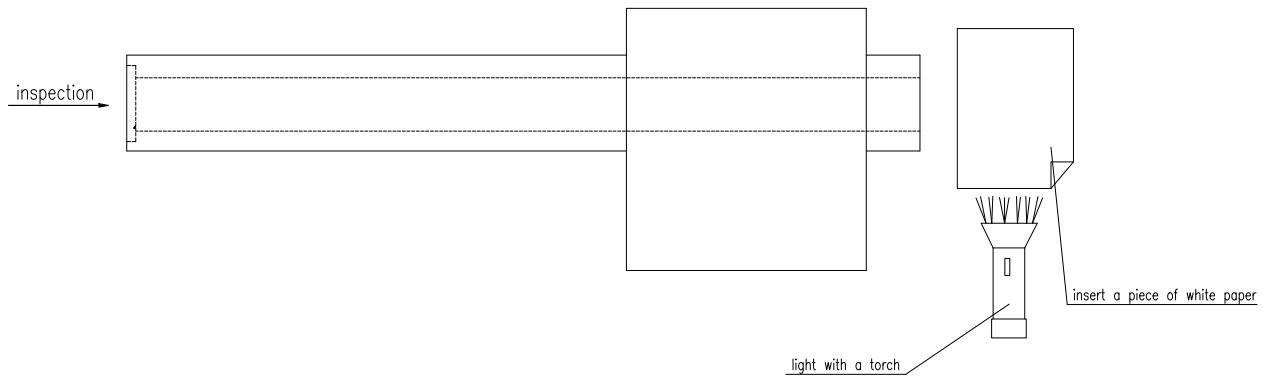
4.9.2.1 cleaning

- (1) get rid of the residual resin inside the barrel
- (2) Clean with wood stick or bamboo which is wrapped with cloth.
- (3) Clean the barrel head and nozzle, especially the connection surface which is important for airproof.



notice: be careful , surface scrape will lead to resin leakage.

- (4) when reducing the temperature of barrel to 30~50℃, Clean the inner-layer of barrel with layers-rags which was wet by impregnant
- (5) inspect the inner-layer of the barrel



4.9.2.2 inspect the inner-layer to check if there's any fray

4.9.3 assemble screw and barrel

4.9.3.1 the procedure of install the screw head

Step 1: put the screw on the two wooden piece, Fit the slotted part of the screw with the screw handle,

Step 2: cover the bolt with heatproof grease.(for example:MoS2)

Step 3: clean screw stop ring ,screw seal ring and assemble them according the sketch

Step 4: Use an appropriate torque wrench, assemble according chapter 3.7.5

4.9.3.2 installation of nozzle and barrel head

Step 1: Hoist the plasticizing device and cleanout

Step 2: Push the plasticizing device into the barrel softly

Step 3: Take aim of the two holes, tap with Copper stick until a tight.

Step 4: Fix up the barrel bolt according to the figure and follow step (1)to(5)

Step 5: Lubricate evenly on the nozzle thread with SiO₂ grease

Step 6: Screw the nozzle into the hole of barrel head, make sure it is sufficiently assembled.



warning!

Screw the bolts when the barrel, barrel head and bolt are under the same temp.

torque value

12.9 bolt diameter (mm)	Screw force (N.M)
10	80
12	150
14	240
16	370
18	530
20	720
22	910
24	1100
27	1580
30	2140
36	3740

4.10 adjust the bearing of the moving platen

The bearing is an auxiliary equipment for holding the weight of platen molds and keep the tie-bar working straightly. Adjust the bearings either too tight or too loosely . The bearings are adjusted to its optimization before sell to the customers. One does not need to reset it until necessary.

4.10.1

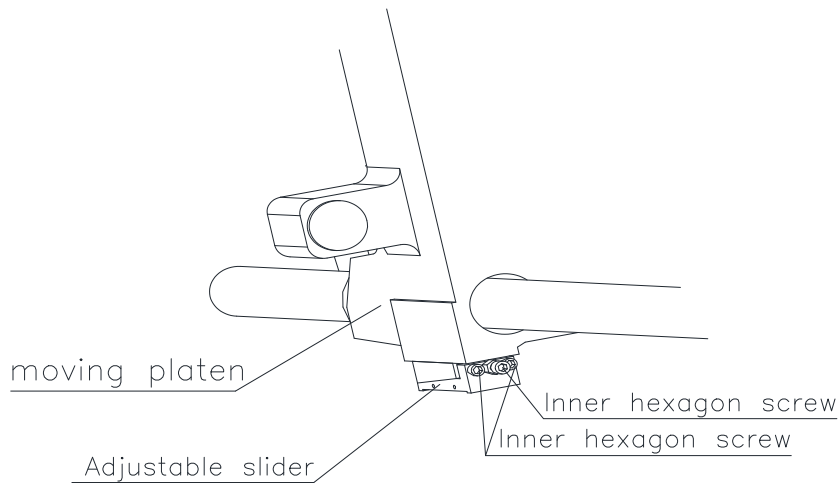


Figure1

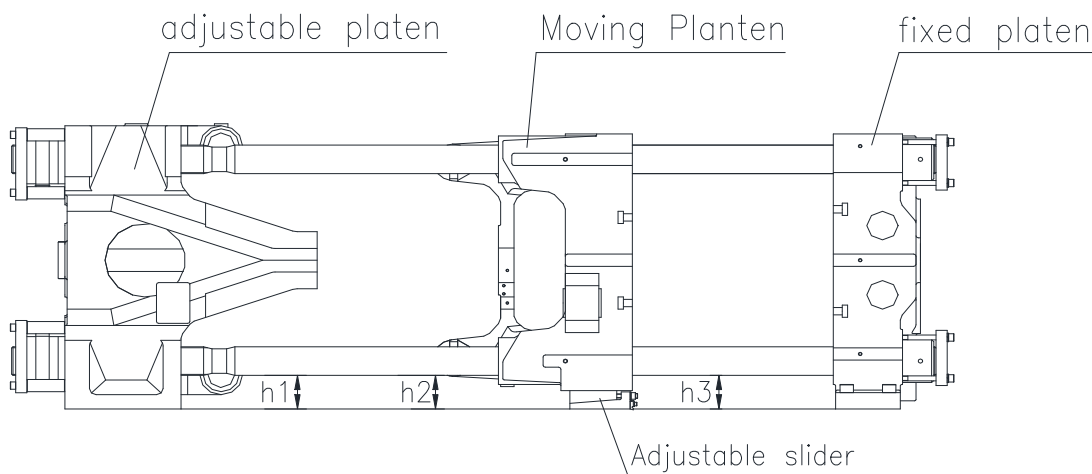


Figure2

Adjust the horizon dial of clamping part first, unload the mould and clamp the moving platen up to its max. Loose the inner hexagon screw of adjustable slider by wrench (refer to figure 1)

Measure $h1=h2=h3=h4=h5=h6$ and screw the bolts tightly($h1 h2 h3$ is operating side while $h4 h5h6$ is un-operating side, refer to figure 2) 。 Adjust till the machine reach best situation, recover the bearing cover.

