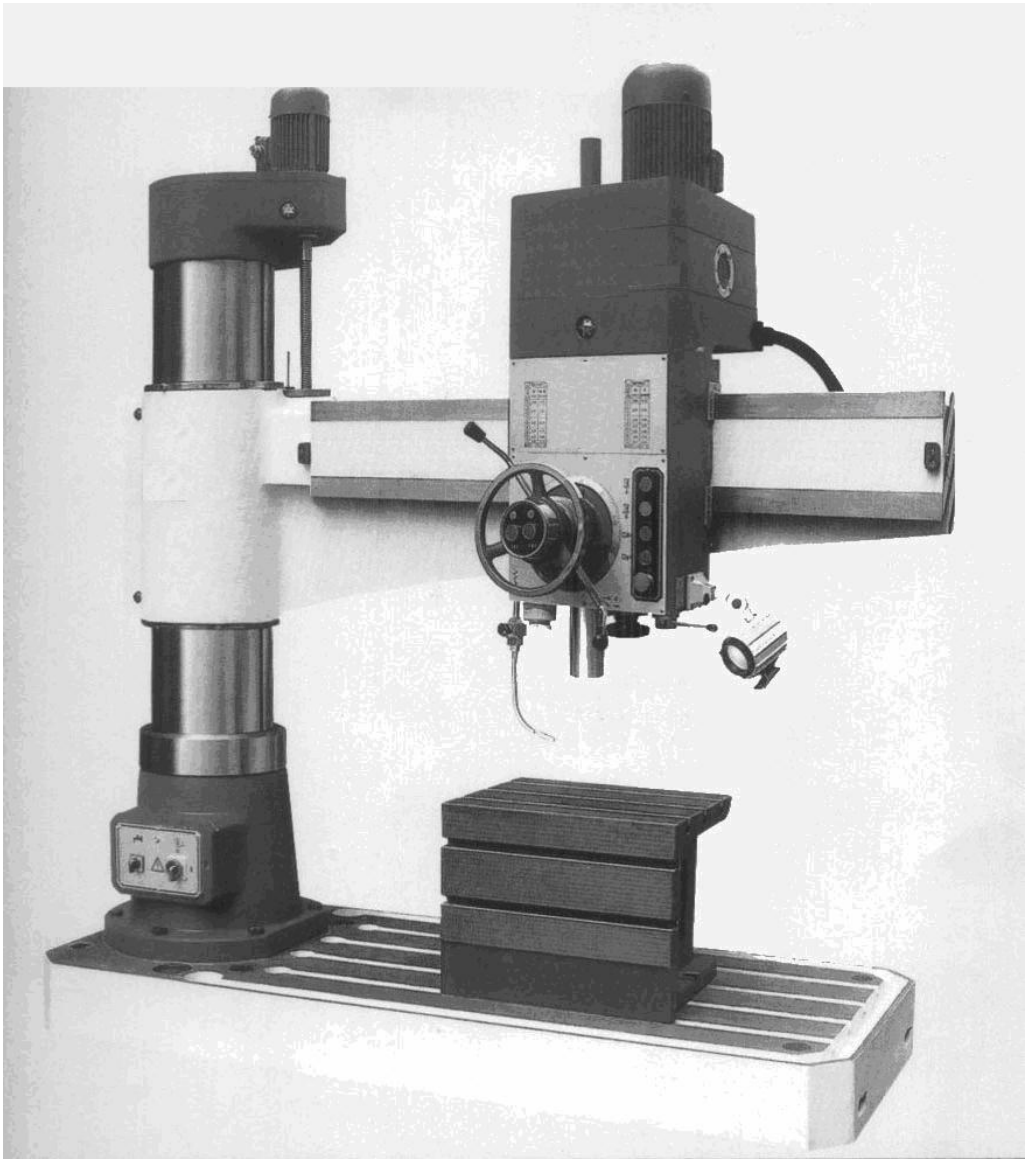
OPERATION MANUAL

MRDP and HRDP Models

1 587 985-3758 239-11505 Ellerslie Road. Edmonton, AB T6W 2A9 Canada sales@viamachinery.com

Thank you for selecting our Radial Drilling Machine, please read carefully the operation manual for safety and instructions. Please keep the operation manual handy for future maintenance.

Warranty will be voided if Manual is not followed step by step.



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1. INTRODUCTION

1. 1 GENERAL SAFETY RULES

Operator must read the Operation Manual before operating the machine, and the Safety Department Manager should assure the operator knows the requirements.

1.1.1 The operation, maintenance and repair of the machine must be done by a qualified trained technician to have the ability to forecast any potential risks. Only safety-conscious workers who are fully aware of the risks can operate the machine. Wrong use of the machine may cause serious injuty or death.

1.1.2 Operators who assemble, operate, or give maintenance to the machine must have read and understood the operating manual.

1.1.3 After the machine has stopped, the tool will still be running for a period of time due to inertia, **DO NOT** open nor touch the tool guard until the machine has stopped completely. Keep your hands off moving parts.

1.1.4 The safety guard **SHOULD NOT** be detached or modified.

1.1.5 The machine should be disconnected from the power supply during maintenance or repair.

1.1.6 Qualified technicians have to be assigned for operation and maintenance of the machine.

1.1.7 Only the manufacturer or a qualified technician can repair the machine.

1.1.8 The machine should be stopped immediately if abnormal phenomena appear until getting technical support.

1.1.9 The machine should be assembled and disassembled with the proper hoisting equipment.

1.1.10 Operators should be aware of all safety instructions and warning signs on the machine and make sure these are always followed 100%. Instruction and warning signs should NEVER be removed from the machine.

1.1.11 Safety inspections should be done before operating the machine. The stroke limit and the Emergency Stop button should be ensured to be working properly before its operation.

1.1.12 After maintenance, the guards and safety devices should be properly reinstalled.

1.1.13 Maintenance should be completed only once the machine is turned off.

1.1.14 Operating personnel age must be at least 18 years and should be trained.

1.1.15 Loose clothing, gloves, neckties or jewelry (rings, watches, etc) SHOULD NEVER be worn when operating the machine. The sleeves and the edges of the work uniform should be kept tight. Safety goggles, shoes and gloves should always be used during operation.

1.1.16 A safety hat should be worn during the operation of the machine in order to keep hair away from the machine.

1.1.17 It is recommended to wear suitable hearing protection when necessary to reduce the risk of hearing loss.

1.1.18 The perimeter around the machine should always be clean, organized and in optimal working conditions.

1.1.19 When the machine is not in use, it should be disconnected from the power supply.

1.1.20 Tools and any other instruments which are not used during the operation should NOT be an obstruction on the machine, especially on the moving parts.

1.1.21 The working piece should be in all times clamped to the working table and the chuck key should be taken off from the chuck before starting the spindle.

1.1.22 The machine should be stopped before adjusting the position of the coolant nozzles.

1.1.23 Compressed air should not be used to remove dust and chips deposited on the machine or any of its parts.

1.1.24 Operators must be aware where the Emergency Stop button is so that it can be pushed without delay in case of an emergency.

1.1.25 The machine should be started according to the Starting Procedures.

1.1.26 Your hands should be kept away at all times from the moving parts of the machine during operation. Serious injury may be caused if hands or any other body parts get in contact with moving parts.

1.1.27 Chip iron found around the machine after is used should always be removed with proper tools to prevent cutting hazards.

1.1.28 The manufacturer should be contacted if there's any concern when reading and using the Operation Manual.

1.1.29 The spindle and the feed should be stopped completely before installing or changing the tool from the chuck.

1.2ADITIONAL SAFETY RULES

1.2.1 Read and understand the ENTIRE Operation Manual before operating the machine.

1.2.2 Always wear safety glasses while operating the machine.

1.2.3 Make sure the machine is properly grounded.

1.2.4 Before operating the machine, remove tie, rings, watches and any other jewelry. Keep the quills and the edges of the work uniform tight. Always be sure to wear safety goggles and wear safety shoes during operation. Do not wear gloves while operating machine tool.

1.2.5 Keep the floor around the machine clean at all times.

1.2.6 Keep all guards of the machine in place at all times when working. For maintenance purpose, use extreme caution and replace the guards immediately after maintenance.

1.2.7 Make sure the work piece and the cutter is well fitted and clamped, and make sure the cutter doesn't touch the work piece before starting the machine.

1.2.8 Shut off the power supply before adjusting or giving maintenance to the machine.

1.2.9 The operator must be focused and in good condition at all times when using the machine.

1.2.10 Use tools properly. Don't force a tool or an attachment to do work which the machine was not designed for. Sharp tools should be used. Deformed or dull tools should NOT be used.

1.2.11 Ensure the motor switch is OFF before connecting the machine to the power supply.

1.2.12 Never attempt to operate or adjust the machine when the procedure is not understood.

1.2.13 Be careful, the handle of the spindle quill will rapidly rebound.

1.2.14 It is advised that the operator should change machining position on the table frequently in order to prolongate the life of the working table.

1.2.15 Lubricate the machine often, according to the lubricating demand.

1.2.16 Keep the electrical elements clean, DO NOT clean the electrical elements with kerosene or gas.

1.2.17 Be sure that the spindle rotation of the machine comes to rest before changing the spindle speed, otherwise the gearbox may break.

1.2.18 It is forbidden to process flammable and explosive metal like pure

aluminum and magnesium.

1.2.19 The machine should never be used in flammable, explosive or humid environment.

1.2.20 The machine should be disassembled and assembled supported by the lifting mechanism with sufficient lifting capacity.

1.2.21 Always stop the machine before adjusting the position of the cooling nozzle.

1.2.22 Make sure that the operating site is well ventilated. It is recommended that a ventilation equipment should be provided on the operating site.

1.2.23 Make sure the machine has been anchored to the ground properly before using it.

1.2.24 Ensure that each clamp of the machine is in the lock position before its use.

1.2.25 Make sure the grounding wire, the Emergency Stop button and every clamp are working properly before using the machine.

1.2.26 Ensure the arm, column and headstock are securely clamped, otherwise it may cause an accident or injury.

1.2.27 Select revolving speed and feed on the table of the plate according to the machining material and diameter of the drill, otherwise it may cause damage to the machine.

1.2.28 The spindle feed handle will turn when the spindle is automatically feeding, keep away from the handle, otherwise it may cause injury to the operator.

1.2.29 Keep others away from the working area during the operation of the machine.

1.2.30 Observe carefully for any object or obstacle around the machine before turning the arm, otherwise it may cause an accident.

1.2.31 There are push points between the headstock and stop block, the arm and column, so operators will look after their own safety.

1.2.32 Always shut off the main supply of electricity before repairing the machine.

1.2.33 Shut off the power supply of the machine before eliminating any malfunction.

1.2.34 Use the Emergency Stop button on the headstock panel in Figure 3.1 when the machine has a fault and shut off the main switch on the door in Figure 4.4. DO NOT switch on the main switch before eliminating the malfunction.

1.2.35 The operation, maintenance and repair of the machine must be done by a qualified technician trained to have the ability to forecast any potential risks.

1.2.36 The operator must be familiar with the position of the Emergency Stop button and its working method.

1.2.37 Any electrical maintenance personnel should be wearing the safety gear as well as insulated shoes. DO NOT turn on the main switch during any repair, and make sure to hang the electrical warning plate on the power switch.

1.2.38 Design a person in charge of the key to the electrical door and the power switch.

1.2.39 Turn off the main switch before opening the electrical door.

1.2.40 Add any needed guard according to the size and shape of the work piece to avoid causing any damage when the coolant and scrap iron splash.

1.2.41 If dismantle spindle balancing device during the reparation, please be careful with the spring.

1.2.42 DO NOT loosen the lifting rope when the machine has not been installed and the foundation bolts are tight.

1.2.43 DO NOT change the cutter, check any parts, eliminate fault, or clean the scrap iron while the machine is in operation.

1.2.44 DO NOT bump the stoppers during the power feed. Turn off the switch of the power feed when the headstock approaches the stopper.

1.2.45 DO NOT wear loose clothing, gloves, neckties or jewelry (rings, watches, etc). Keep the quills and the edges of the clothes tight.

1.2.46 DO NOT use Compressed air, Kerosene, gas or any other flammable liquid as cleaning agents for the machine.

1.2.47 Unauthorized workers must not start, operate or give maintenance to the machine.

1.2.48 DO NOT exceed ±180°when turning the arm in a horizontal direction.

1.3. WORKING ENVIRONMENT AND CAUTION SYMBOLS

1.3.1 The machine is designed for operating on the site:

- The light in the working environment should not be lower than 500 lux.

1.3.2 Do not use the machine in an place where you could find electric dirt, explosion, metal fretted, gas and steam which can destroy the insulation .

1.3.3 Do not use the machine in an environment of impact and vibration.

1.3.4 The noise of the machine is of ≤ 85 dB (A).

1.3.5 Be aware of caution symbols on the machine

: Pinching point

: Hazardous electrical voltage.

: Imminent danger that will cause serious injury to personnel or damage to machine.

NOTE: DO NOT Remove the symbols from the machine.

1.4 STRUCTURE OF THE MACHINE

The machine consists of base, column, table, main drive mechanism, coolant, lubrication and electrical equipment.

2. INSTALLATION AND TRIAL RUN OF THE MACHINE

CAUTION：The headstock, the arm and the column were clamped before leaving the factory. Open the picking box carefully, otherwise it will scratch the paint on the machine surface.

After opening the packing box:

- check all the accessories according to the packing list,
- visually inspect the machine for any damage that may have occurred during transportation. If any damage is detected, inform the manufacturer immediately.

DO NOT connect the power supply of the machine during the swinging and/or installation and DO NOT loosen the clamp handles, otherwise it may cause a serious accident.

2.1 PREPARATION OF GROUND

- In order to make the machine run steadily and keep a high machining accuracy, the machine must be installed on the concrete foundation.
- Install foundation bolts as per machine drawings. (Foundation drawings will be provided for each machine).

2.2 THE WHOLE MACHINE HOISTING (Figure 2.2)

When opening the box:

- First, loosen the nut which tightens the working table.
- Second, swivel the working table 90 degrees in level.
- After that, move the working table to the center of the machine along the longitudinal axes.
- After, tighten the working table on the bed with the nuts again.
- Then attach the rigging to the working table.
- Then, place some rubber paths between the rigging and machine to avoid scratching the machine surface.
- Finally, lift the machine.

