S M T C L

S1-262A PIPE THREADING LATHE

OPERATION MANUAL

(For Mechanical Unit)

SHENYANG NO.1 LATHE WORKS
SHENYANG MACHINE TOOL CO., LTD
THE PEOPLE'S REPUBLIC OF CHINA

THE CHINESE VERSION OF THIS TECHNICAL DOCUMENT IN ENGLISH IS REGARDED AS FINAL.

IT IS NECESSARY FOR YOU TO READ THIS BOOK CAREFULLY AND THOROUGHLY BEFORE OPERATING THE MACHINE.

MATTERS NEEDING ATTENTION TO OPERATION

Before operating the machine, it is necessary for you to read the Instruction Book carefully, thoroughly and be acquainted with all details of the Instruction Book. Only for this doing, you can make the machine run completely and safely.

Before the operation of the machine, the covers, lids and caps, etc. which are dismounted for transportation should be remounted well, and water-proof locations should be sealed with sealant, otherwise, the machine may be not normally started, and also concerned personnel may be hurt and the equipment damaged.

This Instruction Book is compiled according to the present modules. Later, if there is any new module added, we shall revise this Instruction Book at any time. If you need to change a new one due to that the Instruction Book is damaged or lost, pay attention to the points mentioned above, please.

Although this Instruction Book has been checked carefully, if you find there is still a few questionable points, incorrect explanation or omission in it, please make contact with the Marketing Department of our factory.

MATTERS NEEDING ATTENTION TO INSTALLATION

In order to insure the machine running normally, care must be greatly taken to following items during the installation of the machine:

1 Wiring

1.1 The performance values of wires used for connecting the electrical parts should be equal to or more than the specified values in this Instruction Book.

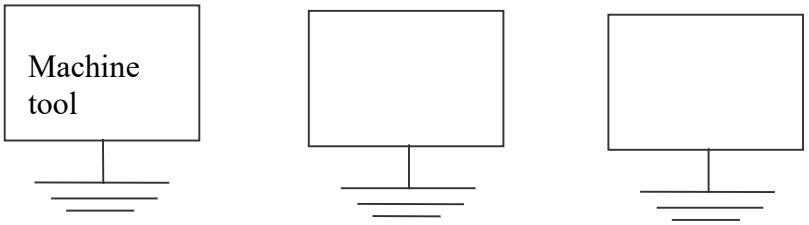
1.2 Never connect the power cables of equipment like welding machine or high frequency quencher, etc., that may cause circuit interference, with the terminal block.

1.3 Power cable should be connected by skilled electrician.

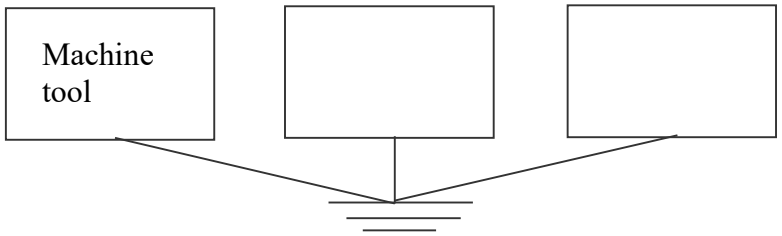
2 Grounding

The cross section and the grounding resistor of grounding wires used for the machine as well as matters needing attention to grounding should be in accordance with the standard GB5226.1-2002. The grounding wire shall be connected as the figures given below:

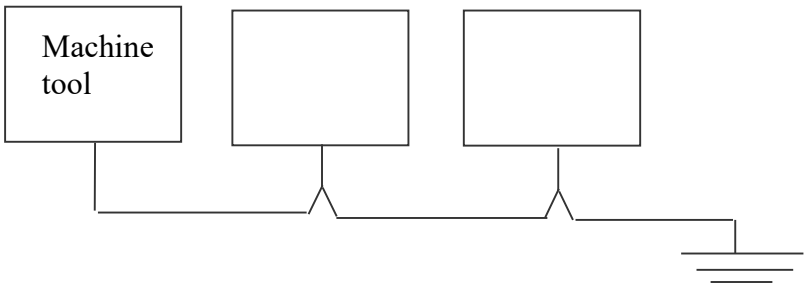
Separate grounding



Common grounding



Never connect some equipment to one grounding rod like the figure given below:



NOTICE TO ENVIRONMENTAL PROTECTION

The following stipulations have to be followed when the machine is finally scrapped:

- It is necessary to deliver some harmful or non-degradable wastes, including used batteries, electrical elements, rubber components, etc., which cannot recovered or re-utilized to designated local recovering unit.
- For any waste liquid, such as lubricating oil, coolant, etc., which cannot be recovered or re-utilized and lead to polluting environment, they have to be drained off at designated place in the locality.

CONTENTS

1 MATTERS NEEDING ATTENTION TO SAFE GUARD

The machine is provided with some safeguard devices to prevent operator from injury and the equipment from damage, and it is necessary for operator to be acquainted with the details stipulated on the safety tablets and the following stipulations thoroughly before operating the machine.