Load the mould and try again until it is in the best position. In order to safeguard the machine ,it is essential to check the bolt and adjust it.

4.11 plastic temperature setting

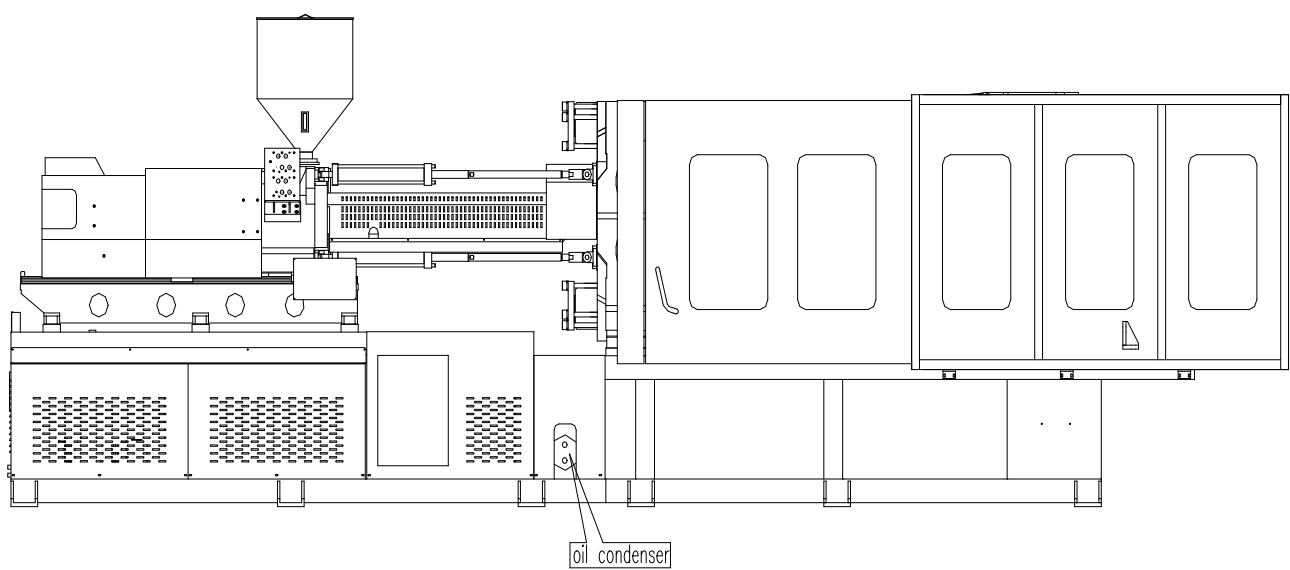
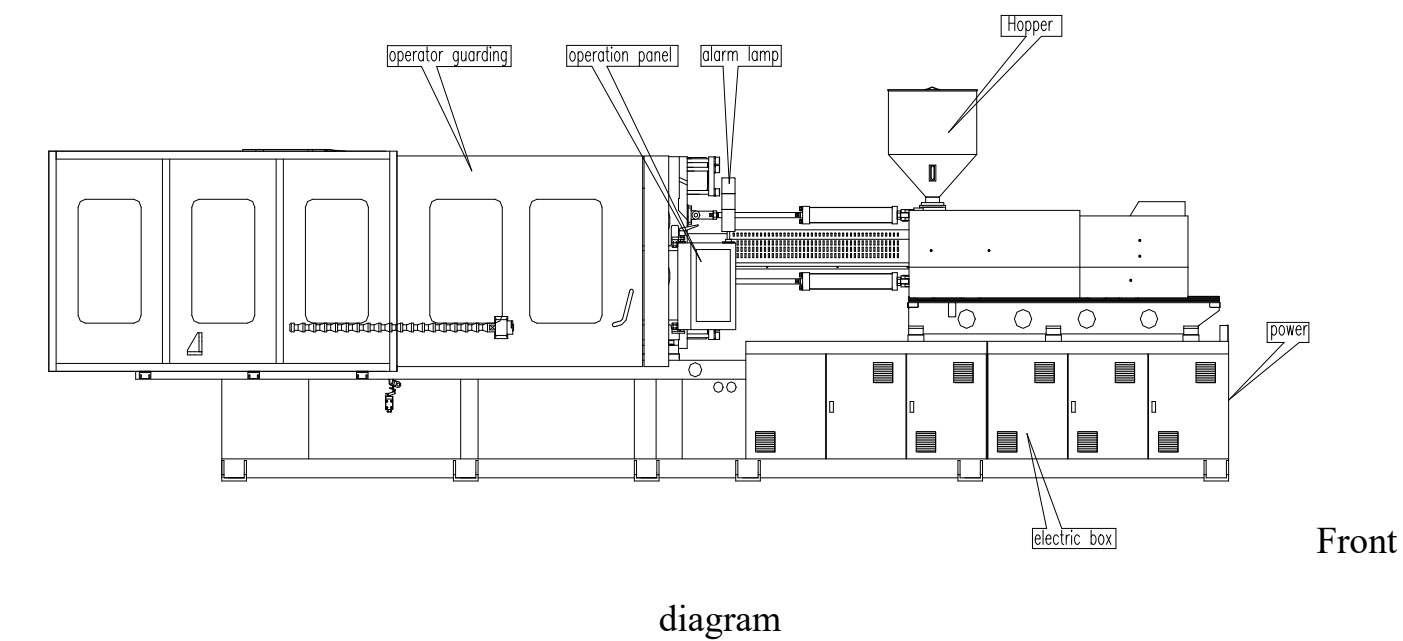
Here's barrel temp setting with different plastic characteristics. The parameter below is subject to alteration according to the experience of professional users.

classify	density	Melting point	constriction rate(%)	Mould temp.	Temperature of barrel		
					nozzle	Mid-stage	backward
PS	1.05	130~165	0.4	10-75	180-260	200-260	160-250
HIPS	1.04~1.06	130~165	0.4	5-75	220-270	190-260	160-250
ABS	1.06~1.1	130~160	0.6	50-80	190-250	180-240	170-240
LDPE	0.91~0.93	108~126	1.5-5	35-60	230-310	220-300	170-220
HDPE	0.94~0.97	126~137	2.0-5	35-60	230-310	220-300	170-220
PP	0.95	160~176	1-2.5	50-80	210-300	180-260	160-240
PVC	1.35	160~212	0.1-0.5	10-60	170-220	160-195	150-195
PMMA	1.18	160~210	0.5	50-90	180-230	160-240	140-220
PA6	1.13	210~215	0.8-1.5	50-80	210-230	210-230	200-210
PA66	1.14	250~265	2.25	50-80	250-280	240-280	220-280
CA	1.3	69~105	0.5	40-75	180-200	170-190	150-180
PC	1.2	215~265	0.8	80-99	250-320	260-340	280-350
POM	1.41~1.42	165~175	2.0	50-90	190-210	175-220	160-210