2.1 Figure

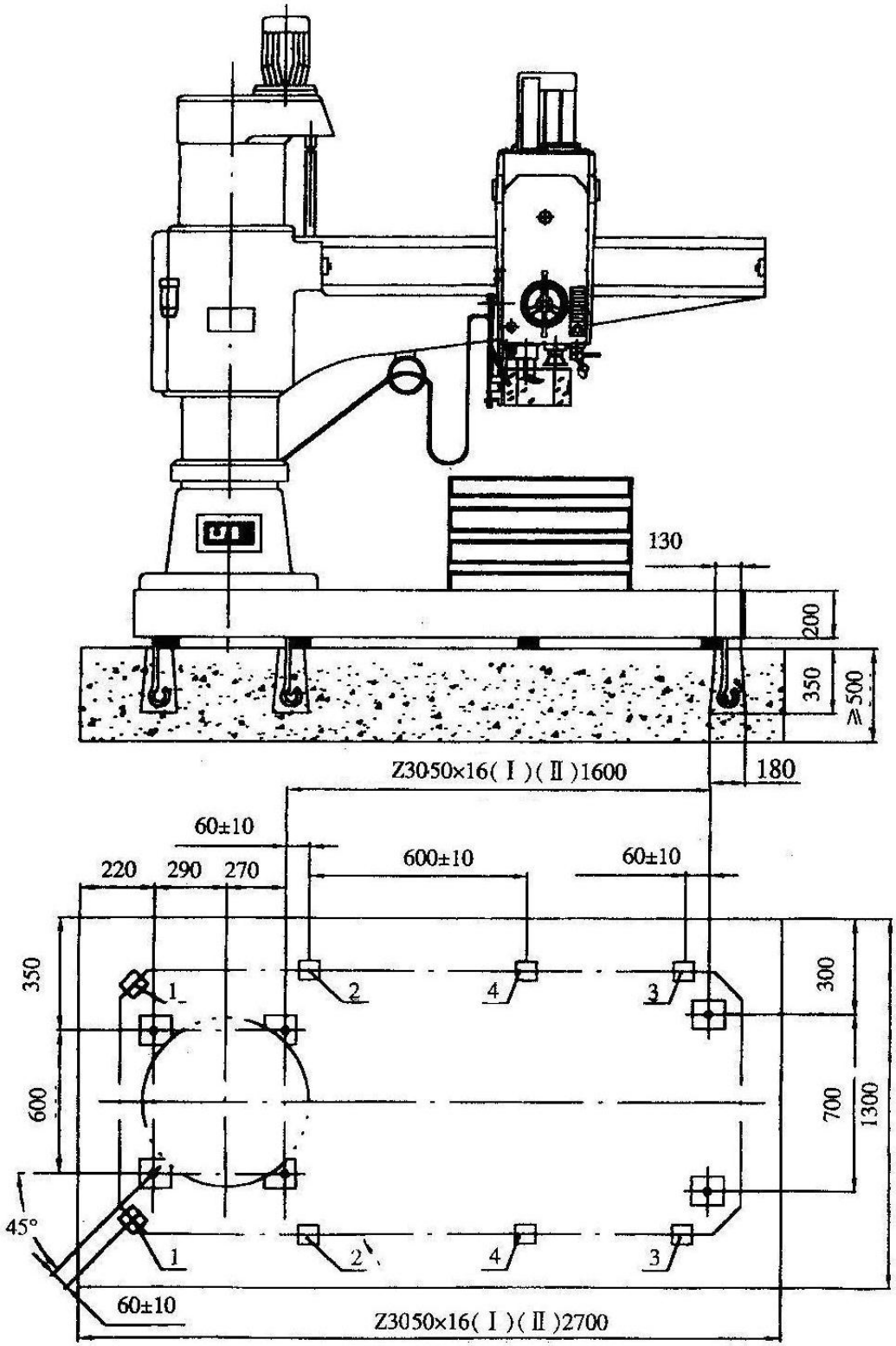
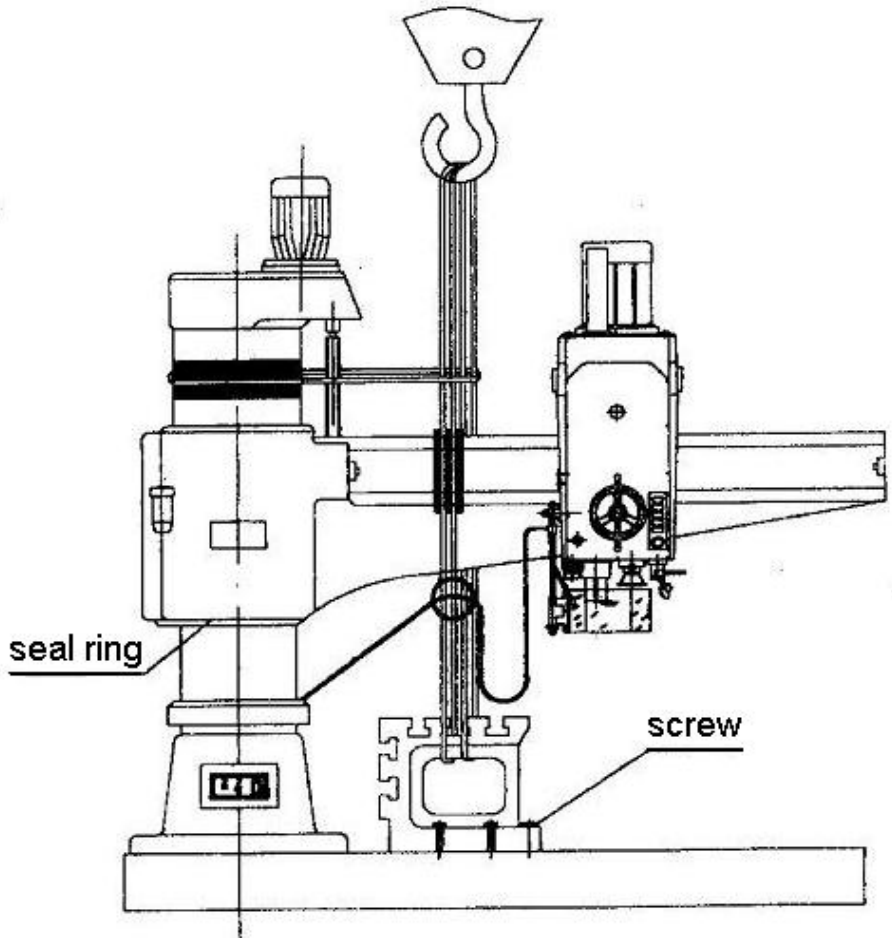

130
200
350
≥500
180
Z3050×16(Ⅰ)(Ⅱ)1600
60±10
600±10
60±10
220
290
270
350
600
300
700
1300
1
2
4
3
45°
60±10
Z3050×16(Ⅰ)(Ⅱ)2700

Figure 2.2



2.3 INSTALLATION

2.3.1 Put the anchor bolts on the machine base when installing the machine, then put the machine on the groundwork and put the sizing block under the machine to level it.

2.3.2 Adjust the level: adjust the sequence of the sizing block according to 1,2,3 and 4 from the groundwork (Picture 2.1). Make sure the machine is leveled in both the horizontal and vertical axis.

2.3.3 Clean the antirust oil on the base, column, arm, spindle and any other surface.

2.3.4 Remove the locking screw (1) according to Picture 2.3 and attach the clamp of the oil pipe.

2.3.5 Remove the locking plate according to Picture 2.4.

2.3.6 Electric installation:

2.3.6.1 Elevating motor installation (see picture 2.5):

- Fix the motor in the proper way and fix the bolt.
- Open the junction box and connect the leads according to the numbers. When finished, cover it and screw down.

2.3.6.2 Connect the leads to the main power.

2.3.7 Check that the phase sequence is plugged properly (Picture 3.1):

- Push the button 1-18(only hydraulic models), check that the headstock and column are loose.
- Push the button 1-19(only hydraulic models), check that the headstock and column are clamped.
- Push elevating button 1-3 on the arm. Move the arm up by 10mm and check whether it is lifting or not
- Push the down button 1-2 on the arm. Move the arm down by 10mm and check whether it is lowering or not.

2.3.8 Clean the rust on the column and guideway:

- Push the falling button 1-2(picture 3.1), make the arm come down 10mm and clean the antirust oil on the top of column.
- Move the arm up 10mm again, clean the antirust at the bottom of the column.
- Repeat the work until the oil is rubbed up.
- Push the button to loosen the headstock and turn the moving hand wheel 1-10.
- Move the headstock to the left and clean the antirust oil on the guide way
- Reset and clamp the headstock.

2.3.9 Lubricate the arm and the column so you can lift and move the arm in large extend.

- Trickle the lubricating oil on the surface of the column.
- Move the arm 50mm down, clean and lubricate the bare section again.
- Move the arm 100mm up, clean and lubricate the bare section properly.

Attention: Do not scratch the surface of the column; oil them according to the lubricating list in picture 2.6. DO NOT run the machine without oil.

2.3.10 Move the arm up to the top of the column，then move it down to the bottom and verify that the travel button works properly.

2.3.11 Adjust the level of the base of the machine once it's been place on the working area. Make sure the base has an accuracy of under 0.04/1000 on both axis. If needed, for leveling, adjust the sizing block according to picture 2.1(1,2,3,4).

2.3.12 Adjust the precision of each element, make sure the measurement values DO NOT exceed the values from the accuracy test list.

- Fill the foundation bolt with cement after the adjustment.
- Fix the sizing block and machine base with cement after they are completely vulcanized.

Verify the following:

1. Check the joint of each oil pipe, oil window, oil mark and any other part. If any of these are leaking, reassemble the machine if necessary.
2. Check the oil level on the gear box and make sure it doesn't exceed the red mark.
3. Verify all parts are lubricated with the correct oil.

L-AN32 is the same as mechanical oil 20#
L-AN68 is the same as mechanical oil 40#

Figure 2.3

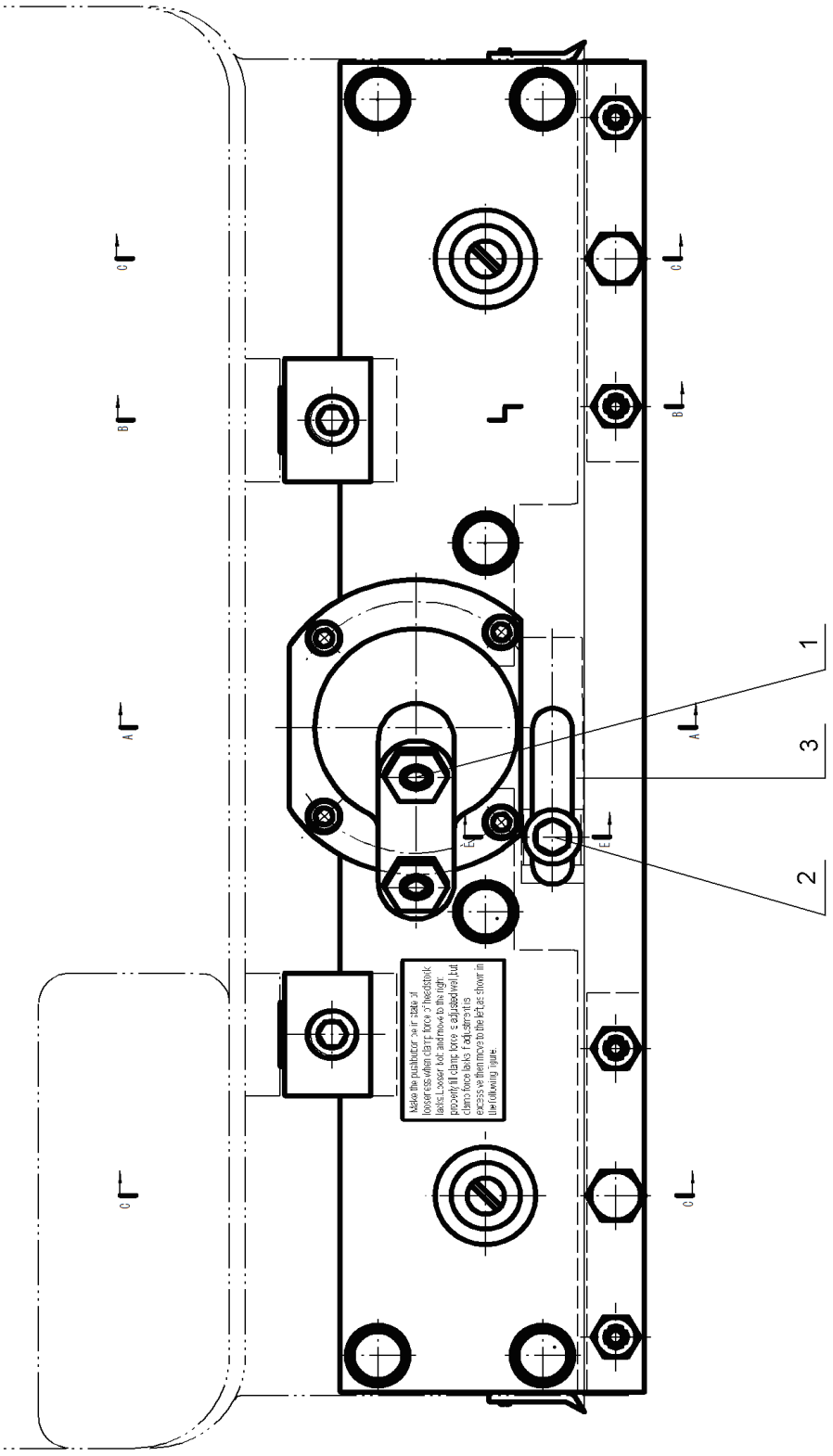


Figure 2.4

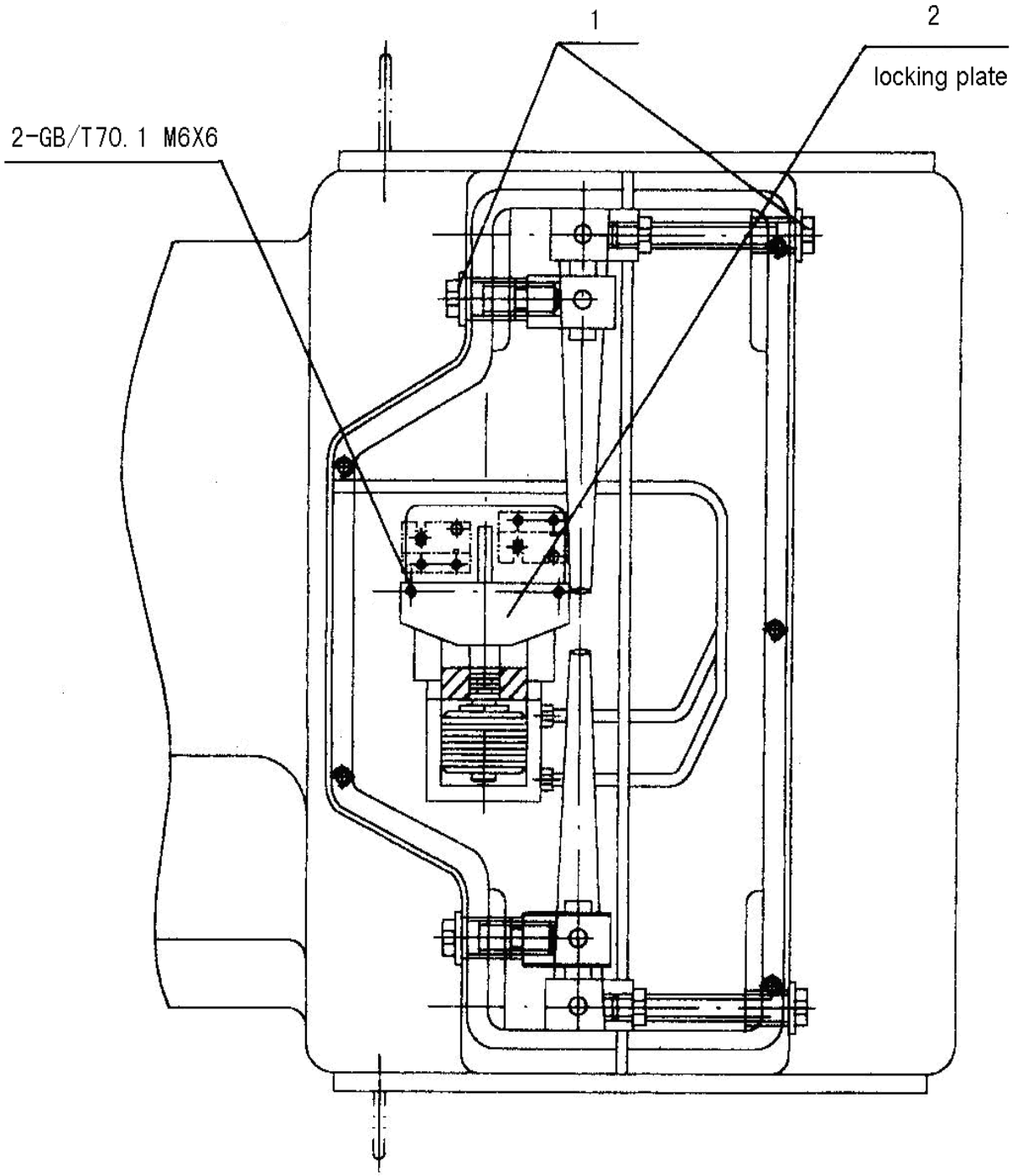
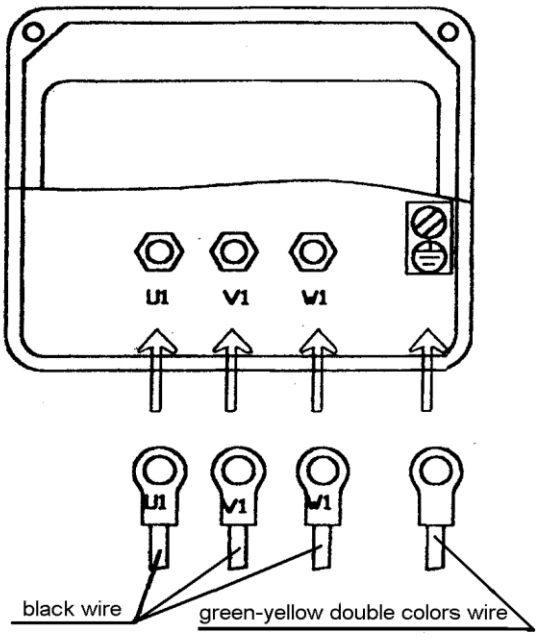
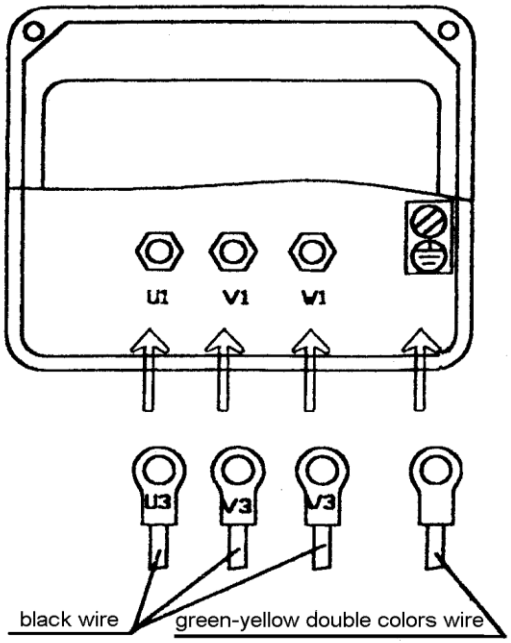