1.1 Requirements for Operator and Maintainer

- **The operator of the machine shall be the personnel who was trained and has skill certificate. Before operating the machine, it is necessary to read the Instruction Book carefully and comprehend the content in the Instruction Book thoroughly. It is only permissible to operate the machine after the operator possesses the required ability for operating the machine.**
- **Before operation of the machine, it is necessary to wear protection suits and insulation shoes well and put the long hair in the cap according to the requirements of the safety-warn labels. In addition, while machining casting materials, wearing anti-rust mask is necessary.**
- **To avoid accidents, personnel to do the maintenance for the machine shall be qualified or possess maintaining capability.**

1.2 Requirements for Basic Operation

Danger:

- **In order to avoid shock, never touch some devices such as transformer, motor, and other places with high-voltage terminals.**
- **Never touch any switch with wet hand; otherwise, shock will result in.**

Warn:

It is necessary to confirm the switch to be used before using, and never mistake it.

Notice:

- **To avoid dangers, the working area provided must be of enough space.**
- **Separate earthing wire should be adopted for the machine and it is better that its length should be as short as possible.**
- **The operator should be familiar with the position of emergency stop button so that it can be touched immediately whenever necessary.**
- **You should at first press the emergency stop button as soon as there is any trouble with the machine or the machine is under hazardous status, then press the general switch of power supply. Never switch on the power supply before the trouble is remedied.**
- **The general switch of power supply should be at once switched off when power**

off.

- **Water and oil may cause working floor slipping, resulting in danger, in order to avoid unexpected accidents, the working floor should be kept clean and dry.**
- **Do not dirty, nick or make down any warn label. Please order a new one from our factory if some words on the warn label becomes unclear or it has been lost. When you make a new order for the label, please make clear for the part No. of the warn label.**
- **Do not touch any switch at will.**
- **Recommended lubricating oil and grease or approved oil possessing equivalent performance should be adopted.**

1.3 Requirements before Switching on the Power Supply

Danger:

Any damage of insulating covers of cables, patch cords or conducting wires will cause current leakage or shock, so check them carefully before switching on the power supply.

Notice:

- **The cables used for electrifying switch and switch of main circuit for the machine should have adequate cross section as specified in the circuit diagrams to meet the power requirements.**
- **Ensure that the protection connecting wire that is not less than the cross section of the phase wire is firmly connected to the PE terminal of the machine.**
- **Check carefully if the electrical system is correct before connecting power supply and pay attention to whether the motor is under moisture status.**
- **The oil tank of the machine should be filled to the oil level and check it, refill it when necessary.**
- **For lubricating points, the kind of oil used and concerned lubricating positions, please refer to the Lubrication Chart.**
- **Every switch and operating lever should be nimble, smooth and their actions should be checked.**
- **Electrician should wear oil-proof insulating shoes, working overalls and put on other articles for safe guard.**

1.4 Requirements after Switching-on the Power Supply

Notice:

- **For operating the machine the first time after unpacking or re-operating the**

machine after the machine has been under stop status for long time, it is necessary to carry out the dry run for the machine for a few hours. And each moving part shall be lubricated with fresh lubricating oil.

- **Carefully observe whether running direction of the motor is in accordance with specified one.**
- **Check amount of coolant, and add it if necessary.**

1.5 Routine Inspection

Danger:

Never insert your finger(s) in-between the pulley and belts when you check tension of the belts.

Notice:

- **Check if there is any abnormal noise coming from motor, gearbox, or other parts.**
- **Check lubrication state of moving parts.**
- **Check if the protective cover and safeguard device are under good status.**
- **Check tension of the belts. If they are too loose, replace them with new matchable ones.**

1.6 Preparation before Operating the Machine

Warn:

- **Tools should conform with installing and clamping size of the tool post.**
- **Excessive tool wear can result in damage; therefore, they should be replaced by new ones beforehand.**
- **The working area should have adequate brightness for convenience of safety check.**
- **Tools or other articles around the machine or equipment should be arranged in perfect order and easy to reach, and the path is unblocked.**
- **Tools or other any articles cannot be put on the headstock, the cover of the tool post or other similar positions.**
- **If the center hole of a heavy cylindrical workpiece is too small, the workpiece may skip out of the center when it is loaded, so pay attention to the size and angle of the center hole.**
- **The length of workpiece should be limited within the specified range to avoid interference.**
- **Rust-proof grease on surface of the machine must be carefully cleaned with**

kerosene and wash the interior of the headstock with warm kerosene. After all oil wicks are washed and dried, be sure to put them back to their original positions. Remove the oilpaper and grease on the guideways; refill the lubricating oil of guideways after cleaning. Never use emery cloth or other hard things to scrape the machine. And it's necessary to fill proper lubricating oil and coolant separately into the oil tank and the water tank according to the requirement.