Chapter 5 technical parameter and diagram

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5.3	Mould installation parameter.....	5-4
5.4	Dimension and installation diagram.....	5-5

5.1 shape diagram

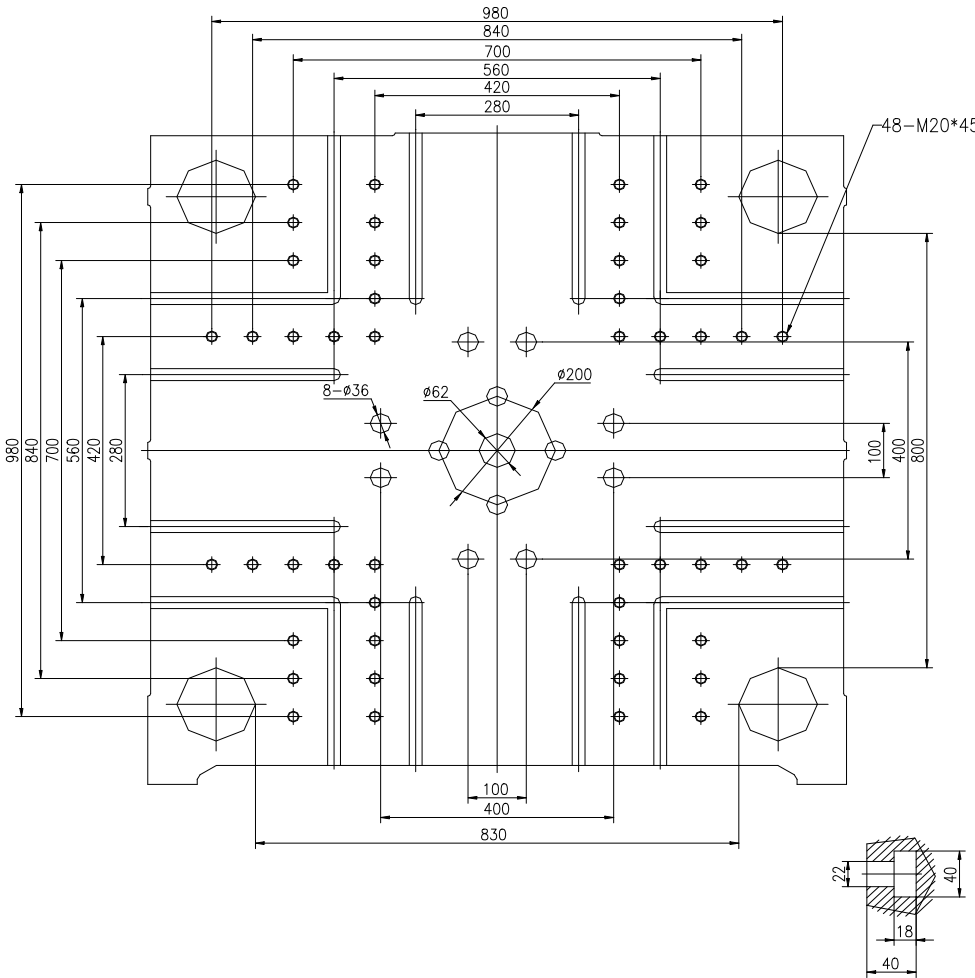
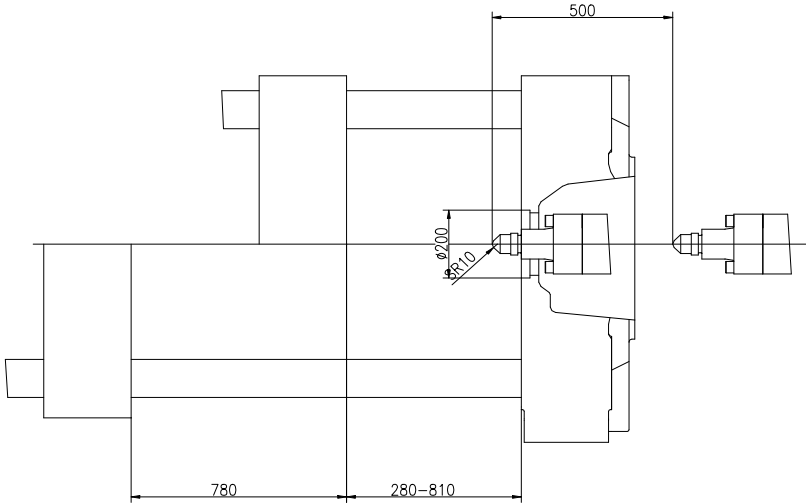