Figure 2.5

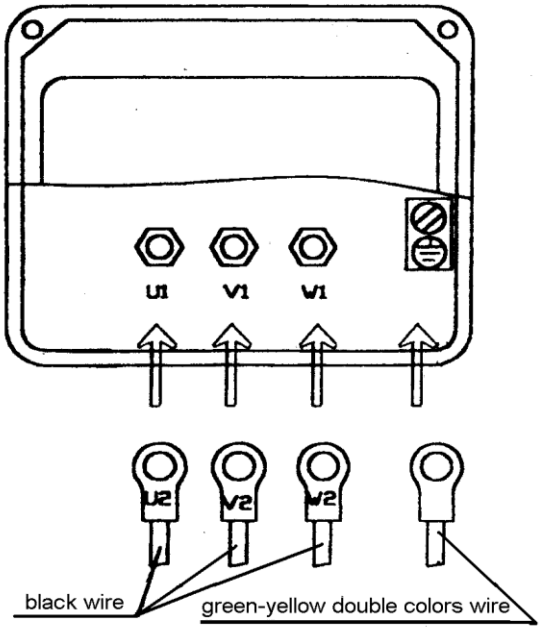
M1 spindle motor wiring box



M3 hydraulic motor wiring box



M2 elevating motor wiring box



M4 cooling pump motor wiring box

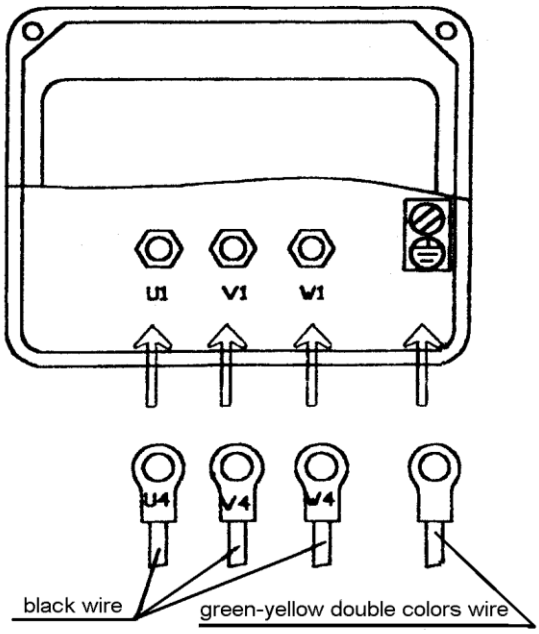
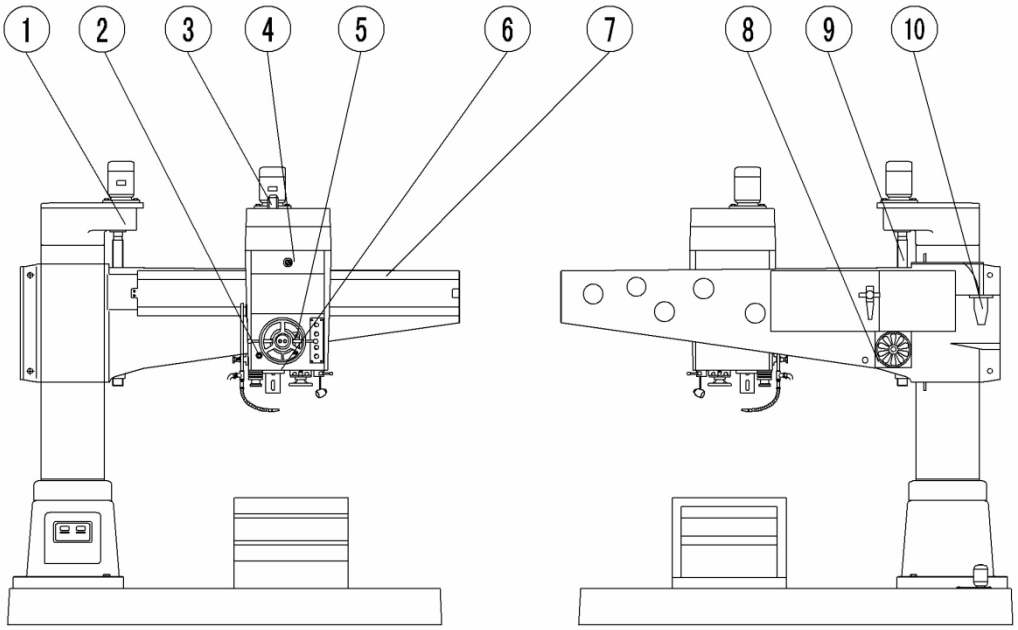


Figure 2.6



No.	Oil site	Lubricant	Cycle	Remark
1	rockerarm lifter oil basin	L-AN32	Change oil once three months.	Oil after unscrewing oil plug.
2	oil basin under gear-box	L-AN32	Change oil once three months.	Oil after opening scutcheon of gear-box.
3	spindle spline	L-AN32	Add oil once a week.	Do not oil too much.
4	oil basin on gear-box	L-AN32	Change oil once three months.	
5	inching worm	L-AN32	Add oil once a week.	Do not oil too much.
6	bearings on spindle	No.2 albany grease	Add oil once a month.	Oil after opening scutcheon of gear-box.
7	rockerarm guide	L-AN68	Six times per shift.	
8	clamped oil pump oil basin	L-AN32	Change oil once three months.	Oil after opening electrical door.
9	rockerarm lifter lead screw	L-AN68	Add oil once a week.	Do not oil too much.
10	column lubricant pump oil basin	L-AN32	Six times per shift.	

2.4 INSTALLATION INSTRUCTIONS (IF DISASSEMBLED PACKING TYPE)

Please read the installation manual carefully after you open the package, if you choose the machine which has a disassembled packing type, install them as the required sequence.

2.4.1 Clean the dust and the antirust on the surface of each part of the machine.

2.4.2 Swing the base according to picture 2.8, put the sizing blocks 1 through 4 and the base as shown in picture 2.1 and screw the nuts on the foundation.

2.4.3 Swing the column according to picture 2.9 and 2.10. Clean the surface where the column is going to be seated. Unpack the cover on the column. Put the column in the base and fix the bolt.

2.4.4 Lift the arm as shown in Picture 2.11. Make sure the arm is balanced when lifted. Clean the dust before the arm is inserted in the outside column. Clean the column surface; wipe the lubrication oil on the surface when the arm is inserted in the column. Align the key from the arm and the key groove from the column, then place the arm slowly into the column.

Lay the sizing block 50—100mm under the flange, which is at the bottom of the rocker after the arm is inserted in the column.

Finally, remove the lifting rigging and insert the lifting screw.

Attention: the arm is not in a safe state until the lifting screw is fully inserted and screwed. Make sure everything is properly installed before lifting the arm.

2.4.5 According to picture 2.12, install the rest of the parts on the top of the column:

- Remove the cover 4 of the rind and put the rind on the column.
- Tighten the bolt 10 and revolve the thread screw into the rind by hand.
- Place the gear 11, attach the gear of the motor and tighten the nut 12.
- Loosen the bolt which is used to fix the rhombic block on the clamp lever and connect the clamp oil pipe.

2.4.6 Remove the locking bolt (1) as shown in picture 2.3 and joint the clamp oil pipe.

2.4.7 Electric installation:

2.4.7.1 According to picture 2.13, insert the power source leads through the top of the column and connect the wires to the lifting motor. (see Picture 2.5)

2.4.7.2 Hydraulic pressure motor installation (see Picture 2.5): Install the motor properly and tighten the bolt. Open the junction box and connect the leads according to the NO., cover and tighten it.

2.4.7.4 Coolant pump installation (Picture 2.5): After installing the motor and

tightening the bolt, open the junction box and connect the leads according to the No., cover and tighten it.

2.4.7.5 Connect the leads of the main power.

2.4.8 Check that the power supply phase sequence is plugged properly (Picture 3.1):

- Push the button 1-18(only hydraulic models), check that the headstock and column are loose.
- Push the button 1-19(only hydraulic models), check that the headstock and column are clamped.
- Push elevating button 1-3 on the arm. Move the arm up by 10mm and check whether it is lifting or not.
- Push the down button 1-2 on the arm. Move the arm down by 10mm and check whether it is lowering or not.

2.4.9 Clean the rust on the column and guide way:

- Push the falling button 1-2(Picture 3.1), make the arm come down 10mm and clean the antirust oil on the top of column.
- Move the arm up 10mm again, clean the antirust at the bottom of the column.
- Repeat the work until the oil is rubbed up.
- Push the button to loosen the headstock and turn the moving hand wheel 1-10.
- Move the headstock to the left side and clean the antirust oil on the guide way.
- Reset and clamp the headstock.

2.4.10 Lubricate the arm and the column so you can lift and lover the arm in large extent:

- Trickle the lubricating oil on the surface of the column.
- Move the arm 50mm down, clean and lubricate the bare section again.
- Move the arm 100mm up, clean and lubricate the bare section adequately,

Attention: Do not scratch the surface of the column; oil them according to the lubricating list in picture 2.6. DO NOT run the machine without oil.

2.4.11 Move the arm up to the top of the column, then move it down to the bottom and verify that the travel button works properly.

2.4.12 Adjust the level of the base of the machine once it's been place on the working area. Make sure the base has an accuracy of under 0.04/1000 on

both axis. If needed, for leveling, adjust the sizing block according to picture 2.1(1,2,3,4).

2.4.13 Turn on the current switch, adjust the clamp force between the column and the rocker and make sure the gap between the bore of the arm and the column is no more than 0.04mm after clamped.

2.4.14 Fill the foundation bolt with cement after the adjustment

Fix the sizing block and machine base with cement after they are completely vulcanized.

2.4.15 Assemble the dustproof rings which were taken-down when the machine was packed.

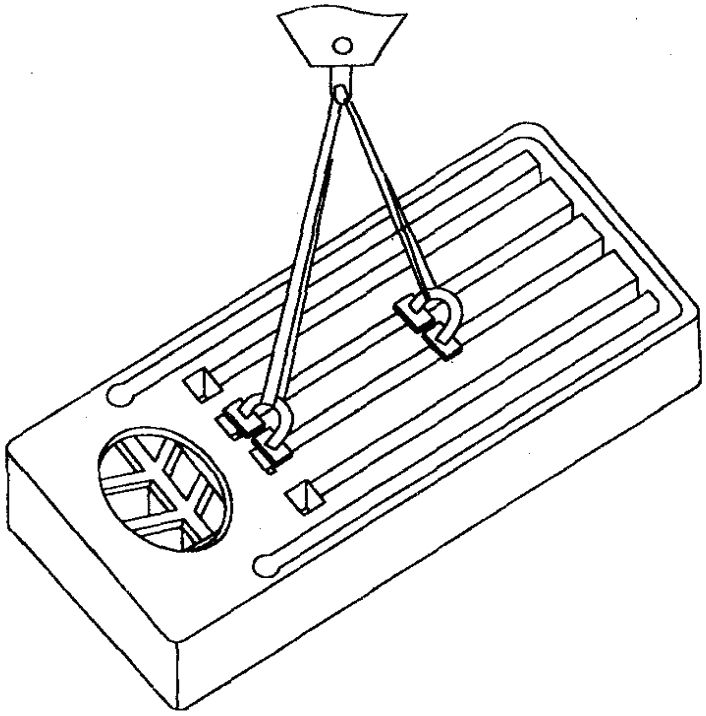


Figure 2.8

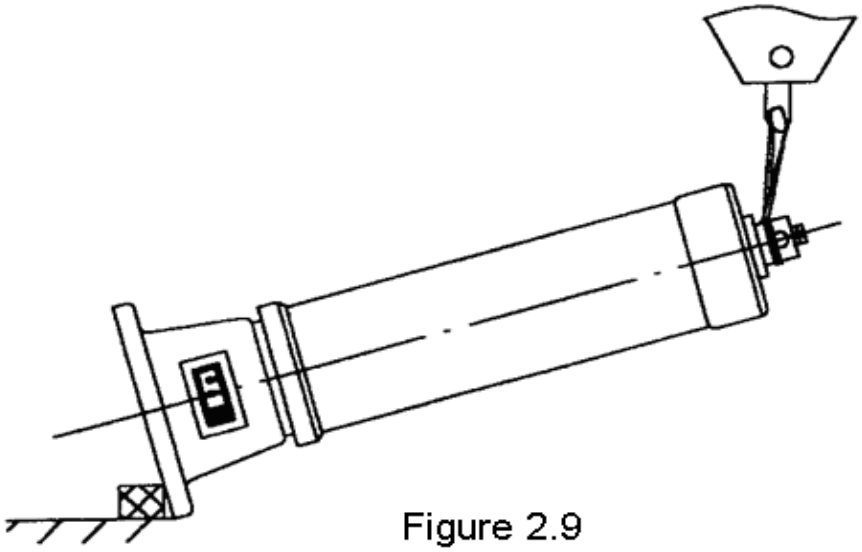


Figure 2.9

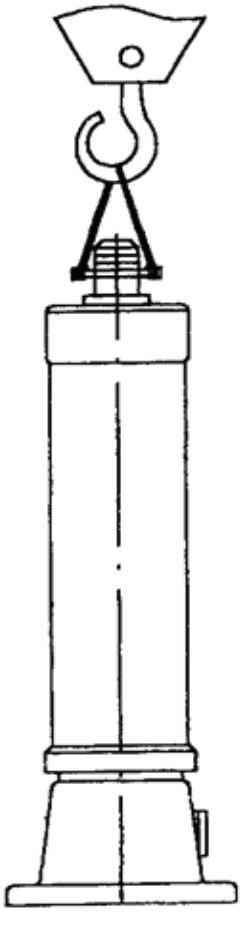
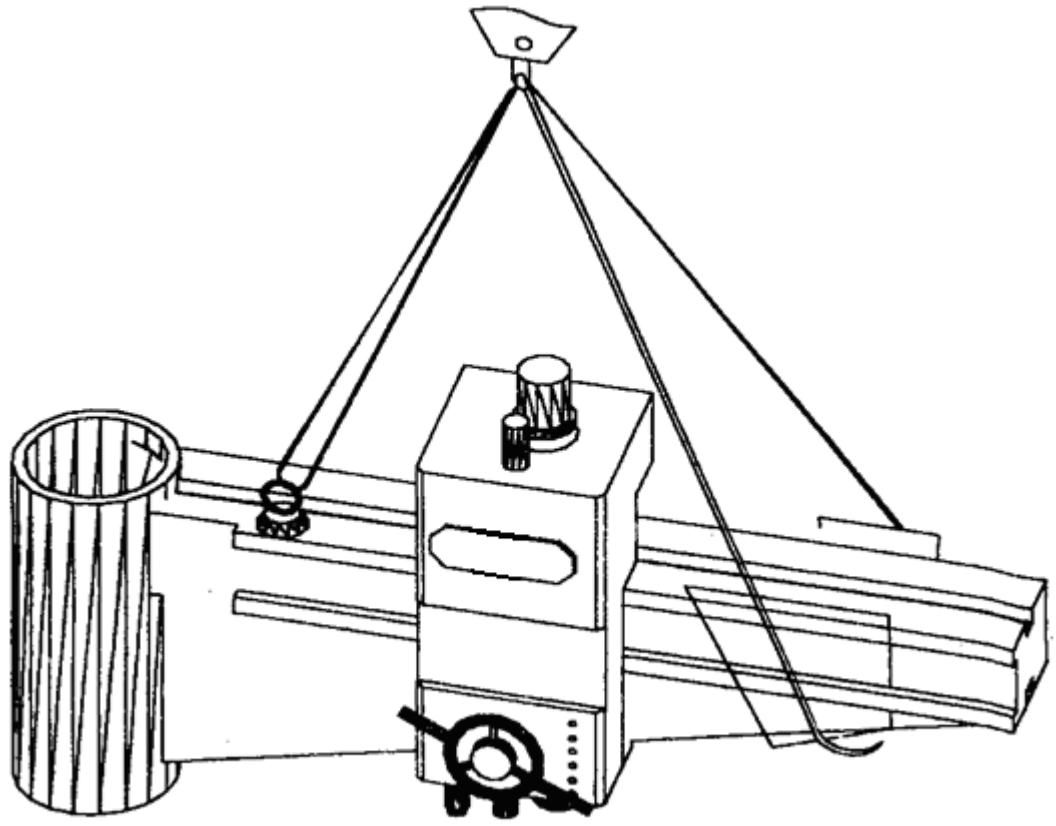