Notice:

- **Before operating the machine, carefully check whether the electric system is satisfactory, the connecting wires and the plugs are correctly connected; there is any loose or imaginary case(s) due to vibration during transportation. After switch-on of the power supply, check whether running direction of the motor is in accordance with the stipulations given in the Instruction Book.**
- **Check whether action of all operating handles of the machine are nimble and make every operating handle being at its neutral step position.**
- **Check functions of all protecting devices such as power-off protection device when the door opened and touch-stop mechanism for limit position, etc.**
- **Before operating the machine, close the protecting cover of chuck, the protecting cover (front chip guard screen) of tool post and the door of belt cover well.**
- **Any person who is irrelevant with operating the machine should withdraw from around the working area.**

1.7 Operation

Danger:

- **Do not shift the speed-changing lever for the spindle on the headstock in any case while the spindle running. It is strictly prohibited to start the spindle when the machine is at the neutral step.**
- **Long hair should be covered with cap when operating the machine.**
- **Do not operate the switches with gloves to avoid fault operation or accident of winding or involving in.**
- **Workpiece and tools must be firmly chucked; otherwise, personnel injury may be resulted in.**
- **The chuck jaws must clamp workpiece to avoid being thrown-off from their positions when the chuck is running at high speed.**
- **When the chuck is extended to clamp workpiece, the holding range of the chuck should not exceed the range stipulated by the technical document supplied by chuck factory.**
- **Workpiece can be unloaded only when the tool and the spindle are under stop**

status. And never touch the workpiece being machined or the running spindle by hand or any other way.

- **Never operate the machine before the safe guard devices are not well closed.**

Warn:

- **The nozzle of coolant can be adjusted only under the machine stop status.**
- **Do not clean chips during machining.**
- **Clean chips with special hook. Do not clean chips on the cutter by bare hand but use brush to clean it.**
- **Installing and unloading the tools is only permissible in case the machine is under stopped status.**
- **Pulling outwards the handwheel of the apron candisengage the handwheel it it necessary to disengage it when executing rapid speed to avoid personnel injury caused by it**
- **When the apron is intended to move towards the chuck, make sure the limit-position touch-stop ring mounted on the reversing rod should be fixed such a position that it will not result in collision with the chuck.**
- **Anyone excepting operator is not allowed to stay in the working area when the machine is running.**

Notice:

- **The chip-guarding screen should be used for defending when turning workpiece.**

1.8 Interruption of Machining

Notice:

After completion of turning, it is necessary for the operator to turn off the stop button of the main motor as well as the switch of the main power supply at the same time before leaving from the machine temporally.

1.9 After Machining

Notice:

- **After the machine stops, clean it and remove chips by means of special hook or other elements (do not clean by bare hand).**
- **Never do cleaning before the machine is stopped.**
- **Back all parts of the machine to their original positions.**
- **Check if the chip scraper is damaged and replace it with a new one if it is damaged.**

- **Check coolant and lubricating oil. If the lubricating oil is very dirty, change it with fresh oil.**
- **Check amount of coolant and lubricating oil. Add them if necessary.**
- **Clean the filter of oil pan.**
- **Before off duty or leaving from the machine, turn off the switch of the general power supply.**

1.10 Safety Equipment

- **Front guard screen**
- **Belt cover**
- **Emergency stop button**
- **Touch-stop for limit position of apron**

1.11 Maintenance Operation

Danger:

- **During maintenance of the machine, anyone who has no relationship with the maintenance should not operate the main circuit switch or the power ON switch on the pendant, therefore a sign panel with "The machine is under maintaining, don't touch the switch" or with words similar to meaning should be hang on the switch or other suitable places. This plate should be easy to see and to pick off but uneasy to fall down.**
- **It's dangerous to maintain the machine while power on, and principally, the main circuit switch should be turned off during maintenance.**

Warn:

Electric maintenance should be done by a professional maintainer and the maintainer should always be in touch with the chief, never make any decision by himself.

Notice:

- **Travel limit device, approach switch or interlock cannot be dismounted or modified.**
- **Cables and other electric equipments used for the machine should all be certificated products.**
- **After maintenance is finished, the working place should be cleaned and rearranged, the oil, water on every part should be cleared away to get a good working ambience.**
- **Take the dismounted parts and dirty oil far away from the machine for safety.**

1.12 Prohibition

- **Shifting change-speed lever of spindle when the spindle is running is prohibited.**
- **While feeding at high and middle speed, shifting levers on the feed box is prohibited.**
- **The abnormal operation is prohibited, such as loading, unloading and checking workpiece, shooting troubles and clearing chips while the machine is running.**
- **It is prohibited to wear loose overalls, accouterments that are obstructive to work, and gloves, and to be with long hair while operating the machine.**
- **It is prohibited for the unauthorized personnel to start, operate, maintain the machine, open the cabinet door and touch the electric parts**

2 GENERAL DESCRIPTION

2.1 Applications of the Machine

The machine is successfully designed for turning pipe threads mainly, that is, cylindrical and conic pipe threading in Metric or Inch system. In addition, the machine can be used as universal lathes, to perform turning jobs, such as turning of outer diameter, boring and turning of internal/external cone surfaces.

The machine is available to turn and repair drill rods, drill collars, square drill rods and casing pipe in the petroleum industry, metallurgy industry, chemical industry, water and electricity industry and geology field. Especially, the machine is suitable for repairing the steel pipes in the oil-pipe station.