note: machine shape as diagram indication above is subject to the actual confirm

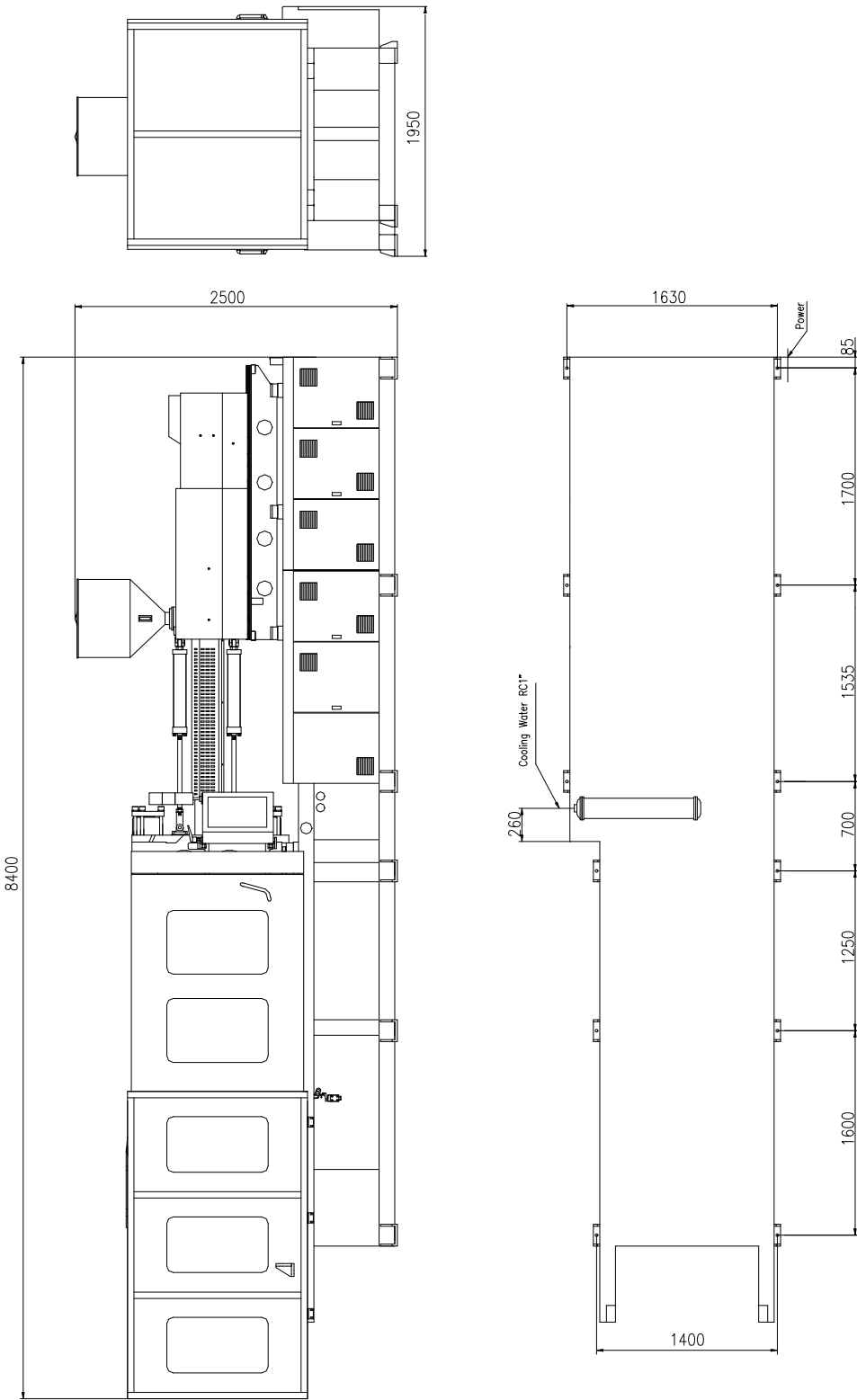
5.2 major technical parameter

Item	Unit	A	B	C
Screw diameter	mm	80	85	90
Screw L/D ratio	L/D	23.3	22	20.7
Shot size(Theoretical)	cm ³	2136	2412	2704
Injection weight(Max)	g	1965	2219	2487
Injection pressure(Max)	MPa	184	163	145
Screw rotaty speed	r/min	0-113		
Heating power	KW	35		
Injector stroke	mm	425		
Clamping force	KN	5000		
Space between tie-bar(H×V)	mm	830×800		
Min mold height	mm	300		
Max mold height	mm	810		
Toggle stroke	mm	780		
mold platen open stroke(MAX)	mm	1590		
Ejector forward force	KN	13.9		
Ejector stroke	mm	230		
Number of ejector post	Pc	13		
Max oil pump pressure	MPa	16		
Power of oil pump motor	KW	45		
Dimension(L×W×H)	m	8.4×1.95×2.5		
Weight	t	18		
Oil tank capacity	L	880		

5.3mould installation diagram

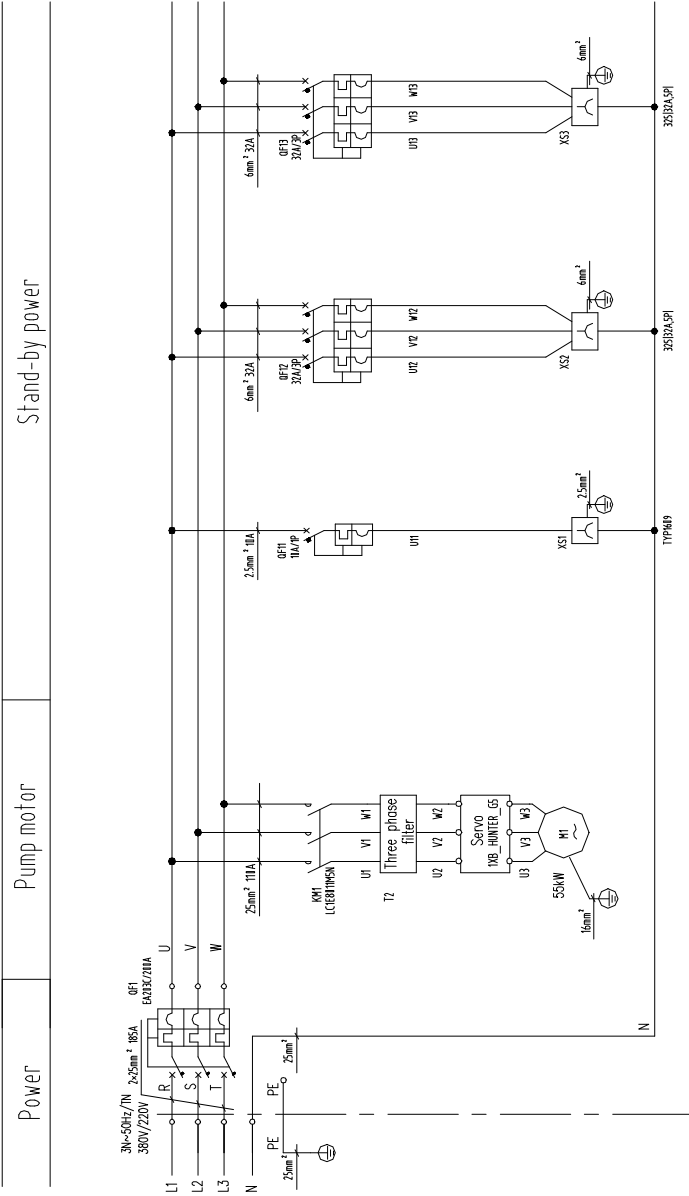


5.4 machine dimension and installation diagram



Chapter 6 Electrical system

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6.1 The Main Electric circuit Diagram