Figure 2.10

Figure 2.11



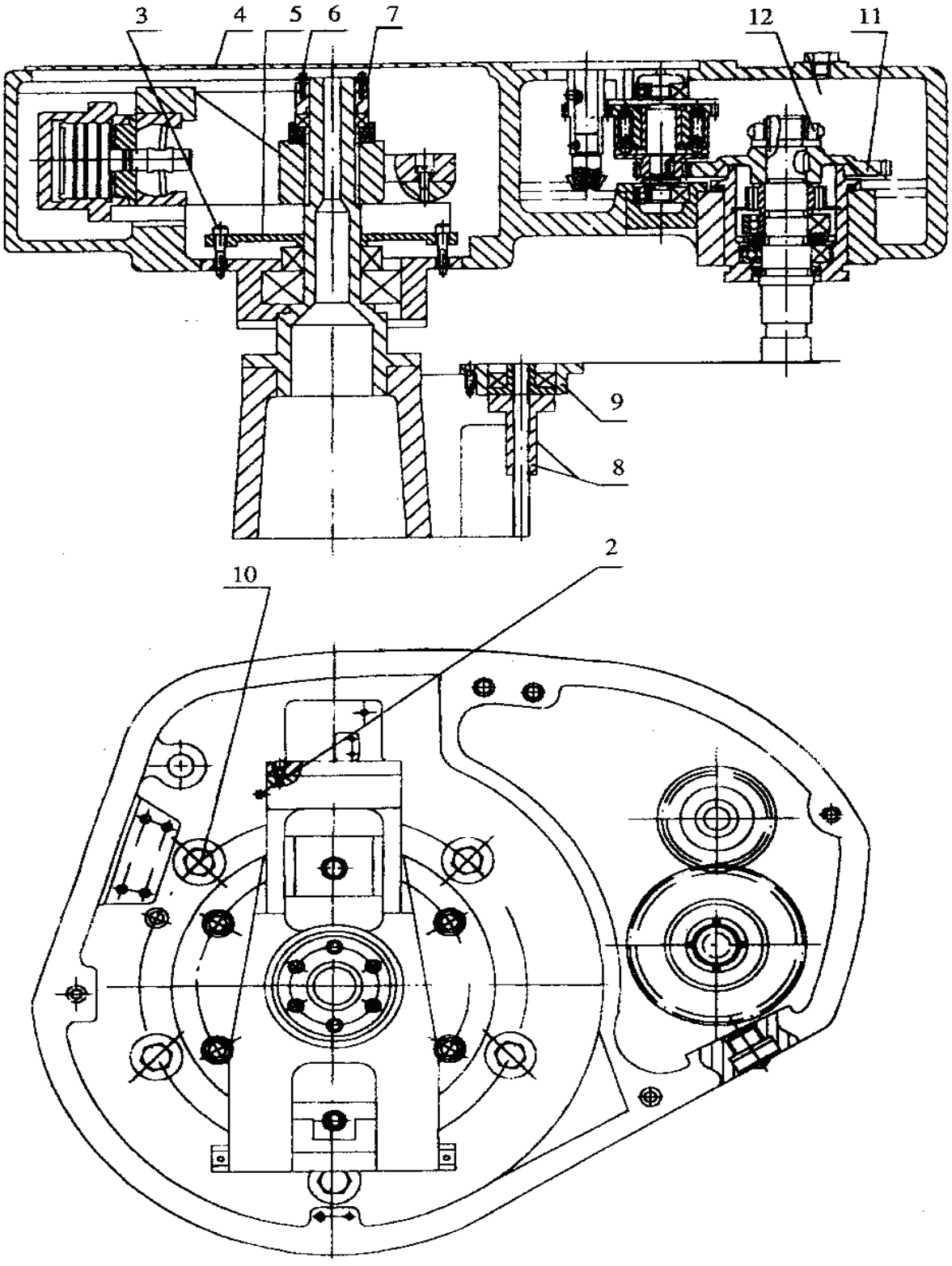


Figure 2.12

2.5 TRIAL RUN

2.5.1 Check the phase and power switch after installing the machine.

2.5.2 Start the machine (See the operating instructions) and check every part is in its proper working state: the clockwise and counterclockwise turn of the spindle, the spindle speed changes, the spindle speed of all steps, the spindle feed of all steps, start and stop of the spindle, elevation and falling of the arm, the tightness or looseness of the headstock and column, the maximum stroke of the headstock, the maximum travel of the arm and the manual and power feed of the spindle.

2.5.3 If the all the above have been checked and positioned properly, start the machine and run the idle for more than 30 minutes. If everything is working properly, the machine can be used.

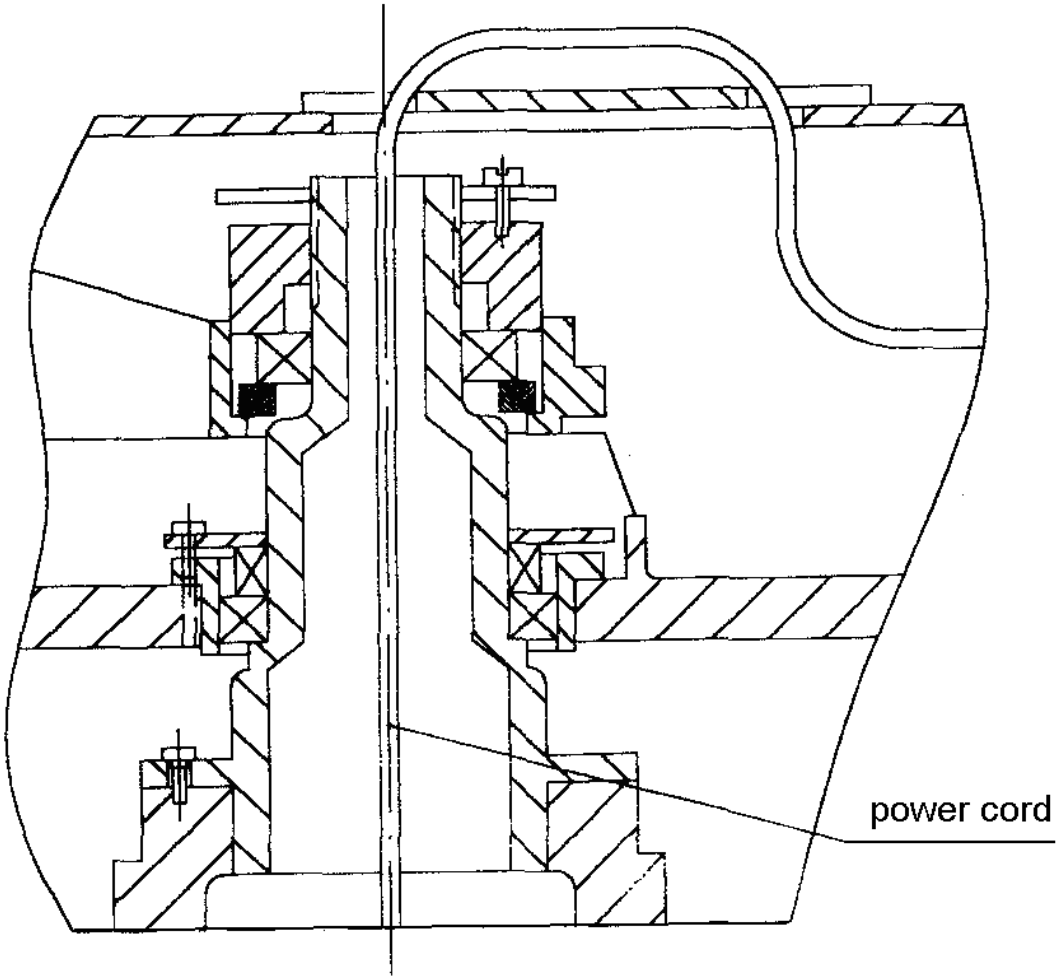


Figure 2.13

3. TECHNICAL CHARACTERISTICS

3.1 MAIN FUNCTION:

The machine can be used for drilling, enlarging holes, reaming, countersinking and tapping on medium-large cast iron and steel.
The main handles and pushbuttons are located on the headstock.

Warning: Do not process flammable and explosive metal, e.g. pure aluminium and magnesium, etc.

3.1.1 The external column turns around the internal column ±180°.
3.1.2 The arm moves up along the external column.
3.1.3 The headstock moves along the arm.
3.1.4 Headstock (see Figure 3.1).

Function	Handle or pushbutton
CW, CCW and neutral of spindle	1—13
Manual/Power feed of spindle	1—15
Horizontal movement of headstock	1—10
Spindle movement	1—9
Spindle setting stroke cutting	1—7
Spindle micro feed	1—17

3.1.5 Lift and clamping of the arm:

- The lifting power of the arm is supplied by an elevating motor, lead screw and nut. (see Figure 3.1 headstock panel).
- There is a safety nut on the elevating nut, which secures the arm from falling suddenly.
- A hydraulic pressure drives a rhombic block to clamp the arm. This rhombic block will self-lock after clamping.
- The arm will automatically clamp after it's fully lifted or lowered, which is controlled by the electric switch on the oil cylinder.

Function	Handle or pushbutton
Arm up	1—3
Arm down	1—2

3.1.6 Clamp of headstock and column：

- A hydraulic pressure drives the rhombic block to clamp the headstock and column.
- The two clamp actions can carry through at the same time or separately. (Pushbutton 1-6 on the panel of headstock).
- The middle position is for tighting, the left position is to loosen the column separately, the right position is to loosen the headstock separately. (Pushbutton 1-18，1-19) (see Figure 3.1)

Handle list (see Figure 3.1)

Position	Name	Position	Name
1—1	E-stop pushbutton	1—11	Preset spindle feed knob
1—2	Arm down pushbutton	1—12	Preset spindle speed knob
1—3	Arm up pushbutton	1—13	Spindle handle of clockwise, counterclockwise, neutral
1—4	Main motor stop pushbutton		
1—5	Main motor start pushbutton	1—15	Manual/power feed switch handle
1—6	Clamp selected knob of Headstock and column	1—16	Light Switch
1—7	The handle of setting travel and limit position	1—17	Micro feed handwheel
1—8	Dial inching adjusting handle	1—18	Loose pushbutton of headstock and column
1—9	Spindle moving handle	1—19	Clamp pushbutton of headstock and column
1—10	Headstock moving handle	l—20	Coolant adjustable valve knob

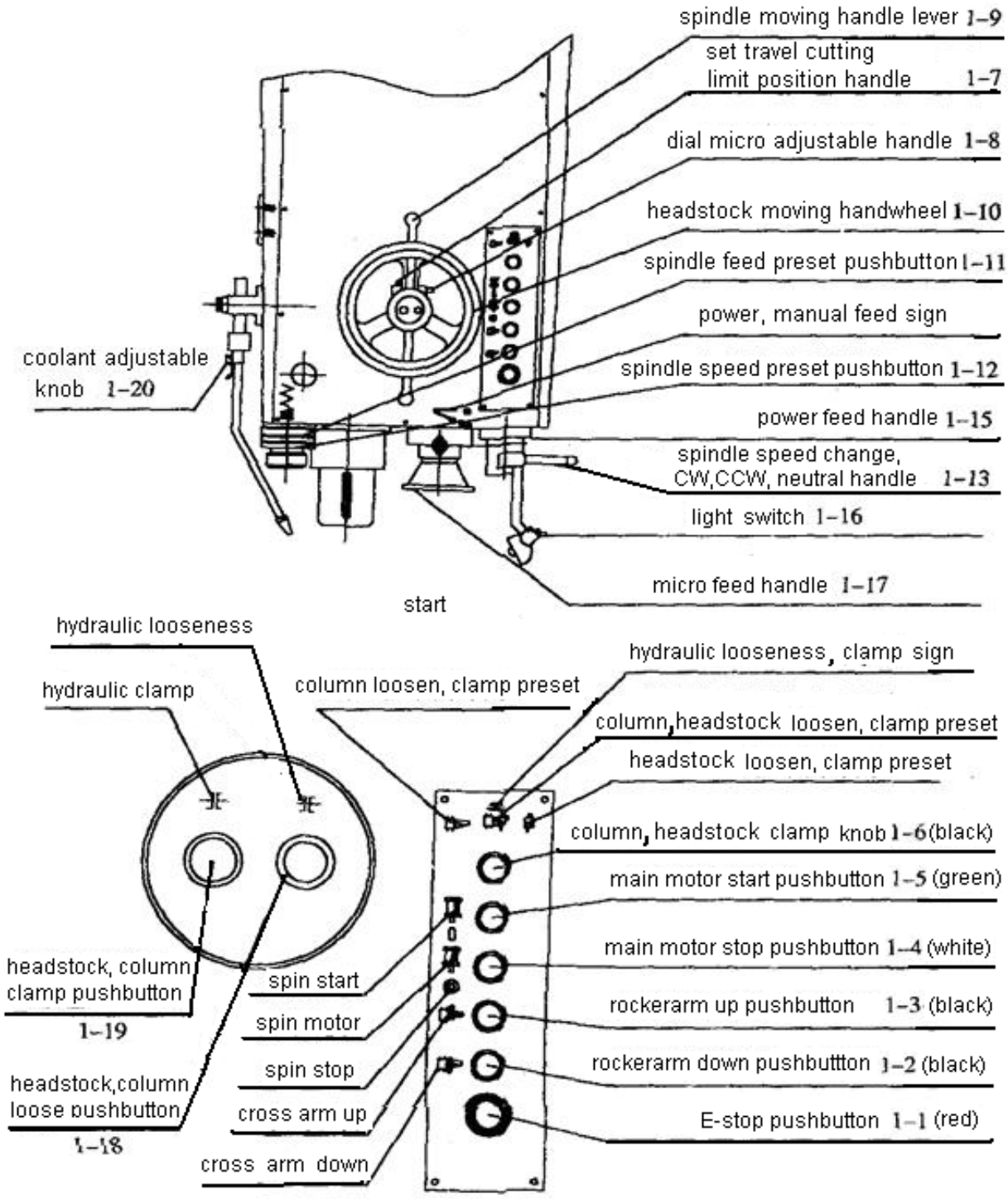

spindle moving handle lever 1–9
set travel cutting limit position handle 1–7
dial micro adjustable handle 1–8
headstock moving handwheel 1–10
spindle feed preset pushbutton 1–11
power, manual feed sign
spindle speed preset pushbutton 1–12
power feed handle 1–15
spindle speed change, CW,CCW, neutral handle 1–13
light switch 1–16
micro feed handle 1–17
coolant adjustable knob 1–20
start
hydraulic looseness
hydraulic clamp
column loosen, clamp preset
hydraulic looseness, clamp sign
column,headstock loosen, clamp preset
headstock loosen, clamp preset
column, headstock clamp knob 1–6(black)
main motor start pushbutton 1–5 (green)
main motor stop pushbutton 1–4 (white)
rockerarm up pushbutton 1–3 (black)
rockerarm down pushbuttton 1–2 (black)
E-stop pushbutton 1–1 (red)
headstock, column clamp pushbutton 1–19
headstock,column loose pushbutton 1–18
spin start
spin motor
spin stop
cross arm up
cross arm down