2.2 Scope of Machining

This machine can be used to turn:

Petrol casing pipe of Φ114 mm~ Φ340 mm

Petrol drill rod of Φ114 mm~ Φ140 mm

Petrol drill collar of Φ121 mm~ Φ203 mm

Square drill rod of Φ108 mm~ Φ133 mm

Geologic casing pipe and mining core tube of Φ127 mm~ Φ325 mm

The machining scope of the machine shall be determined according to the size and the technical specifications of the machine, and it is strictly forbid to do machining exceeding the machining scope, otherwise, the machine will be damaged, even the personnel injuries and deaths will be caused.

2.3 Accuracy of the Machine

The accuracy of the machine complies with the standard Q/S1.JO2.02-1998《Accuracy of Pipe Threading Lathes》.

2.4 Environment Available to the Machine

The machine is to be used in following environment and operating conditions:

- Environmental temperature: 5° C ~ 40°C. The average temperature within 24h shall not be over 35°C.
- Relative humidity: within the range of 30% ~ 95%, and the principle of humidity change is that no condensation results in.
- Height above sea level: Lower than 1000 m.
- Atmosphere: There is no excessive dust, acid gas, corrosive gas and salt component.
- It is necessary to avoid temperature rising of environment due to direct

lighting up of the sun for the machine or heat radiation.

- Location for installation of the machine should be far away from vibrating source
- Location for installation of the machine should be far away from flammable and hazard articles.

2.5 Affection of the Machine to the Environment

The machine does not drain harmful gas or liquid. Therefore, there is no bad affection from the machine to the environment.

2.6 Appearance View of the Machine

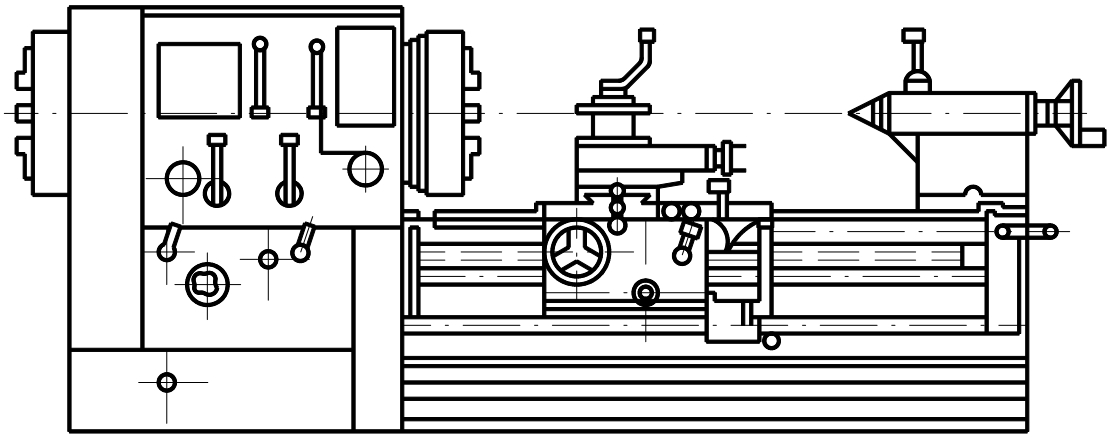


Fig. 1 Appearance view of the machine

3 TRANSPORTATION, HANDLING AND INSTALLATION

3.1 Transportation of the Machine

During the packing of the machine, gas-phase closure packing method for anti-rust has been applied and the corresponding measures for anti-damp, anti-vibration and anti-impact also taken to guarantee the machine can be transported and stored under the temperature of -25°C~+55°C, and the highest resistible temperature is up to 70°C during the short-period transportation and storage within 24h. In addition, we have employed non-pollution material for packing case.

3.2 Handling of the Machine

To lift the machine packed in wooden case by a crane, strong steel wire rope should be looped in the rope marks pointed lateral sides of the case, when transporting and unloading the case, bumping and shocking should be avoided. In any case, do not excessively incline the case. If rolls are used for the transport of the case, it is important that the inclination of the slope should not exceed 15°, the diameter of the rolls used must not be over 70 mm. Never place the wooden case on a prismatic body or upside down.

When the machine is unpacked, first, inspect its exterior condition and check attachments according to the “PACKING LIST”. When lifting the unpacked machine with a crane, the two pieces of strong steel bars of ϕ65 mm~ϕ70 mm long should be inserted into the hanging holes at the two ends of the machine bed (the steel wire rope shall hitch the steel bars). And the wooden blocks should be padded between the strong steel wire ropes and the position touched with the wire ropes of the machine or the steel wire ropes slipped with rubber pipe. In addition, it is necessary to make use of the carriage to keep balance while handling. Before lifting, it is necessary to remove the chip guard screen.

Note:

- In order to keep balance for the machine being lifted up both in horizontal and vertical directions, it is necessary to guarantee the balance of the machine while it is just away from ground (at the very beginning).
- Angle of the steel wire rope to vertical plane shall be not more than 60°.
- Whenever handling the machine by more than one people, it is necessary to send the previously set coordinative signal for coordination.