Heater

VI

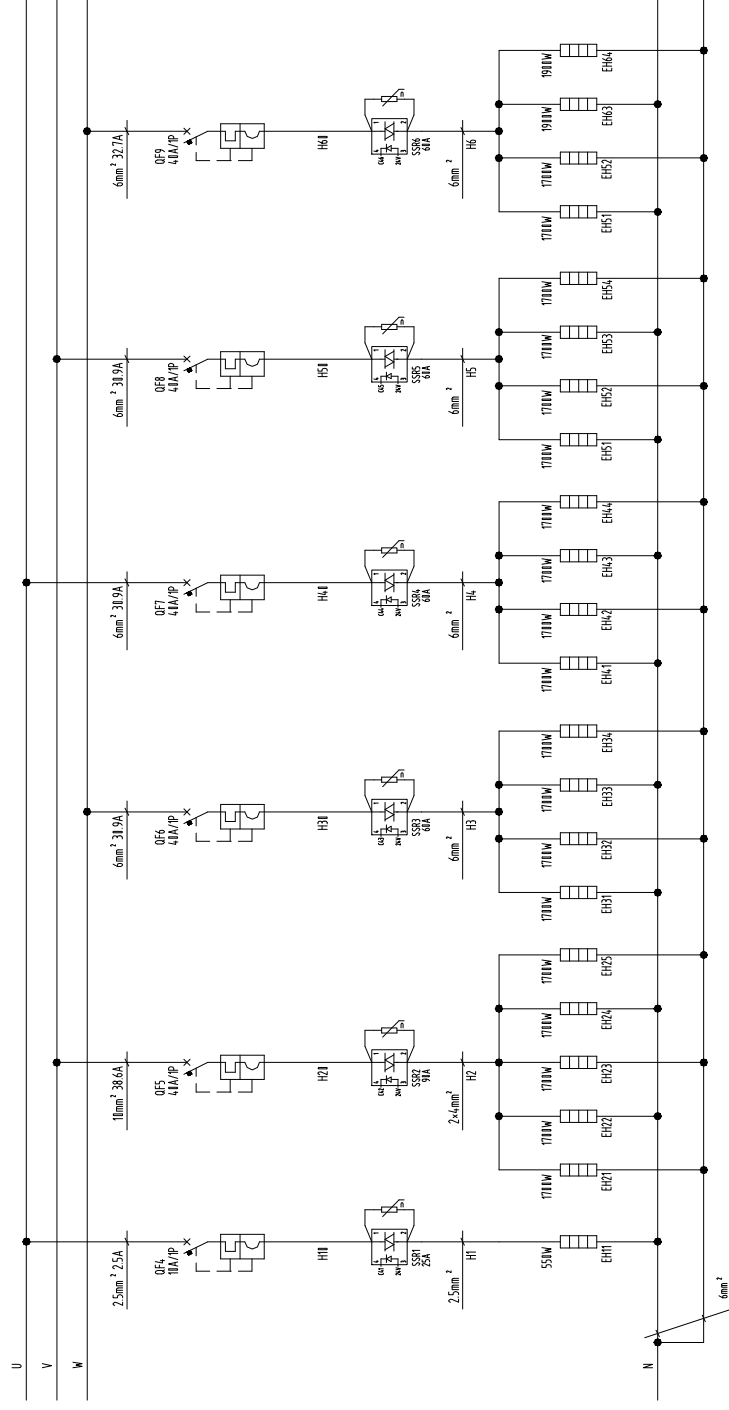
V

IV

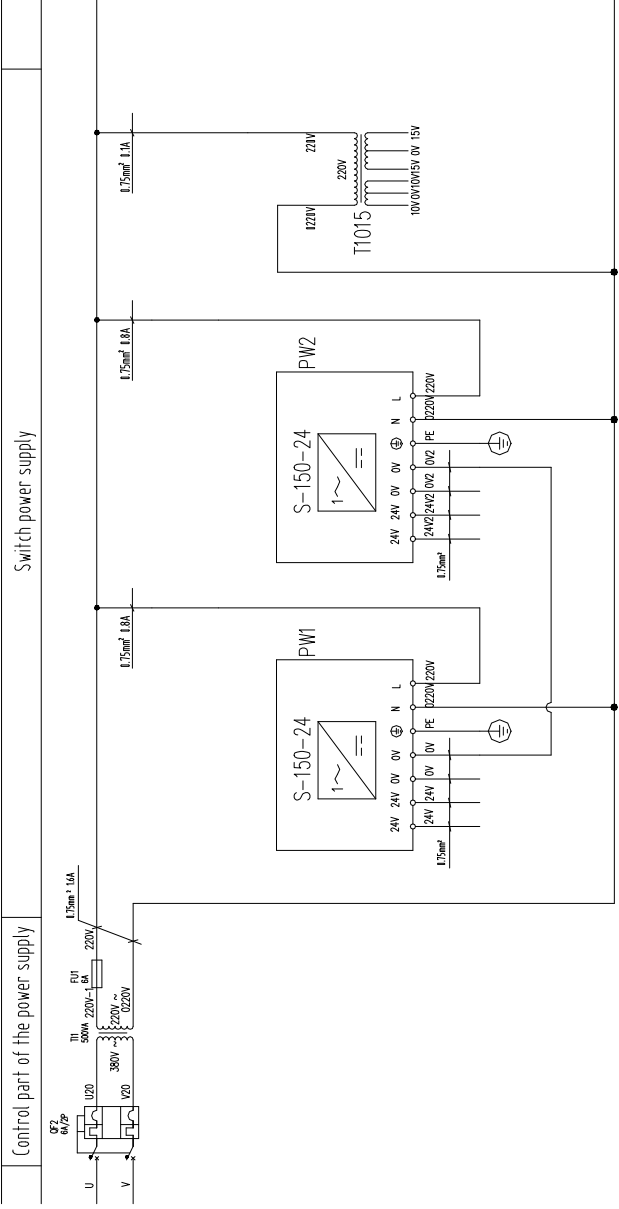
III

II

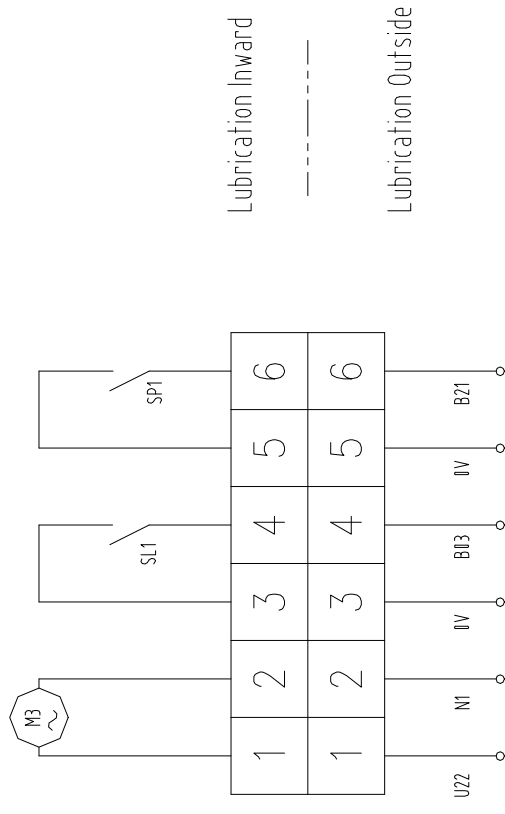
I



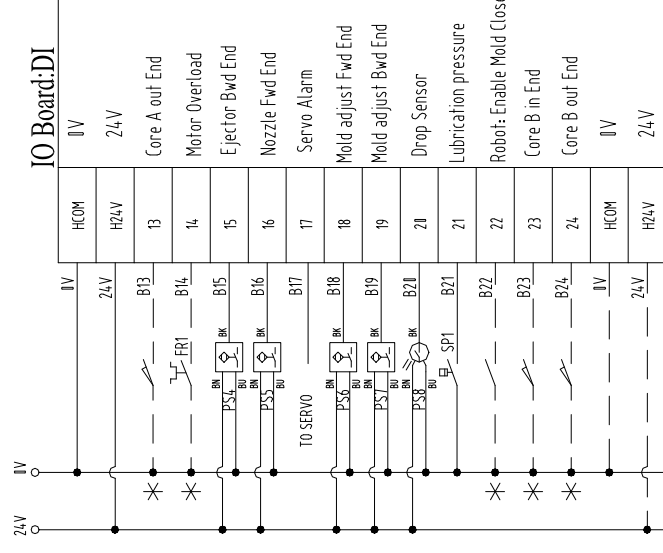
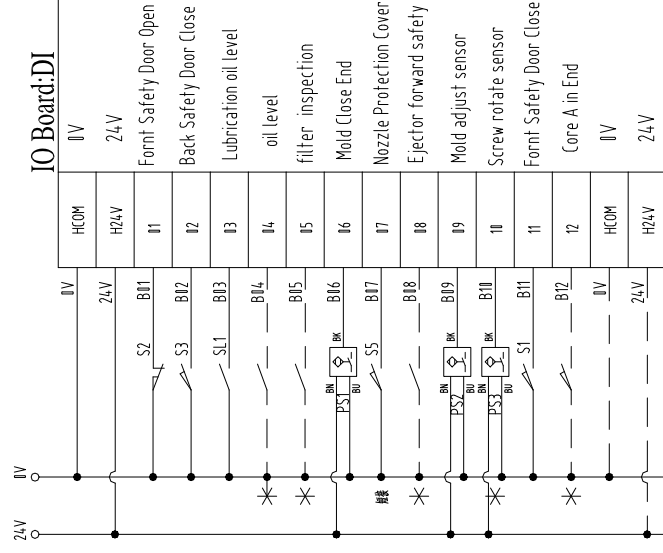
6.2 Heating Control Circuit Diagram



6.3 Control Circuit Principle Diagram

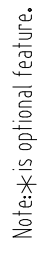


6.5 Electric Circuit Diagram For Lubrication Pump



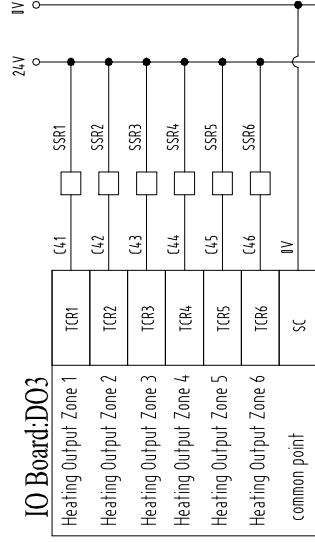