Figure 3.1

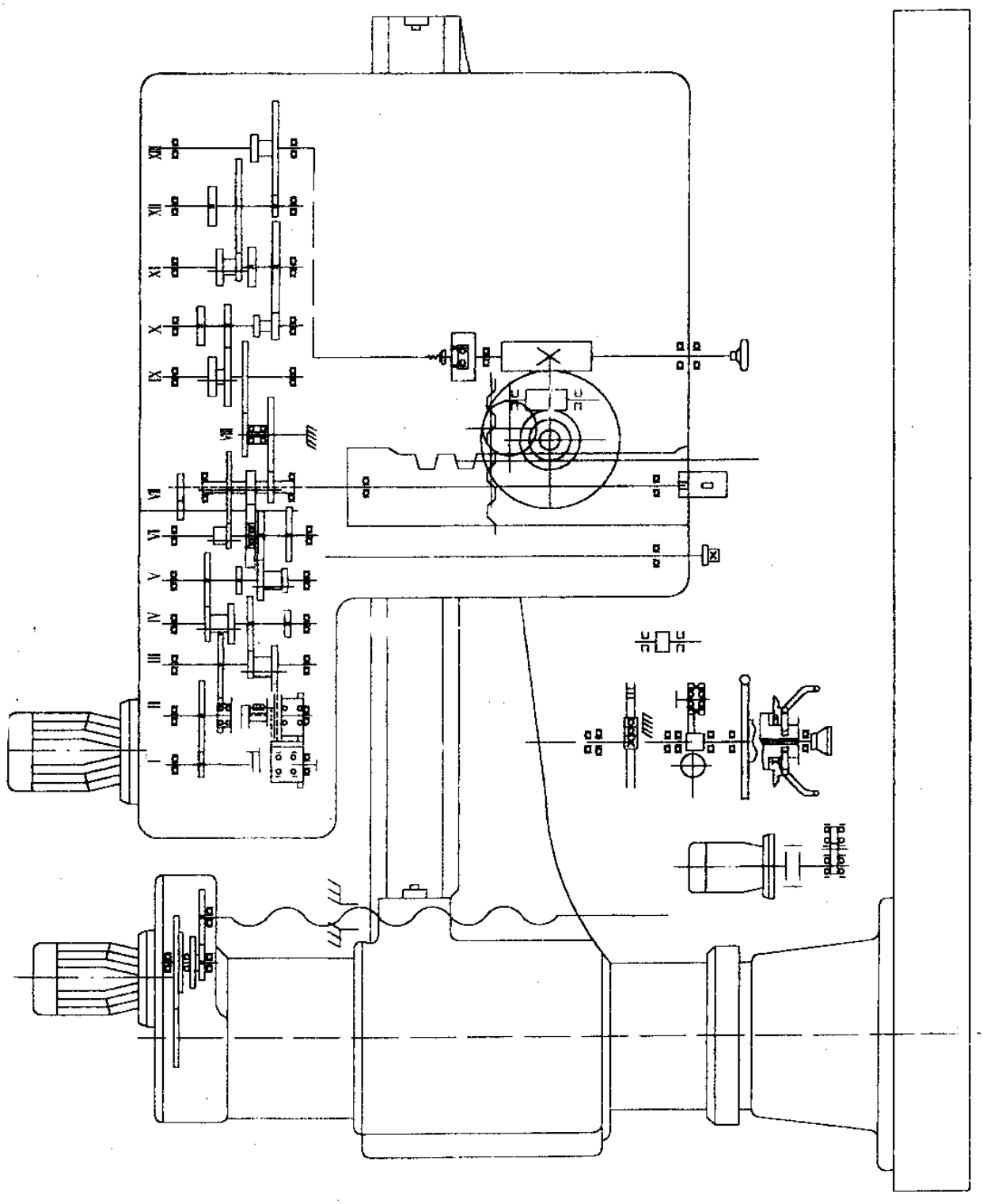


Figure 3.4

4. OPERATION OF THE MACHINE

Operate the machine only after trial run.

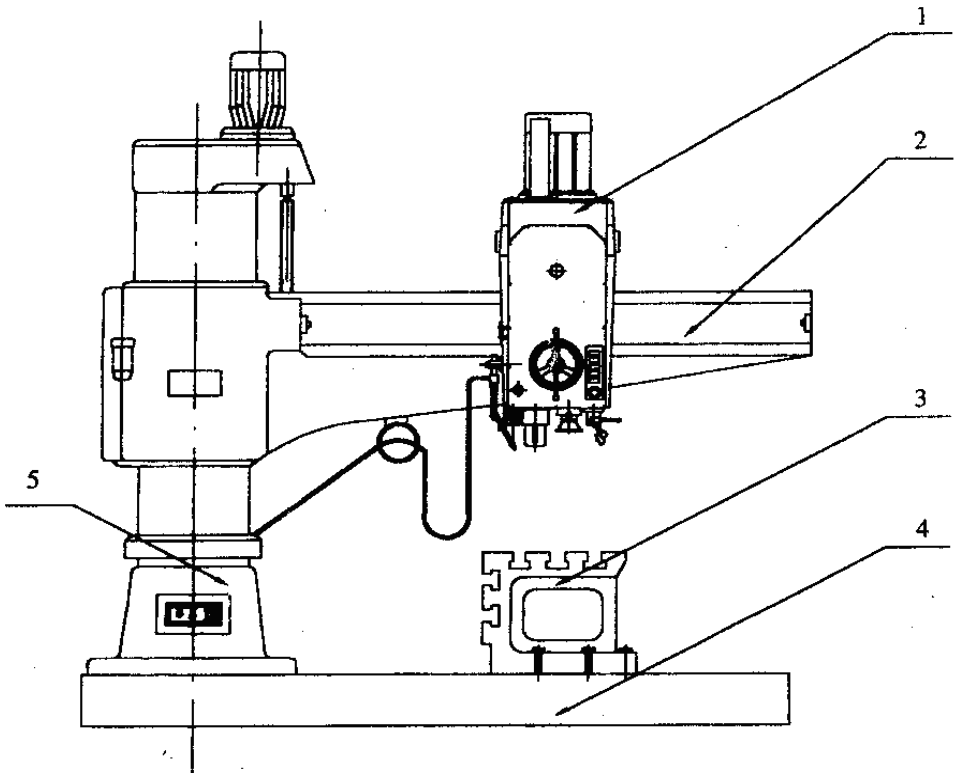


Figure 4.1

No.	1	2	3	4	5
Name	headstock	arm	table	base	column

NOTE：1．Check that the locking plate in Figure 2.4 is removed;

2．Check that the joint is removed and the oil pipe is connected well. (1 in Figure .2.3).

4.1 STEPS TO PREPARE THE MACHINE

4.1.1 Turn on the main switch 4-1 on the column, then push the startup button of the coolant pump 4-3 (Fig. 4.4) and turn on the switch of the lamp (Fig.3.1);

4.1.2 Clamp the work piece on the worktable.

4.1.3 Adjust the arm to the appropriate position according to the exact height of

the work piece. (button 1-2,1-3)

4.1.4 Turn the knob 1-6 to choose the clamp mode of the headstock and column.

4.1.5 Loosen the clamp of the headstock and column through pushing the button 1-18.

4.1.6 Adjust the headstock to the appropriate position along the guide way of the arm by turning the hand wheel 1-10;

4.1.7 Adjust the arm horizontally to the position desires by turning the hand wheel 1-10.

4.1.8 Push the button 1-19 and make the headstock and column be clamped at the same time.

4.2 AUTOMATICALLY DRILL：

4.2.1 Push the startup button 1-5 of the main motor.

4.2.2 Turn the primary knob 1-12 of the spindle speed and choose desired speed.

4.2.3 Turn primary knob 1-12 of the spindle feed and choose desired feed.

4.2.4 Push down the automatic feed handle 1-15 and link it to the feed state.

4.2.5 Pull out the handle 1-9 and put through the automatic feed.

4.2.7 Speed change of the spindle:

- Push down the CW, CCW handle 1-13 to the position of the speed desired,
- achieve the speed of primary election and feed;
- put up in the horizontal position,
- move the handle left to the clockwise position, then automatic drilling and cutting can be carried through.

4.3 TWO INSTANCES OF MANUAL FEED:

4.3.1 Change automatic feed into manual feed: Push the handle 1-9, disconnect the automatic feed and then manually control the handle 1-9.

4.3.2 The manual feed: when the operation begins, if the handle 1-15 of the automatic feed is not pushed down, the automatic feed cannot be performed; rotate the hand wheel 1-9 counterclockwise to realize a manual feed.

4.4 TAPPING

4.4.1 Push the startup button 1-5 of the main motor.

4.4.2 Rotate the primary knob 1-12 of the spindle speed and feed knob 1-11.

Choose the spindle speed and feed rate desired.

4.4.3 Turn the spindle clockwise or counterclockwise; push down the speed change handle 1-13 to the speed change position for three seconds. Put it up to the position of clockwise rotation, now the screw thread can be drilled. After reaching the preset depth, move the handle 1-13 to reverse to unthread the tool.

4.5 NEUTRAL SPINDLE/SPEED CHANGE：

Follow Fig.4.2. Turn up the handle 1-13, it is easy to turn the spindle manually. To start up the spindle, push down 1-13 to the position of speed change until the spindle turns, and then move it to clockwise rotation and reversal.

4.6 SPINDLE CLOCKWISE AND COUNTERCLOCKWISE ROTATION

As shown in the Fig.4.2, adjust the handle to the position of the clockwise and counterclockwise rotation after the main motor starts up, which means the spindle will turn clockwise and counterclockwise.

4.7 SPINDLE SPEED

4.7.1 Automatic feed：Push down the handle 1-15, then pull out the handle 1-9, let the automatic feed work through.

4.7.2 Manual feed: Push the handle 1-9, rotate it, drive the spindle feed up or down.

4.7.3 Micro feed: Put the handle 1-15 in the horizontal position and then pull out handle 1-9, turn handle wheel 1-17.

4.7.4 Setting stroke cutting: As shown in the Fig. 4.3, pull out the handle 1-7, and after turning the handle 1-8 to the position in the picture, turn the dial to the cutting depth desired.

Aline it with “0” in the box size, and then turn the handle 1-8 to the position shown in Fig.4.3.

Clamp handle 1-8 using the clamp knob on the other end, push handle 1-7, turn on feed switch. When cutting depth reaches the preset stroke value，handle 1-15 is put up automatically and the cutting is completed.

4.8 STOP THE MACHINE WITH OPERATED PROCEDURE

4.8.1 Put up automatic feed handle 1-15 and disconnect automatic feed.

4.8.2 Push moving handle 1-9 of the spindle and disconnect automatic feed.
4.8.3 Clamp headstock and column.
4.8.4 Stop the running of main motor by pushing the button.
4.8.5 Turn off the coolant switch.
4.8.6 Turn off the switch of the main power supply.

ATTENTION：

1. When drilling to the critical state of a desired size，the feed capacity must be minished to avoid destroying the tool.
2. If not operating properly, the worker must push the red emergency-stop button (1-1) on the plate of the headstock at once.

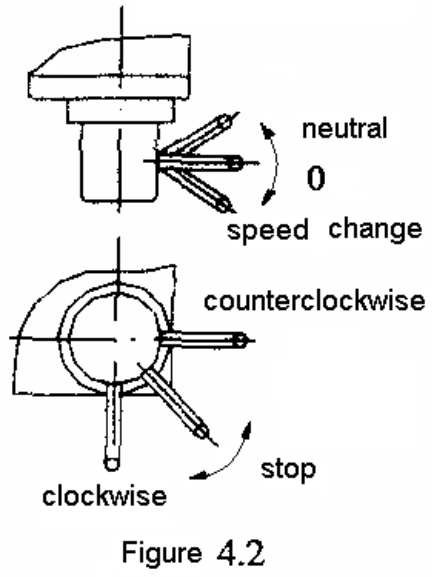


Figure 4.2

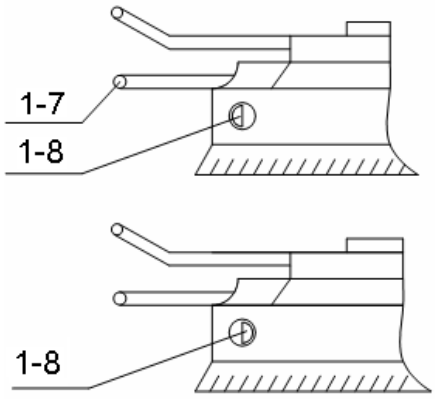


Figure 4.3

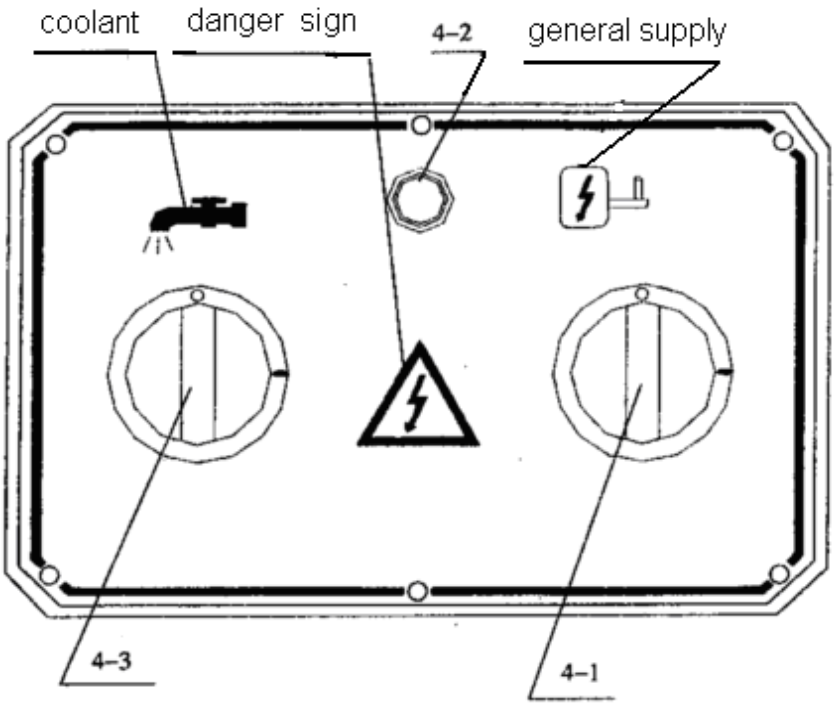


Figure 4.4

No.	Name
4—1	Main switch(red)
4—2	Power light
4—3	Cooling switch(black)

Symptom	Possible cause	Corrective action	Remark
Main motor does not turn when pushing the startup button.	Main switch is not switched on； startup button is not connected properly; the relay does not activate; junction box of the main motor and connected point are not connected well or the joint break is off.	Open the main switch, check the joint of the startup button; check every connected point of the relay in the junction box, and connect them. Replace bad fuses with new ones if necessary.	
Spindle speed change operation handle doesn't work properly	Speed change oil pump is in a single direction, the motor's turning is wrong, the pump does not inhale the oil, so it cannot drive the shifting fork to push the friction disk up or down	Change random two wires of the main motor.	
The spindle and surface of the machine is leaking oil.	There is too much oil in the oil box, it leaks from the top of the bearing house	Do not exceed the mark when adding oil.	
Lead screw of box is leaking oil.	There is too much oil in the oil box, the redundant oil is leaking out from the bearing on the screw.	Add oil according to the mark, do not exceed the mark.	
The headstock cannot be clamped.	The clearance of 55° guide way between the headstock and the rocker is too big; the position of the clamp block 3 is wrong; the connection between the clamp oil cylinder and brake frame leaks oil or oil pipe 1 leaks oil; magnitude of interference of rhombic block is not enough, it cannot self-lock.	Adjust bolt 5 to make the clearance between the 55° guide ways not more than 0.04mm,(check with the 0.04 clearance gauge); in the state of looseness, loosen bolt 2 and adjust clamp block 3 to appropriate position, then tighten bolt 2 again.	see Fig.7.1

Headstock does not move after pushing the pushbutton of headstock or doesn't move properly	1. Loosen bolt 2, clamp block 3 moves too when moving headstock, which makes the clearance between the clamp block and the guide way to be reduces, so this affects the movement of the headstock. 2 If it's not flexible when moving headstock, please check if the ball bearing is broken.	Check if bolt 2 is loose on the clamp block, and replace the ball bearing on the clamp plate.	See Fig.7.1
The column cannot be clamped	The bolts are adjusted too tight on the spring plate, which makes the column be too tight, rhombic block clamp cannot make the inner and outside surface of the column tight; the nut 6 is not adjusted appropriately, which will produce clearance between the lever and the box; there is not enough pressure oil to drive the piston, so make the rhombic block not be in the state of clamping.	Readjust the bolt on the spring plate, but make sure the force when rocker is loose, then adjust the nut on the column to make the clamp force reach 1568N(thrust in the end of rocker), then use the bolt to tighten the nut; adjust the nut 6 to diminish the clearance between lever and box if loosen the column too little, then tighten the 4 bolts in the nut 7; adjust the oil in the hydraulic system and make sure the oil is in the state of 245～291X10^4Pa or changing the oil in the oil tank.	See Fig.7.2

The arm cannot be clamped.	Bolt 1 is not adjusted appropriately, there is clearance between the arm and outside of column when the rocker is in the state of clamping, the limit switch is near the piston, piston touched the limit switch when piston does not reach the position of clamping, which makes the hydraulic motor stop supplying the oil.	Remove the side cover, loosen the clamping nut or adjust bolt 1, not only make sure the clearance is of 0.04mm, but that also the clearance gauge is not inserted, and make sure the rhombic block self-locks；adjust the position of the limit switch to make the normal close point of the limit switch disconnect in the state of clamping，and make rhombic block be in the position of clamping, please refer to headstock clamp organ about the rhombic block.	See Fig.7.3

ATTENTION:

1. If there is a serious malfunction and the headstock has to be opened, only a professional technician should repair the machine.
2. If there is some malfunction, the machine needs to be tested again after eliminating the malfunction.