3.3 Installation of the Machine

3.3.1 Preparation before Installation of the Machine

Installation of the machine should be in accordance with the stipulations for working environment given in the Chapter 2.4. Besides, pay attention to following:

- The machine shall be installed in workshop with arrester equipment.
- The floor for installing the machine should not be soft and not strong enough. If the machine has to be installed on this kind of soft soil floor, it is necessary to use the pile way or similar measures to increase the supporting force of the soil so that the

machine will not sink or incline.

- If the machine has to be installed near the vibration resource, it is necessary to dig a canal around the machine or make similar measures for anti-vibration.

3.3.2 General Power Supply

The voltage equipped for the machine is standard configuration 380V/50Hz, optional configuration 240V/480V/60Hz, 220V/440V/60Hz, 220V/60HZ, 600V/60Hz and 420V/50Hz. The voltage configuration of this machine is determined according to the user's order.

3.3.3 Installing the Machine

The performance of a machine is greatly affected by the installing way. If the guideways of a machine is precisely machined, the original machining accuracy cannot be obtained due to the reason of bad installation of the machine; therefore, it is difficult to obtain the required machining accuracy for the machine. And most troubles of the machine are caused by this reason.

Note:

It is necessary to read the installing procedures carefully and install the machine according to the requirements specified, otherwise accuracy and serving life of the machine will be affected.

3.3.3.1 Foundation

For installing the machine, a plane installation place should be found first, then, determine the installing space and prepare the foundation according to the foundation plan and specified ambient requirements.

Floor space of the machine not only consists the space required by operating machine but also the space required for maintenance (the distance of pulling the water tank plus distance for maintenance). The space needed by the machine itself and maintenance space have been specified in the foundation plan.

For installation position, please refer to Fig. 2、Fig. 3、Fig. 4and Fig. 5.

3.3.3.2 Installation Steps

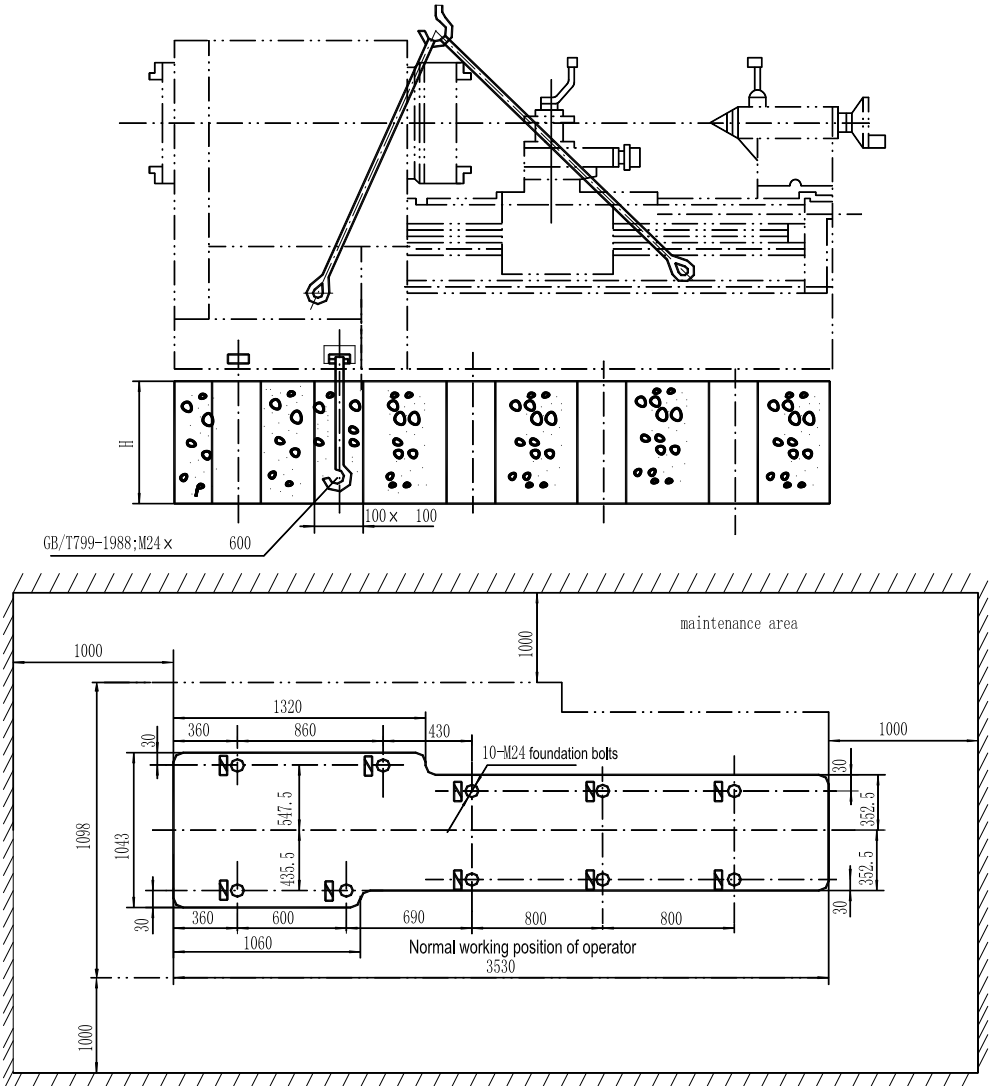
- The machine and the foundation bolts shall be supported by the iron wedges of the same number which shall be placed near the foundation bolts in pairs of 40-60 mm wide, 140 mm long and 5° in inclination. When placing each pair with cement, large end of bottoms wedge faces inward and that of top wedge faces outward for convenient adjustment.
- Roughly adjust installing accuracy of the machine. The accuracy of installation is tested by a level that is placed respectively at two ends of the bed ways. The readings of the level should all not be over 0.02/1000 in both longitudinal and traverse directions. If not so, first make rough adjustment by means of wedges.