Note: * is optional feature.

6.6 Digital Input Circuit Diagram

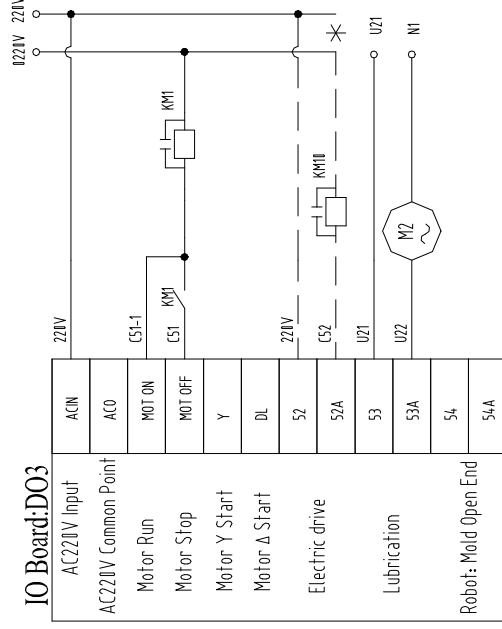


6.7 Digital Output Circuit Diagram 1

IO Board:DO3

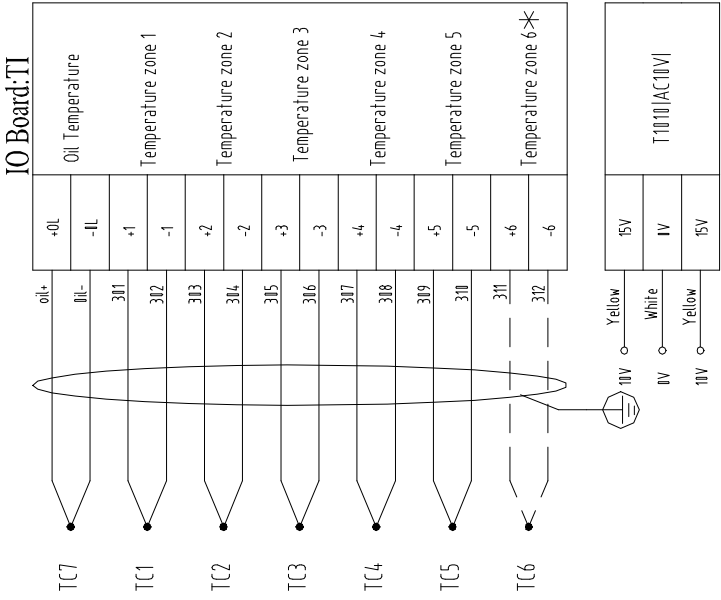


IO Board:DO3

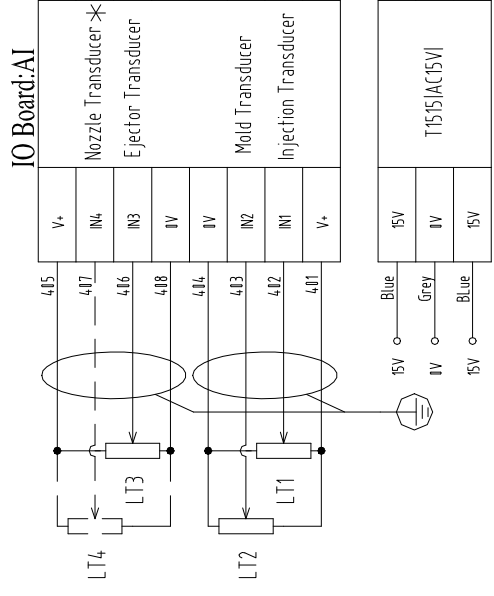


Note:✱is optional feature.

6.8 Digital Output Circuit Diagram 2



6.9 Temperature Contor Circuit Diagram

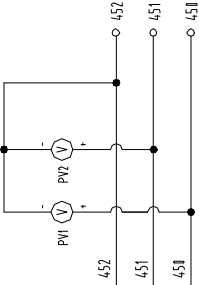


Note: * is optional feature.