6. DISPOSAL OF MALFUNCTION

The machine is a universal tool. During the process of a workpiece, the spindle parts and tools can move up, down, or rotate. The operator must stay safe during the process of the machining, once the malfunctioning occurs, such as an engulfment, impact and brush burn, first the operator should push down the red emergency-stop knob 1-1. Then eliminate the malfunction, and finally switch on the main switch 4-1 after all the malfunction is eliminated.

7. MAINTENANCE AND ADJUSTMENT OF THE MACHINE

7.1 MAINTENANCE：

7.1.1 The machine must be lubricated according to the operation manual during the operation, the strainer must be cleaned frequently and the oil should be kept clean.

7.1.2 The guide way of the rocker and column should be kept clean, and should be lubricated often to avoid injury.

7.1.3 The table and base must be kept clean, the scrap iron should be cleaned frequently, do not clean them directly by hand to avoid injury.

7.1.4 The coolant must be changed every month, and kept clean, any impurity such as scrap iron in the coolant is deposited in the entrance of the coolant box, so scrap iron should be disposed every day.

7.1.5 The spindle must be cleaned before inserting the tools.

7.1.6 Maintenance of the electrical equipment:

The electrical equipment must be clean, so the dust and dirt must be cleaned often. The loop should not be cleaned with kerosene or gasoline. The motor should be checked once a year, and the bearing needs to be cleaned once a year too. The oil must be changed once a year at least. The bearing of the motor must be lubricated with grease. All relays should be cleaned carefully. Rusted relays must be exchanged for new ones. Relays should not be oiled. The frayed and oxygen part must be renewed with a file.

7.2 ADJUSTMENT OF THE MACHINE

7.2.1 Adjustment of the spindle clamp force (see Figure 7.1)

Loosen screw 2 and remove screw 3 to adjust spindle clamp force. Bear 392N circle force on the verge of the wheel, which is ok when the headstock cannot be loose. Adjust the gap between the arm and the headstock with bolt 5 and 6, use the 0.04mm thickness gauge to examine, but the demand depth can’t be deeper than 20mm; achieve the demand of the headstock, the headstock can be moved when the bear circle forces on the verge of the wheel, then screw down the bolts.

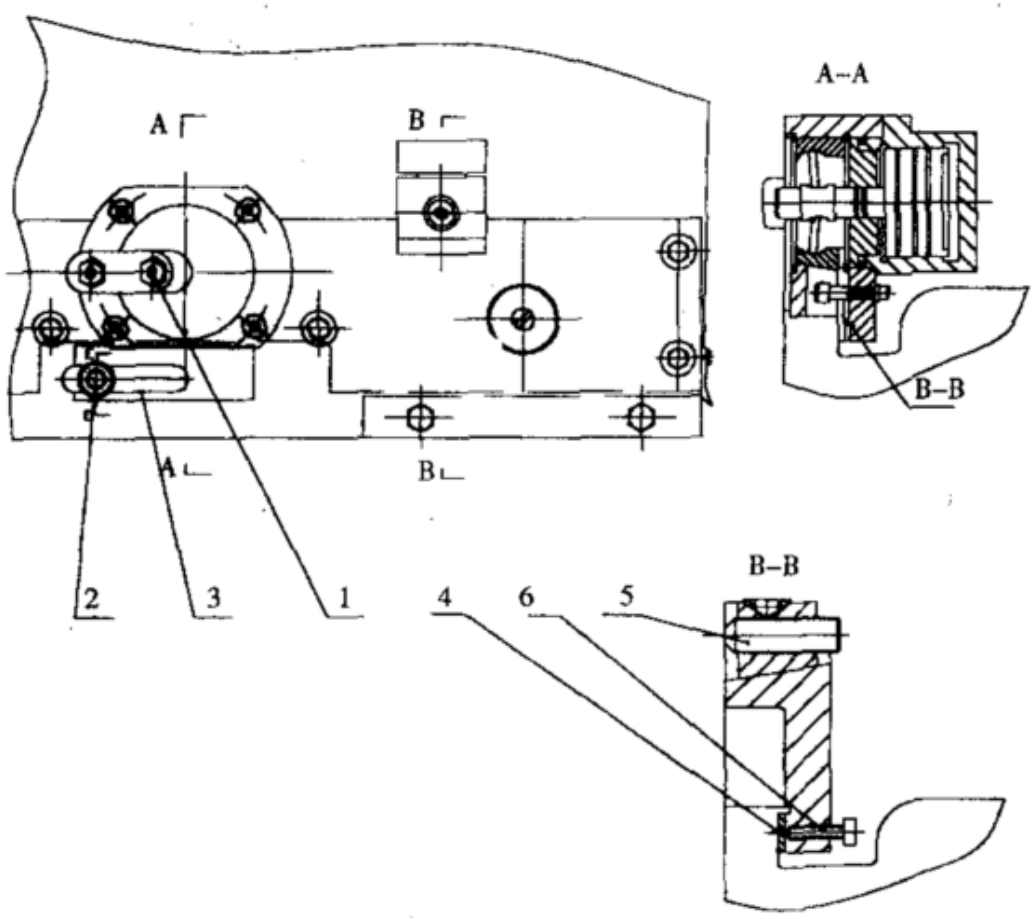


Figure 7.1

7.2.2 Adjustment of the column clamp force:

The bolt 3 is used for adjusting the clearance of the inside and outside cone-shaped surface of the column. Please force the bolt uniformly when adjusting it. Use the nut 7 to adjust the column's clamping force. If operator bears 1568N force on the end of the arm, the column can't be swiveled, but it can be swiveled after loosened and bear 29N horizontal strength, please screw down bolt 6 and screw nut 7. (See Fig. 7.2).

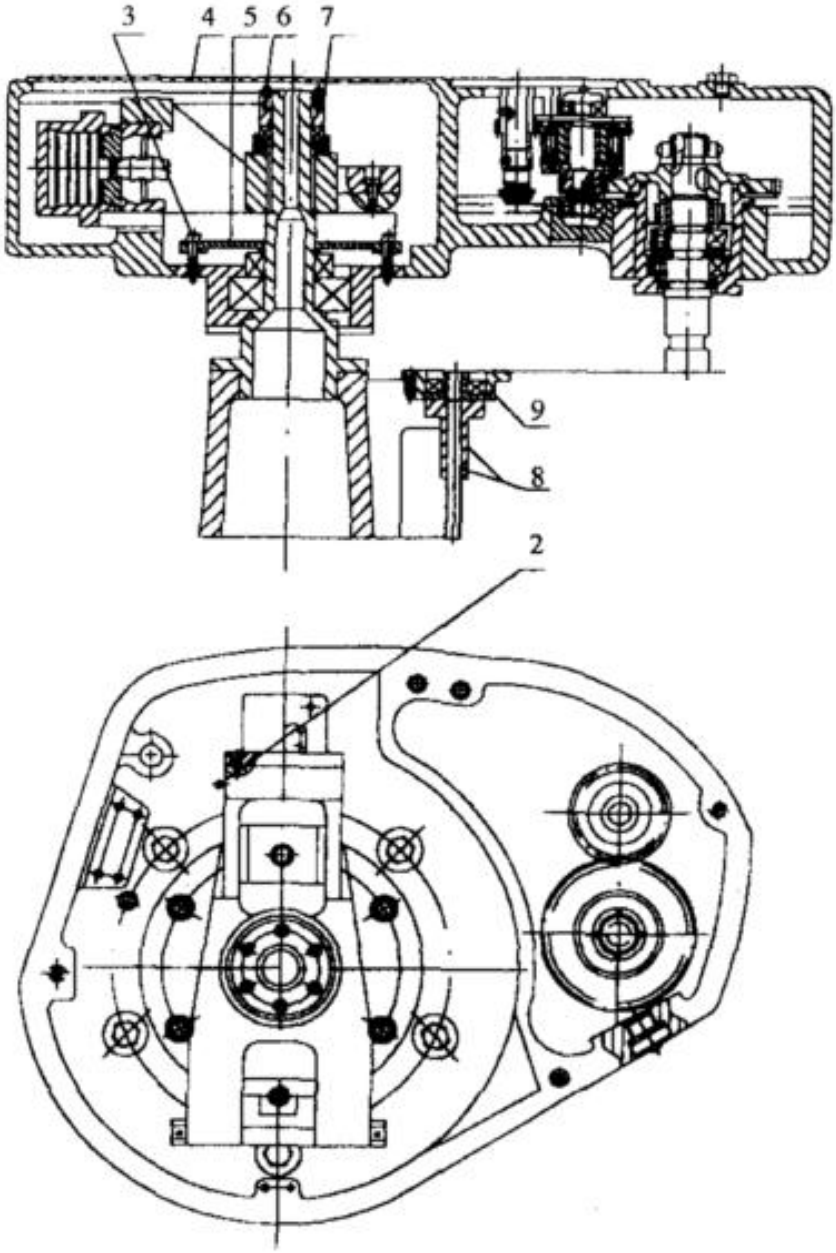


Figure 7.2

7.2.3 Adjustment of the arm clamp force (see picture 7.3):

Shut off the power while elevating or adjusting the arm, then the arm will be lax. Adjust the bolt 1, 2, 3 and 4 befittingly to make sure the 0.04mm clearance gauge can't be inserted when clamping the arm.

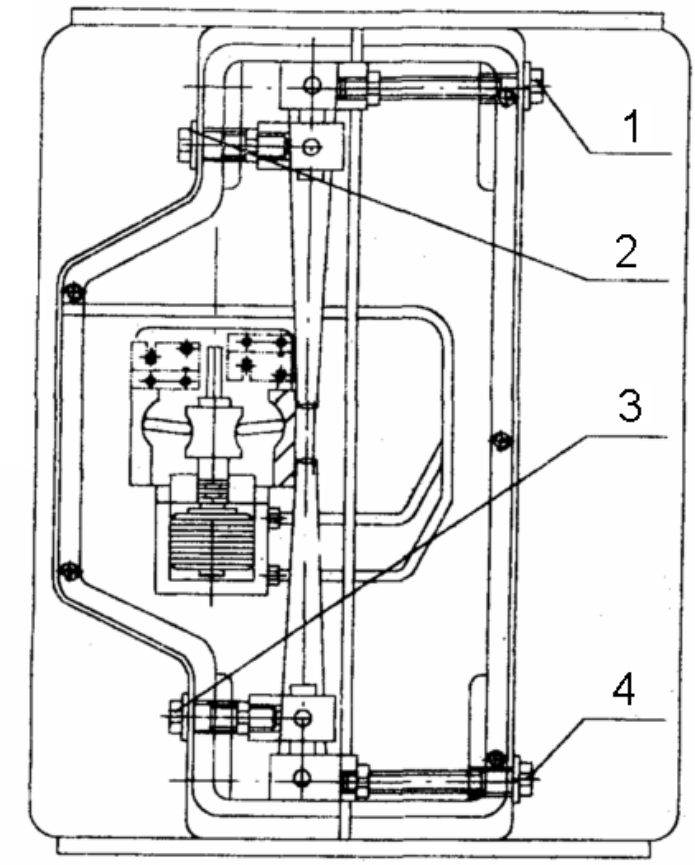


Figure 7.3

8. HYDRAULIC SYSTEM OF MACHINE

The hydraulic system of the machine consists of the controls and the clamping mechanisms.

8.1 CONTROL ORGAN OF THE HYDRAULIC SYSTEM (Figure 8.2)

The control valve and pre-election valve are installed at the top of the headstock. The spindle speed pre-election valve and the feed pre-election valve are six-way turning valves, each valve controls four differential motion oil cylinders to realize a step speed change. The control valve is 5-bit and six-way turning valve, which controls the clockwise, counter-clockwise, speed, neutral and brake oil cylinder.

Oil the machine as following:

Action / No.	1	2	3	4	5	6
Clockwise	+	-	-	-	+	-
Counterclockwise	-	+	-	-	+	-
Speed change	+	+	+	-	+	-
Neutral	-	-	-	+	+	-
Stop	-	-	-	-	-	-

remark：“+”: high pressure oil， “—”: low pressure oil

Connection of every oil way：

1．Clockwise oil cylinder
2．Counterclockwise oil cylinder
3．Preelection valve
4．Neutral oil cylinder
5．Oil pump outlet
6．Scavenge oil mouth

The high pressure oil enters the pre-election valve to push the Speed change oil cylinder, which drives a shifting gear to change the speed. The high pressure oil enters to the clockwise oil cylinder simultaneously through an eyelet during the speed change. Because the oil cylinder's area is different (clockwise cylinder's area is bigger than counter-clockwise cylinder's area), it causes the shifting fork to push the friction disk and to push clockwise the friction disk with a little force, then the transmission chain can be started.

When the control valve is in stop position, the oil way ⑤ directly scavenges the oil way ⑥, and the whole system is in low-pressure state. At this time, the spring will be loose because without the push of the oil way ⑤ it will push the friction disk heavily and it will make the transmission chain to start, then the spindle will stop.

Please attach the oil pipe as shown in the picture 8.3. Make sure the end of No.1 oil pipe is into the oil net when inserting No.1 oil pipe and cleaning the oil net, or else, the hydraulic pressure system will possibly get damaged.

The hydraulic pressure system's force is controlled by the spring 3 in an overfalling valve on the oil pump, the force is $156.8x10^4 \sim 196x10^4$ Pa.

8.2 HYDRAULIC CLAMPING SYSTEM (Figure 8.1)

The oil impels the piston to realize clamping and looseness of the headstock, column and arm through a rhombic block. The clamping or looseness of the arm is controlled by an electromagnetic valve separately. But the clamping and looseness of the headstock and column can be done at the same time too. These operations are controlled by the pushbuttons 1-6 on the headstock.

When the operator clamps or loosens the headstock or column, adjust the pushbuttons 1-6 to the designated position (middle position is for linkage looseness, right is for loosening headstock separately, left is for loosening column separately), then start the clamp motor. The oil from the oil pump will flow into the clamp oil cylinder through a distributor that impels the piston and rhombic block to realize the clamping.

The hydraulic system has a closed circulation type: its acting force is $250x10^4 \sim 280x10^4$ Pa. Because the oil cylinder's area is different, part of the oil is supplied when oiling into the big oil cavity, superfluous oil will leak when oiling into the small cavity. Oil leaking will flow back to the oil tank. The system does not bring excessive pressure phenomenon and low pressure phenomenon due to low efficiency of cubage.

8.3 COOLANT

Use coolant during processing the steel, ream, tapping.
Push the switch 4-3(see picture 4.4) to start the coolant pump, and adjust the knob 1-20 (see picture 3.1) to control the flux.

NOTE: Make sure the nozzle is directed to the processing part.
Don't use a flammable and deleterious coolant.