- After rough adjustment of the machine, pour cement into the foundation boltholes, and carry out the fine adjustment after dry out of the cement.
- Adjust the installing accuracy of the machine precisely. On the one hand, adjust the pad wedges; on the other hand, adjust the foundation bolts, until the installing accuracy is up to the requirements.
- All foundation bolts should be evenly tightened, and no bad effects to the accuracy of installation.
- After the accuracy catches up the requirements, fill cement into the space between foundation and lathe legs and trim the surface around the base leg to prevent ingress of lubricating oil.

3.3.3.3 Connection of Inner Devices of the Machine

After completion of the leveling for the machine, before switching on the machine, the following work shall be done:

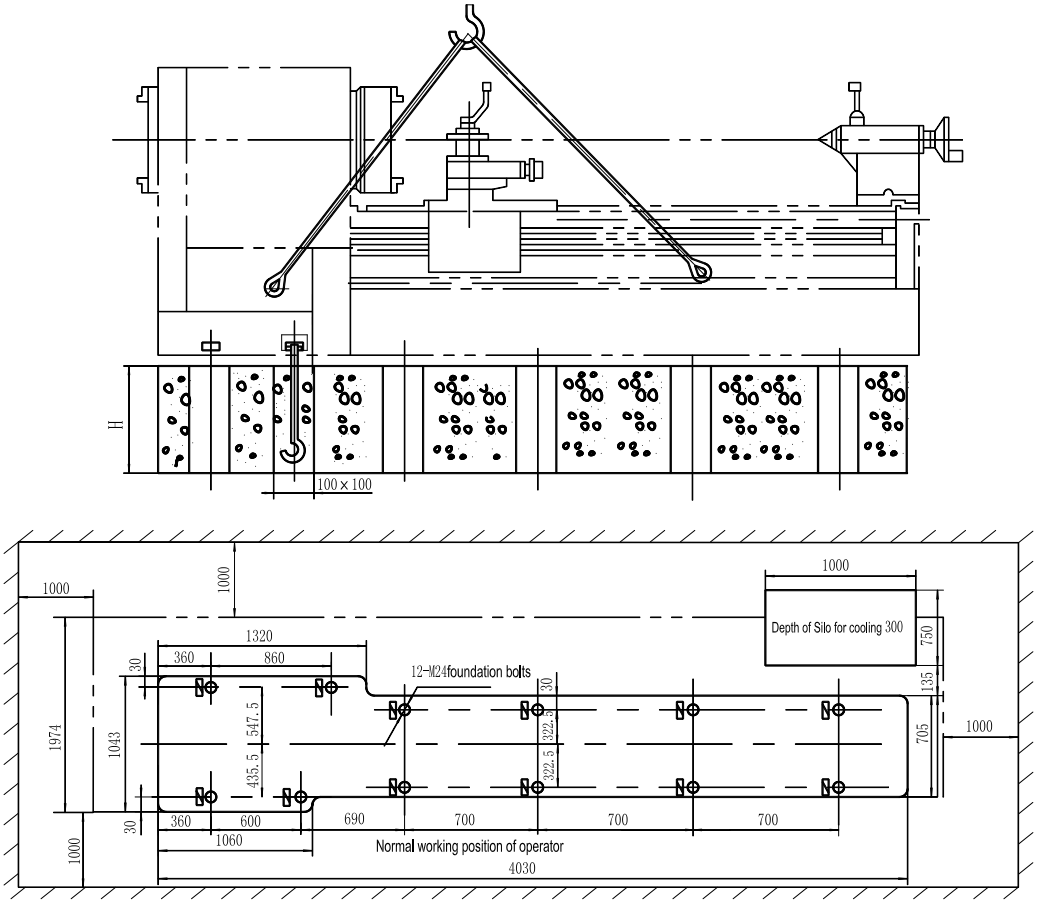
- Recheck the connection of each connector to see if they are firmly connected.
- Check and be sure that the input power supply is in correct phase; otherwise, running direction of the motor will disagree with the specified one.



Notes: 1. The value of "H' is determined according to the earthiness.