6.10 Analog Input Circuit Diagram

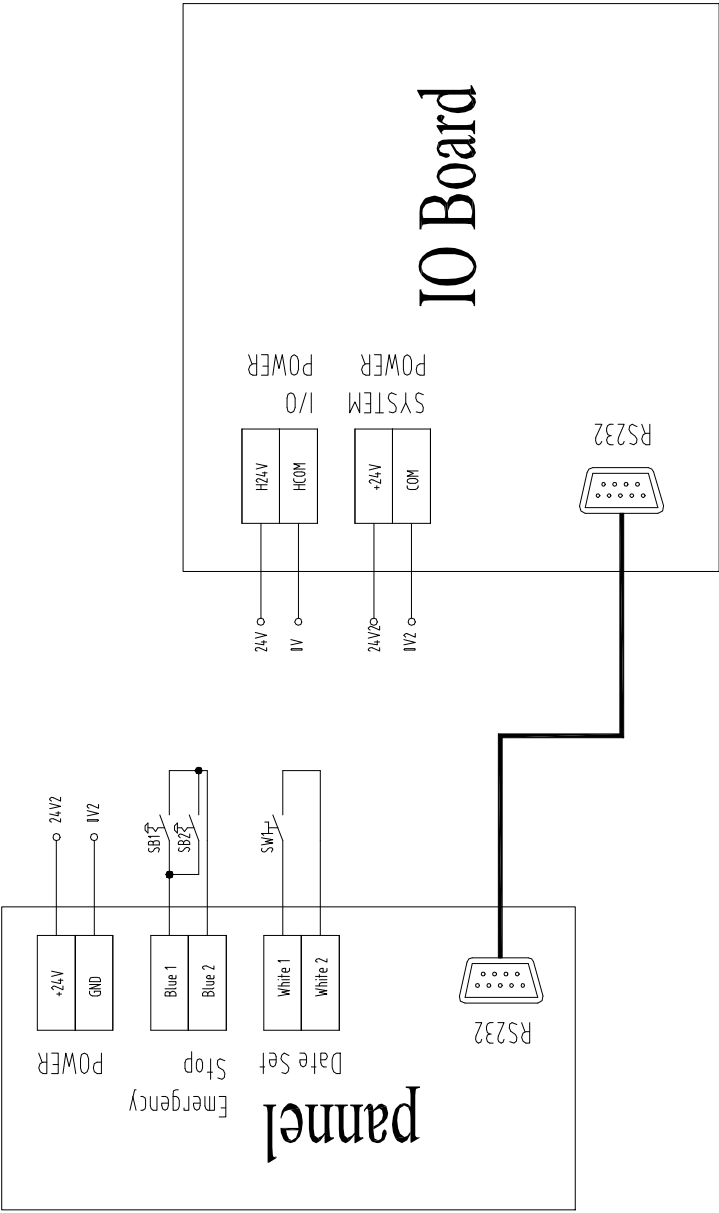
IO Board:AO

COM	COM	452
Main Flow	FW	451
Main Pressure	PW	450
Numerical Control - Back pressure	P2+	
	P2-	
Main Flow	F1+	
	F1-	
Main Pressure	P1+	
	P1-	
Proportional Valve Power DC48V/24V	COM	
	+48V	

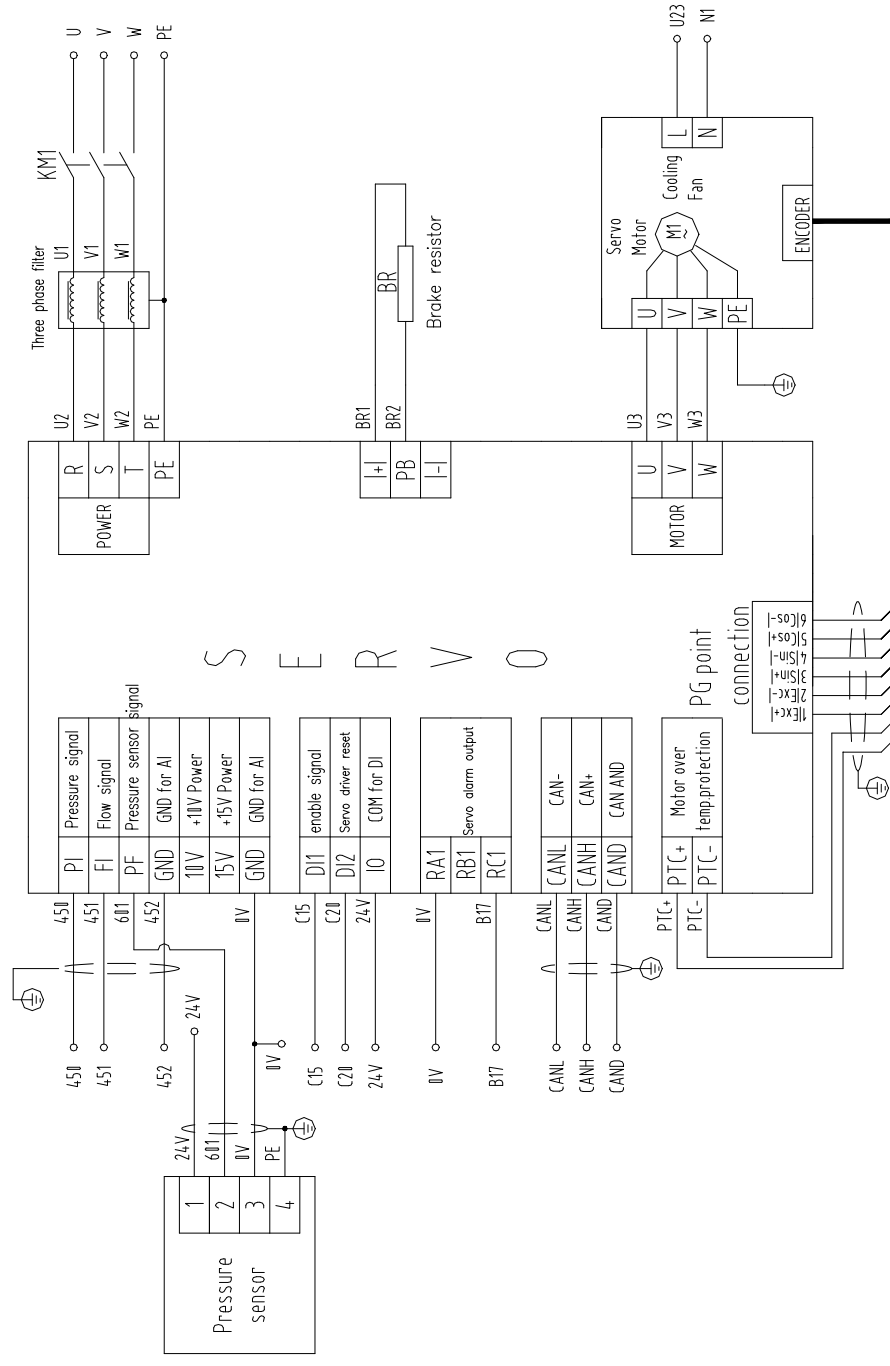


Note: * is optional feature.