Coolants list：

Purpose	Component	Property	Remark
Drill steel	Emulsification plaster 3～5%，soda ash 0.2～0.35%，sodium nitrite 0.25～5%，water		
Ream	Emulsification plaster 3～5%，soda ash 0.2～0.35%，sodium nitrite 0.25～5%，water	Nonflam-Mable, antirust	
Tapping	Oxidation Paraffin 40%，kerosene 30%，transformer oil 30%。		Smear them on the cutter before tapping

8.4 DISPOSAL OF COOLANT

The coolant box is at the back of the machine's base, the coolant can be used circularly. Please change it when it's dirty.

Method: Open the coolant pump, let the coolant flow to an empty container, use the dishcloth to clean the box and after that you can put the new coolant.
The impurities, such as scrap iron, remains on the portal of the coolant box, please clean it often.

Hydraulic and Clamping System Diagram

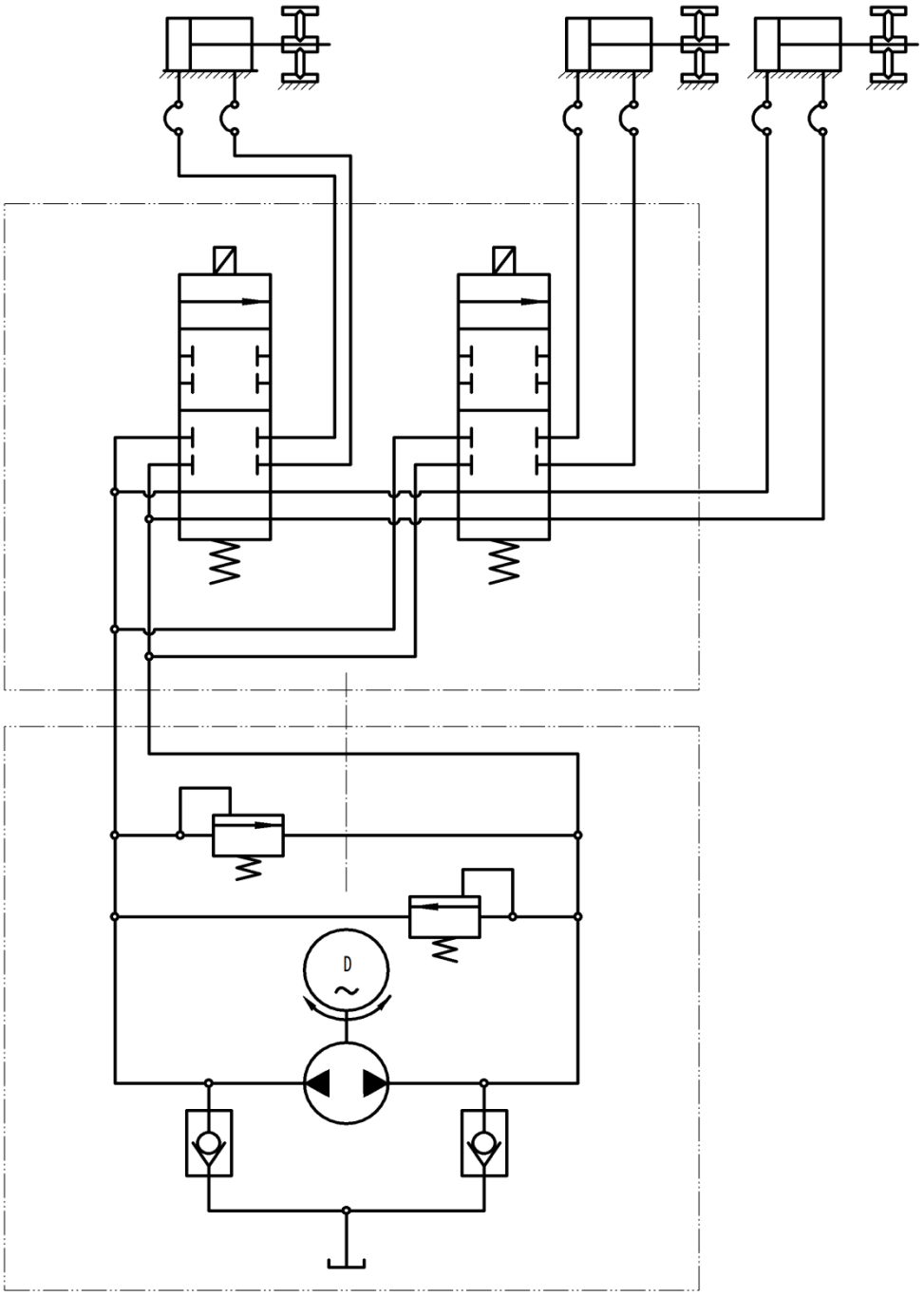


Figure 8.1

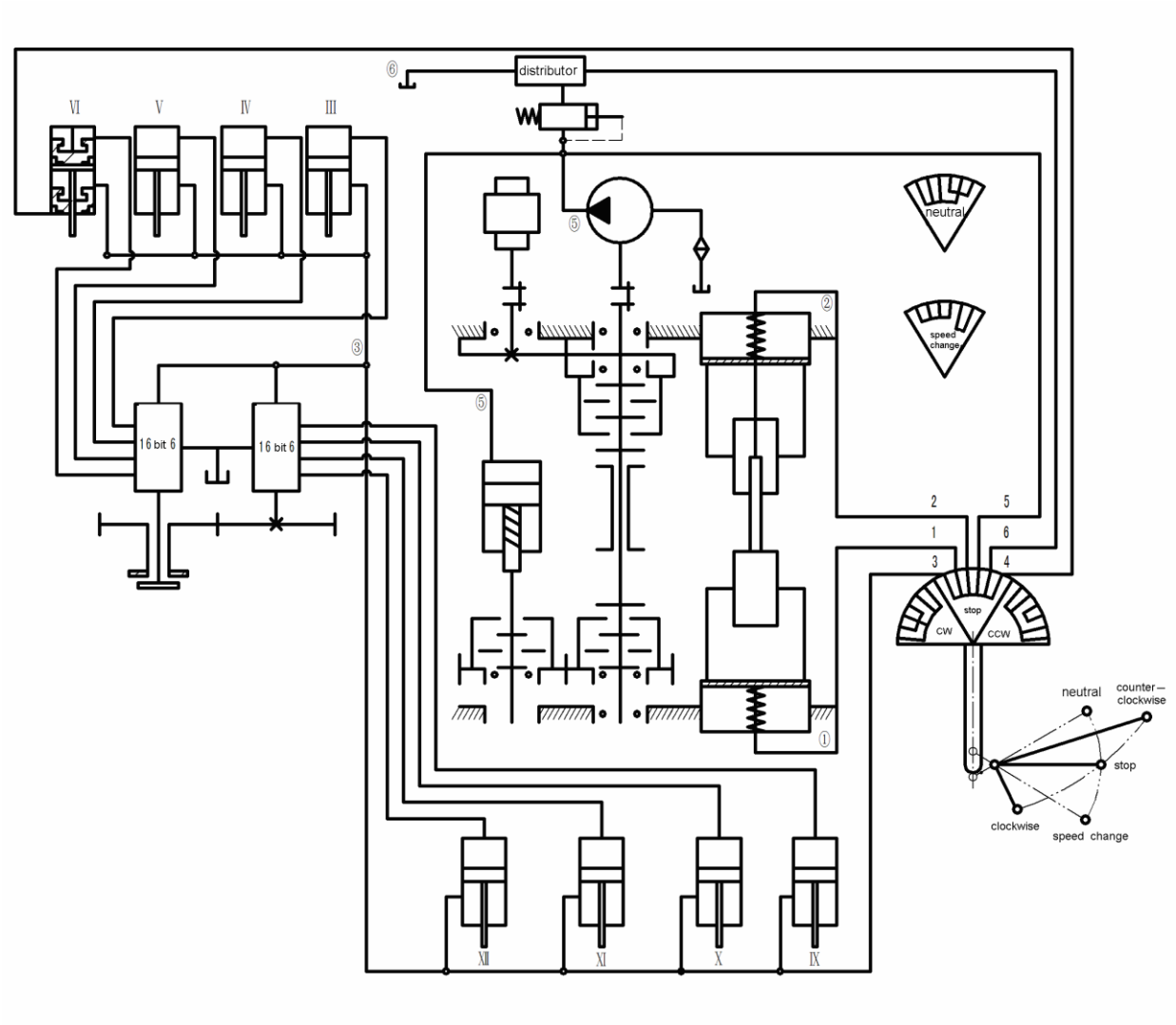

distributor
VI
V
IV
III
neutral
speed change
16 bit 6
16 bit 6
2
5
1
6
3
4
stop
CW
CCW
neutral
counter–clockwise
stop
clockwise
speed change
XII
XI
X
IX

Figure 8.2

Commutation table of speed change oil cylinder

rotating speed \ oil cylinder number	III	IV	V	VI	rotating speed \ oil cylinder number	IX	X	XI	XII
2000	+	+	-	+	3.20(0.126″)	+	+	-	-
1250	-	+	-	+	2.0(0.0787″)	+	-	-	-
800	+	+	+	+	1.25(0.0492″)	-	+	-	-
630	+	-	-	+	1.0(0.0394″)	+	+	+	-
500	-	+	+	+	0.8(0.0315″)	-	-	-	-
400	-	-	-	+	0.63(0.0248″)	+	-	+	-
320	+	+	-	-	0.5(0.0197″)	+	+	-	+
250	+	-	+	+	0.4(0.0157″)	-	+	+	-
200	-	+	-	-	0.32(0.0126″)	+	-	-	+
160	-	-	+	+	0.25(0.0098″)	-	-	+	-
125	+	+	+	-	0.2(0.0079″)	-	+	-	+
100	+	-	-	-	0.16(0.0063″)	+	+	+	+
90	-	+	+	-	0.13(0.0051″)	-	-	-	+
63	-	-	-	-	0.1(0.0039″)	+	-	+	+
40	+	-	+	-	0.06(0.0024″)	-	+	+	+
25	-	-	+	-	0.04(0.0016″)	-	-	+	+

Hydraulic hose Connections

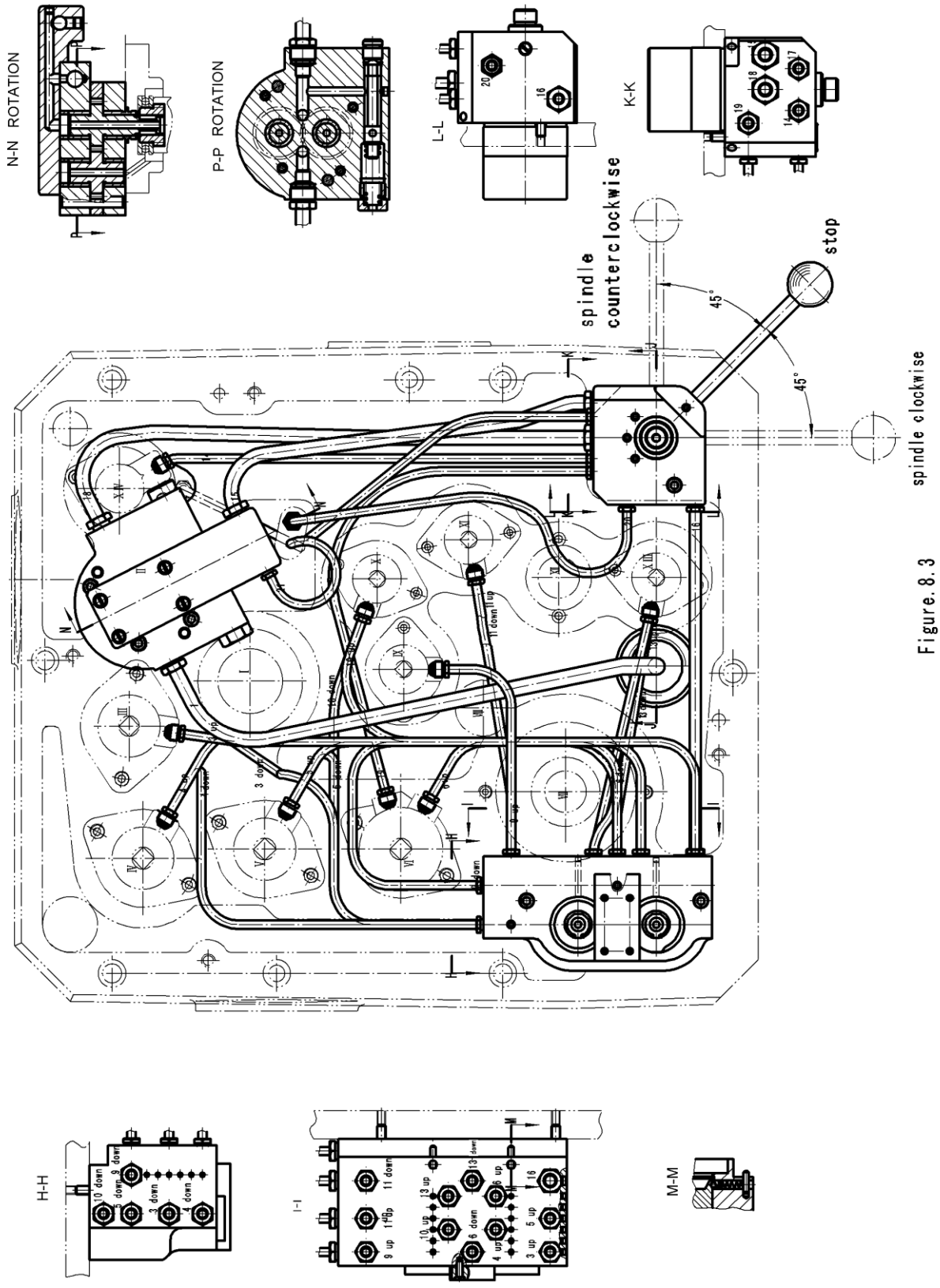


Figure. 8. 3

9. ELECTRIC SYSTEM OF MACHINE

9.1 VOLTAGE

9.1.1 Rated voltage：3 Phase, 380/220/415 Volts

9.1.2 Voltage range: Normal voltage is 0.9~1.1 times of rated voltage.

9.1.3 Frequency：50/60Hz.

9.1.4 Frequency range：0.99—1.01 times of rated frequency (continuous).
0.98—1.02 times of rated frequency (short-term operation).

9.1.5 Imbalance voltage: Negative sequence and zero sequence of three-phase do not exceed 2% of positive sequence.

9.1.6 Voltage interruption: Interrupt power or zero voltage duration does not exceed 3sm, interval falling time does not exceed 1s during random time of power cycle.

9.1.7 Voltage fall: Voltage fall does not exceed 20% of peak value voltage in 1 cycle，falling interval time should be more than 1s.

9.1.8 Maximum start-up current: 67.62A.

9.1.9 Control loop voltage: AC 110V; Lighting voltage：AC 24V。

9.1.10 All motors which are used for transmission, as following：

M1—main motor.
M2—Elevating motor of arm.
M3—Hydraulic pressure motor
M4—cooling pump

Caution: DO NOT turn the arm in one direction continuously to avoid twisting off wires since there is not control ring on the top of the column.

9.2 SETTING

9.2.1 Current protector: 20A breaker.

9.2.2 Check the phase sequence of the machine:

The headstock will loosen when pushing the headstock looseness button, which indicates the phase sequence of machine is right, otherwise adjust the position. Adjust the phase sequence of the elevating motor after adjusting the phase sequence of the main power.

9.3 CIRCUIT EXPLANATION (refer to electric chart)

9.3.1 Preparation before starting the machine：

Open the door of the electric box on the cross arm, then switch on the breaker QF2, QF3, finally, close the door.

9.3.2 Start：

Turn on the main switch under the column, a power light HL1 will light up when the electricity is switched on.

9.3.3 Run of the spindle motor:

Push the start pushbutton SB3, the AC contactor KM1 will close and self-lock, the spindle motor will turn. Push the stop pushbutton SB2, AC contactor KM1 will release and the spindle will stop turning.

Set thermal relay FR1 to avoid an overload running from the spindle motor. The value is set according to the current info on the name plate of the spindle motor.

9.3.4 Rise and fall of arm:

Push up (or down) button SB4 (or SB5), the contactor KM4 will close, the motor M3 clockwise will turn, the pressure oil enters the arm loose oil cavity by distributor to push piston and rhombic block, which make the arm loosen, at the same time, the piston pushes the limit switch SQ2 with a spring reed that makes the AC contactor KM4 to break, and makes the AC contactor KM2 to close. The motor M3 will stop turning and the motor M2 will turn to drive the arm up or down.