2. The marks "▯" in the figure show the positions of pad irons.

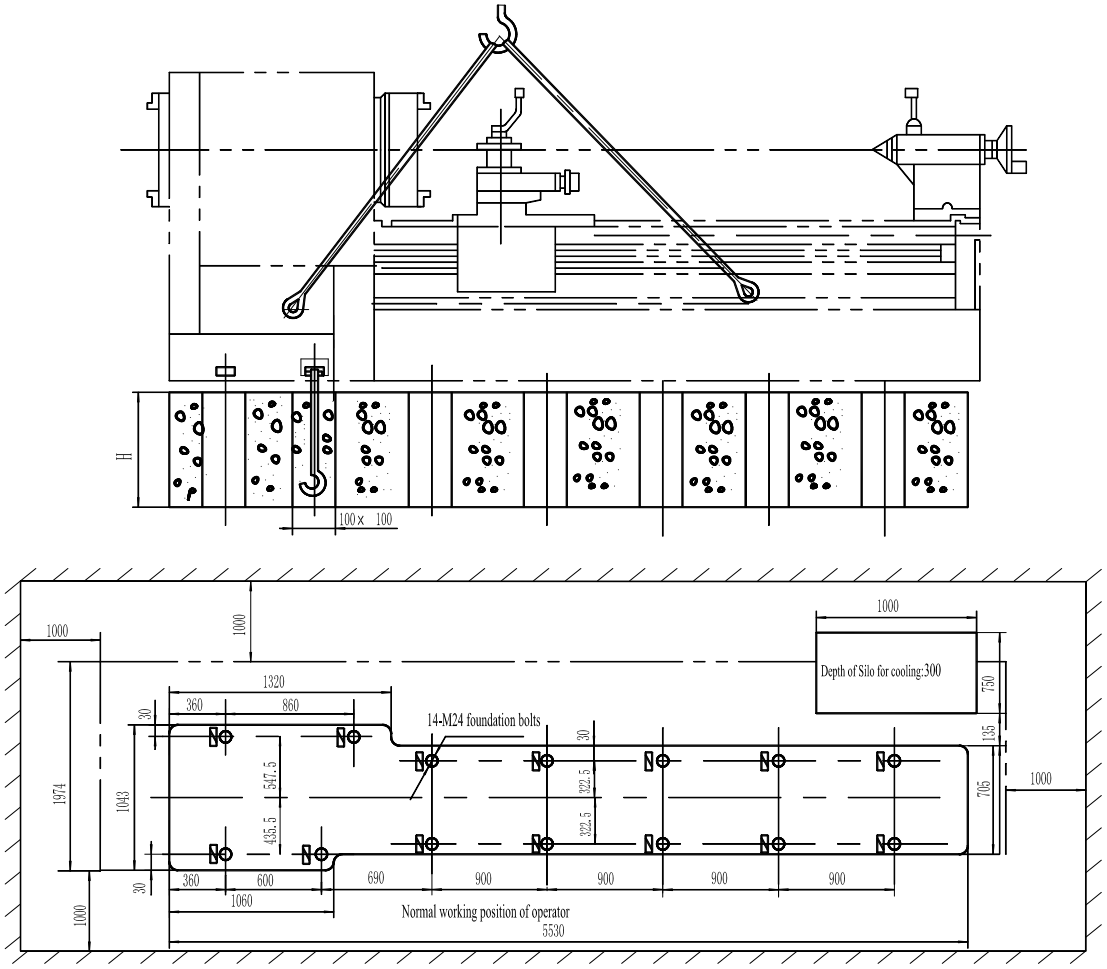
Fig. 2 Handling and foundation plan of the machine（S1-262A/1000）



Notes: 1. The value of "H' is determined according to the earthiness.

2. The marks "▯" in the figure show the positions of pad irons.

Fig. 3 Handling and foundation plan of the machine (S1-262A/1500)



Notes: 1. The value of "H' is determined according to the earthiness.

2. The marks "▯" in the figure show the positions of pad irons.

Fig. 4 Handling and foundation plan of the machine (S1-262A/3000)