6.11 Analog Output Circuit Diagram



6.12 Communication Circuit Diagram

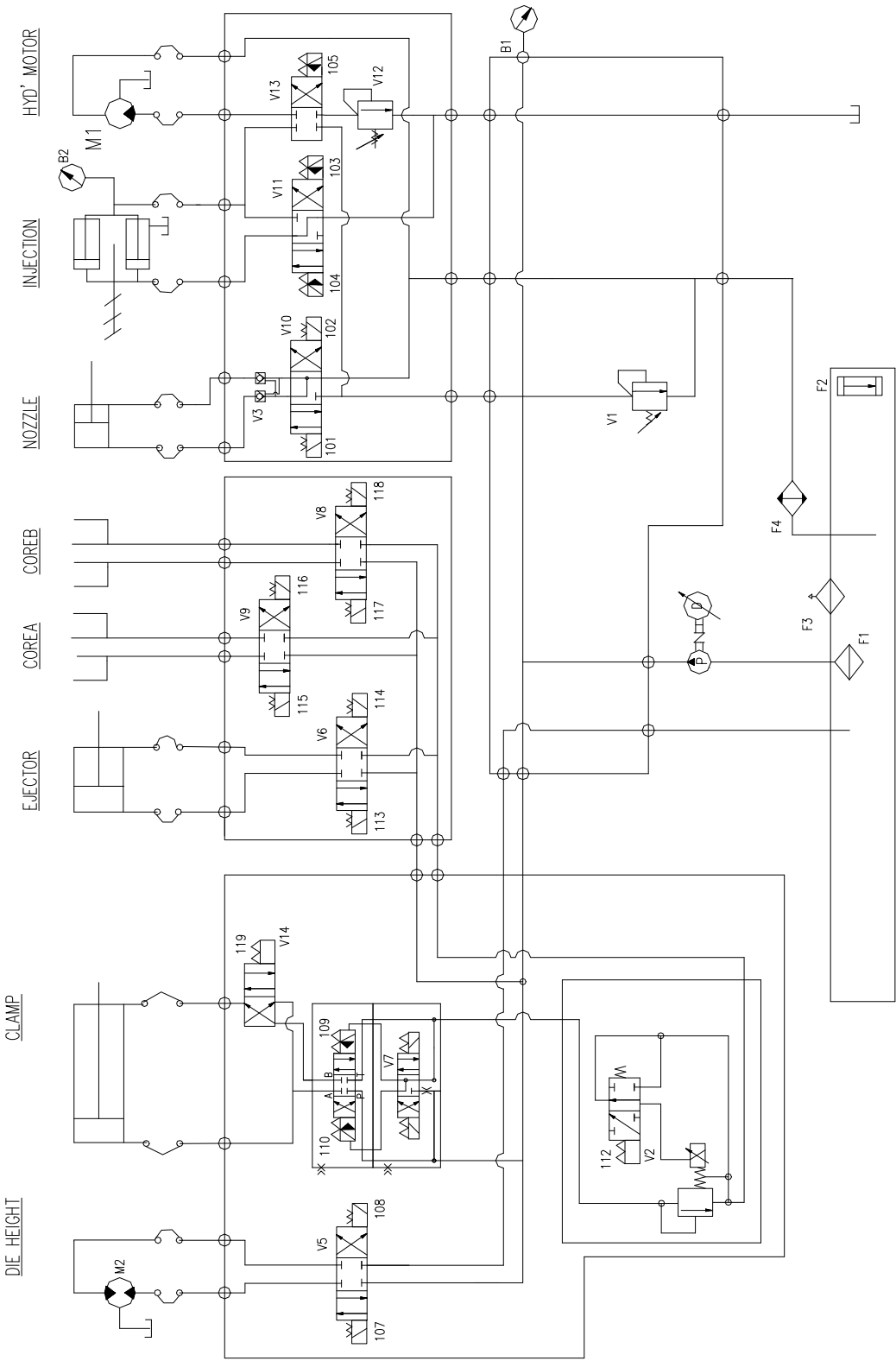


6.13 Servo drive circuit diagram

Chapter7 Hydraulic system

7.1	Hydraulic principle illustration.....	7-2
7.2	Valve action procedure illustration.....	7-3
7.3	Hydraulic system components.....	7-4

7.1 Hydraulic principle illustration



Note: * is optional feature

7.2 Valve action procedure illustration

Electromagnetism	Close mould				INJECTION	Keep pressure	Pre-plastication	Flow resistance	Base backward	Openmould			Ejection retreat	Ejection advance	Core A In	Core A out	Core B In	Core B out	Adjust mould	
	Slow speed	High speed	Low pressure	High pressure						Slow speed	Slow speed	Slow speed							Mould big	Mould small
501	+	+	+	+	+	+	+	+	+	+	+	+	+	+	◎	◎	◎	◎	+	+
504	+	+	+	+	+	+	+	+	+	+	+	+	+	+	◎	◎	◎	◎	+	+
101					+	+	+													
102									+											
103					+	+														
104								+												
105							+													
107																				+
108																			+	
109											+									
110	+	+	+	+																
112										+	+	+								
113													+							
114													+							
115															◎					
116																◎				
117																	◎			
118																		◎		

注：1. “+”meaning:when normal function for the standard electricity, “◎”meaning:when the choose and buy a function。

2. 115、116、117、118 is core, 。

7.3 Hydraulic system components

The company reserves the right to change hydraulic components brand,

No	Mark	Name	Model	Explain	Note
1	D	Motor	MF2525172F	Drive pump	
2	P	Pump	QT6252-100/63	System power	SUMITOMO
3	M1	Hydraulic motor	NHM16-1600	Drive screw	INTERMOT
4	M2	Hydraulic motor	BM3-400P1	Drive moulding-adjustment	
5	F1	Sucktallurgy	ZF100X200	Filter oil	
6	F2	Liquidometer	DT-D-150	Oil level shows	
7	F3	Air filter	FSB.25.BM	Filter air	
8	F4	Cooler	6	Reduce oil temperature	
9	V1	Pressure relief valve	HRF-G06-3-L-32	System pressure	
10	V2	Solenoid valve	DBW20B-1-30/31.5	Slow speed	
11	V3	Superposition valve	Z2S6	Keep pressure of base	
12	V4	CAM valve	DC-G02-B2S	Hydraulic safety (Choose)	
13	V5	Solenoid valve	DSG-01-3C2	Adjust mould	
14	V6	Solenoid valve	DSG-03-3C2	Ejection action	
15	V7	Solenoid valve	DSHG-06-3C2	Control mould action	
16	V8	Solenoid valve	DSG-01-3C2	Core B action(choose)	
17	V9	Solenoid valve	DSG-01-3C2	Core A action(choose)	
18	V10	Solenoid valve	DSG-01-3C4	Control base	
19	V11	Solenoid valve	DSHG-06-3C12	Injection and shot back	
20	V12	Solenoid valve	EBG-06-A70-R(DB-H20L)	Back pressure	
21	V13	Solenoid valve	DSHG-06-2B2BL	Store material	
22	V14	Solenoid valve	DSHG-06-2B2	Differential	
23	B1	Pressure gauge	CM2/PS1-60	Connection pump motor	YEA THEI
24	B2	Pressure gauge	CM2/PS1-60	Pressure show	YEA THEI

Specific in kind prevail.