If the arm does not loosen, the limit switch SQ2 cannot close, and the AC contactor KM2 will not close, so the arm cannot rise or fall.

When the arm reaches the target position, it will stop rising or falling when loosening the pushbutton SB4 (or SB5).

The AC contactor KM5 closes 1.5 second later and the motor M3 counterclockwise will turn to supply the pressure oil. The pressure oil enters the clamp cavity to make the arm clamp, at the same time, a piston pushes the limit switch SQ3 with a spring reed to turn off the AC contactor KM5, at last, the motor M3 will stop turning.

The limit switch SQ1 (SQ1a,SQ1b) is to limit the travel of the arm; the limit switch SQ1（SQ1a, SQ1b）acts when the arm reaches the target position, then the AC contactor KM2 will break, the motor M2 will stop turning, and the arm will stop the vertical movement.

The automatic clamp of the arm is controlled by the limit switch SQ3, and

there are several conditions in which the hydraulic pressure motor could overload running for a long time. These conditions might be that there is a malfunctioning on the hydraulic pressure system's clamp, or the limit switch SQ3 is adjusted improperly, which doesn't make the touch spot disconnect after clamping the arm.

Set thermal relay FR2 to avoid overload running of hydraulic pressure motor. The value is set according to the current info on the name plate of motor M3.

9.3.5 Looseness or clamping of the column and headstock can be done separately or synchronously.

9.3.5.1 Synchronous looseness or Clamping of the column and headstock:

Turn the switch SA to the middle position, at this time push the loose button SB6, the electromagnet YV1 and YV2 attracts, AC contactor KM4 attracts, the motor M3 clockwise will turn to make the pressure oil enter to the loose oil cavity and drive the piston and rhombic block, which will make the column and headstock to loosen.

9.3.5.2 Looseness or Clamping of the column and headstock can be done separately:

Turn the switch SA left, at this time push the loose button SB6, the electromagnet YV1 and YV2 attracts separately, the AC contactor KM4 attracts, the motor M3 clockwise will turn to make the pressure oil enter the loose oil cavity to drive the piston and rhombic block, which will make the column and headstock to loosen separately.

9.3.6 Start and Stop the Cooling pump

The power of the cooling motor can be connected and disconnected by turning the switch QS2.

9.3.7 Emergency stop and release

Push the Emergency stop button SB1, the machine will stop; turn the Emergency stop button SB1 as the direction of the arrow to reset.

Caution: Some of the electrical parts are still charged when pushing

The Emergency stop button SB1 on the machine is nonelectrified only after turning off the main power switch QS1.

9.3.8 Stop the machine：

The operator must switch off the main power switch QS1 before repairing any part of the machine.

9.4 MAINTENACE ADJUSTMENT OF ELECTRICAL EQUIPMENTS

Caution:

a. Be careful with the wire of the main switch and relay which is still electrified during checking the electrical equipment.

b. Turn off the switch QS1 before opening the electrical door.

9.4.1 Adjustment:

9.4.1.1 The angle of the elevating limit switch is adjusted before leaving the factory. If the elevating switch fails or the arm doesn't work after pushing the button: open the cover of the limit switch, if the switch SQ1 has a fault, adjust the angle, then close the cover and screw down the bolts.

9.4.1.2 Adjustment of the micro switches SQ2 and SQ3

The position of the micro switches SQ2 and SQ3 are adjusted properly.

When a fault happens in the vertical direction: remove the end cover on the left of the cross arm, if find cross arm is not loose, or clamp cannot reset; adjust the position of the micro switches SQ2 and SQ3 if the position is not reasonable, and finally fix the adjustable plate well.

9.4.1.3 Setting the current value of thermal relay:

The value is set according to the data on the motor's name plate

9.4.1.4 Running state of PLC: Under normal conditions, the vertical line moves back and forth on the screen after connecting the power. This indicates the PLC is running, otherwise do as following: push ESC→ (some words will appear on the screen), then push the arrow →run, then →OK 2 times and finally →ESC.

When the PLC program stops: after resuming running state of PLC, push the loose (clamp) or up (down) button. If the machine does not work, it means that the data of the PLC has been switched off. In this situation, the PLC needs to be exchanged with a new PLC with program.

9.4.2 Preventive check

The electrical equipment should be inspected yearly, eliminate any equipment that has a fault on it.

9.4.2.1 Measurement of insulated resistance

Measure the main loop and the control loop with a 500V Megohmmeter，the insulated value should be greater than 1 megohm.

9.4.2.2 Check of ground protection

There is a ground protection on every motor, operation panel and electrical

door, Make sure the ground screws are screwed down.

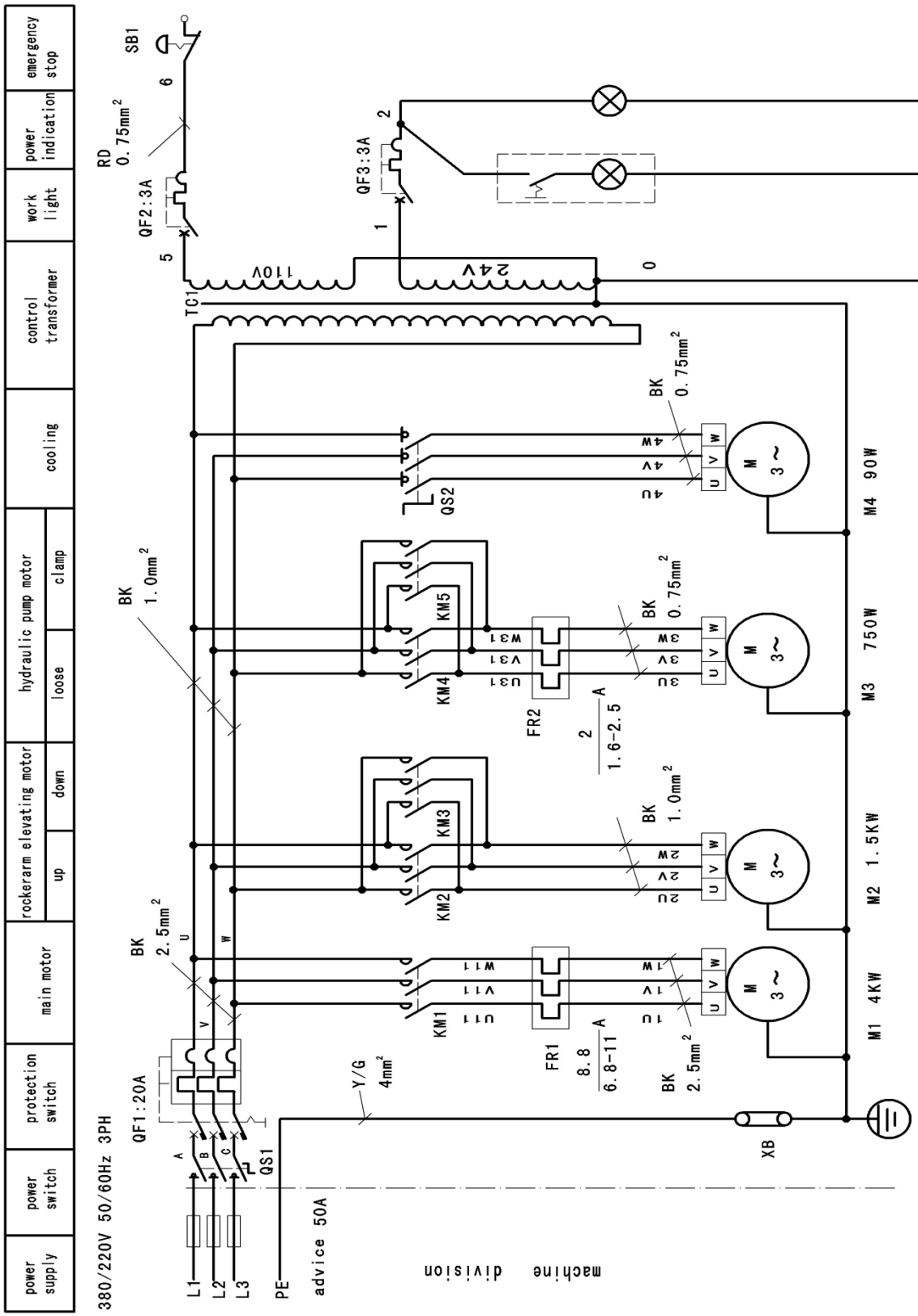
9.4.3 Troubleshooting of electric

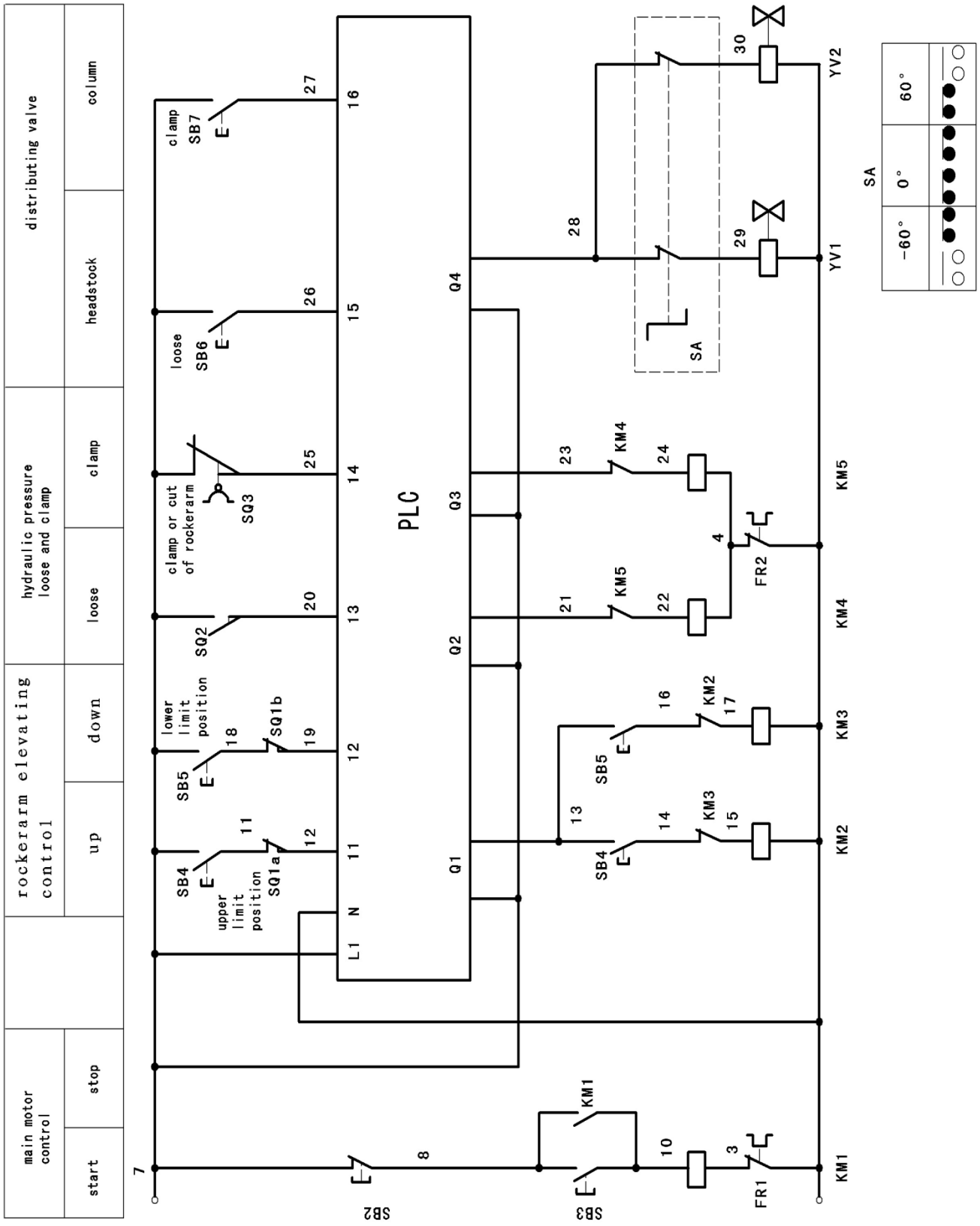
If something differs from the wiring diagram and electrical components, discard.

Symptom	Possible cause	Solution
Spindle does not rotate.	1. The switch is disconnected 2. The relay FR1 overheated or tripped 3. Low voltage 4. Control loop has a fault 5. Motor has a fault 6. Short circuit in line cord or plug.	1. Connect the switch. 2. Reset relay by pushing the reset button after it is cool or replace for a new one. 3. Check power supply for proper voltage. 4. Check control loop and eliminate fault. 5. Check motor and eliminate fault or replace for a new motor. 6. Inspect cord or plug for insulation and shorted wire and replace the extension cord.
Elevation of cross arm has a fault.	1. The switch disconnects. 2. Control loop has a fault. 3. Motor has a fault.	1. Connect the switch. 2. Check control loop and eliminate fault according to wiring diagram. 3. Check motor and eliminate fault or replace for a new motor.

Clamping or looseness of hydraulic pressure has a fault.	1. The switch is disconnected 2. Thermal relay FR2 overheated 3. Control loop has a fault. 4. Mechanism or oil way has a fault.	1. Connect the switch. 2. Reset relay by pushing the reset button after it is cool or replace for a new one. 3. Check control loop and eliminate fault according to wiring diagram. 4. Check mechanism or oil way parts and eliminate fault.
Cooling system has a fault	1. The switch is disconnected 2. Control loop has a fault.	1. Connect the switch. 2. Check control loop and eliminate fault according to wiring diagram.

Electrical Diagram




main motor control
start
stop
rockerarm elevating control
up
down
hydraulic pressure loose and clamp
loose
clamp
distributing valve
headstock
column
PLC
L1
N
Q1
Q2
Q3
Q4
SB2
SB3
SB4
SB5
SB6
SB7
SQ1a
SQ1b
SQ2
SQ3
upper limit position
lower limit position
clamp or cut of rockerarm
loose
clamp
SA
KM1
KM2
KM3
KM4
KM5
FR1
FR2
YV1
YV2
-60°
0°
60°

10. Main Electrical Components List

Code	Name	Specification	Qty	Remark
M1	Motor	Y112M-4 380/220/415V 50/60Hz 3PH 4kW V1	1	
M2	Motor	Y90L-4 380/220/415V 50/60Hz 3PH 1.5kW V1	1	
M3	Motor	YSJ80-4 380/220/415V 50/60Hz 3PH 0.75kW V1	1	
M4	Cooling pump	AOB-25 380/220/415V 50/60Hz 3PH 90W	1	
TC	Control transformer	JBK5-160 160VA I:0-380V O:0-110V(110VA)、0-24V(50VA)	1	
QS1	Power switch	JFD11-25/31 red	1	
QS2	Cooling switch	JFD11-25/31 black	1	
QF1	breaker	DZ47-63(3P 20A)	1	
QF2 QF3	breaker	DZ47-63(1P 3A)	2	
FR1	thermal relay	JR29-25(7-10A)	1	
FR2	thermal relay	JR29-25(1.6-2.5A)	1	
KM1	AC contactor	CJX2-1810(AC 110V)	1	
KM2-KM5	AC contactor	CJX2-0901(AC 110V)	4	
PLC	Intellectual controller		1	
SQ1	Limit switch	HZ4-22	1	
SQ2、SQ3	Limit switch	LX5-11	2	
EL	Working light	JC25(AC 24V 40W)	1	
HL	power light	AD11-22/20(AC 24V) white	1	
SB1	E-stop pushbutton	LAY7-01ZSM/1 red	1	

Code	Name	Specification	Qty	Remark
SB2	Pushbutton	LAY7-01BN/1 red	1	
SB3	Pushbutton	LAY7-10BN/2 green	1	
SB4-SB7	Pushbutton	LAY7-11BN/3 black	4	
SA	Knob	LAY7-02X/3102	1	
YV1-YV2	electromagnetic valve	MFJ1-3(AC 110V)	2	

11. Packing list

NO.	Name	Specification	Qty	Remark
1	Machine		1	Elevating motor was dismantled,it need to be installed by buyer
2	Table	Varies with each model	1	It is on the base of the machine
3	drift	Big,middle,small	1	Each one
4	Reduction Sleeve	3/2,4/3,5/4	1	Each one
5	Foundation bolt	Varies with each model	6	
6	T-slot bolt	M24	4	
7	Drill chuck		1	
8	Arbor	B16	1	