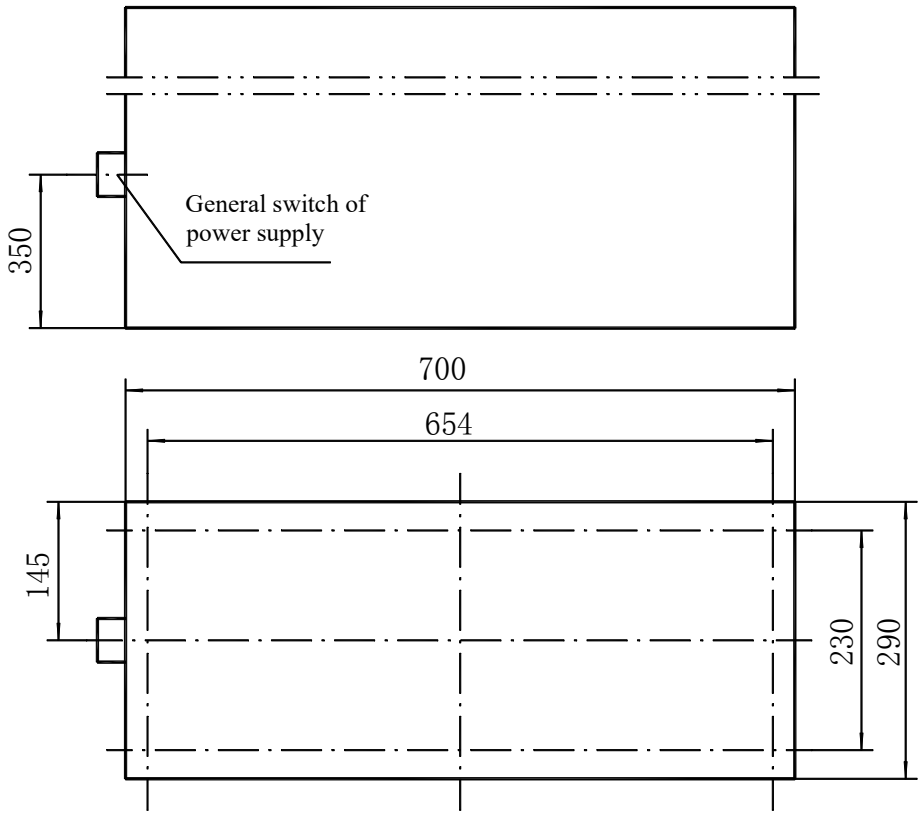


Fig. 5 Foundation plan of electric cabinet (located at the proper position behind the headstock)

3.4 Trial Run

After completion of connecting wires of inner devices, following preparation work before trial-run should be carried out.

- Re-install those protection covers dismounted for convenient transport on their original positions.
- Clearing.
- In order to prevent the machine from rusting, the sliding surface and some metal parts are painted with antirust. During the transportation, dust, sand powder, and other dirty things may enter into the coating for anti-rust, so it is necessary to clean them out, otherwise, the machine cannot be allowed to be started.
- During the clearing, it is necessary to use kerosene to clean the anti-rust coating, heated kerosene for cleaning inside of the headstock. After all oil wicks (knitting wool) have been washed and dried, be sure to put them back to their original positions. Leadscrew, feed rod, guideways, etc., should be carefully wiped dry and covered with a film of oil against rusting. Before using the machine, lubrication shall be done in accordance with the stipulations specified by the Lubricating Chart of the lubricating system.

Check

- ◆ Whether every part of the machine is damaged.
- ◆ Whether any part or accessory is lost.
- ◆ Whether all positions that should be lubricated are sufficiently lubricated.

- ● Trial-run

  After completion of installing and the preparation work before trial-run mentioned above, it is necessary to do trial-run very carefully. Time for trial-run is about one hour. Larger load is not allowed to be used during the period of trial-run.

4 SPECIFICATIONS OF THE MACHINE

Main specifications:	
Height of spindle centerline to bed guideway face:	450 mm
Height of spindle centerline to the ground:	1150 mm
Max. external diameter of pipe to be turned	340 mm
Max. center distance(when tailstock is used):	1000mm;1500mm;3000mm
Max. turning length (travel of the carriage):	1000mm;1500mm;3000mm
Spindle	
Diameter of spindle bore	355 mm
Steps of spindle speed	12
Range of spindle speed	5.6-254r/min(50Hz)
	7-305 r/min(60Hz)
Feed system	
Number of feeds in longitudinal and traverse direction	32
Range of longitudinal feed	0.095~1.44 mm/r
Range of traverse feed	0.095~1.44 mm/r
Threads in Inch system:	
Number:	26 (Standard configuration)
Range:	1-14t/in (Standard configuration)
Number:	40 (Special order)
Range:	1/2~28 t/in (Special order)
Threads in Metric system:	
Number:	22
Range:	1~15 mm
Module thread:	
Number:	21
Range:	0.5~7.5 mm
Thread in Diametral-pitch system	
Number:	20
Range:	28~2 t/in
Saddle and carriage	
Vertical distance from spindle centerline to bearing face of the tools	33 mm

Size of tool section	32×32 mm
Max. swing angle of middle rest	±90°
Max. travel of cross slide	300 mm
Max. travel of compound rest	200 mm
Rapid speed of carriage in longitudinal and traverse direction	4 m/min
Taper attachment	
Max. continuous turning taper length of ratio 1:4	500 mm
Max. cross travel	100 mm
Apron	
Teeth per inch of leadscrew	2 t
Outer diameter of leadscrew	55 mm
Outer diameter of feed rod	38 mm
Module of rack	3 mm
Tailstock	
Diameter of center sleeve	100 mm
Travel of center sleeve	250 mm
Taper of center sleeve	Morse No.5
Taper of center	Morse No.5
Traverse travel of tailstock	±15 mm
Power system	
Main motor: (The voltage frequency of motor and pump is in accordance with the voltage frequency of the customer's order)	
Type	Y180-4 B3
Power	18.5 kW
Speed	1500 r/min
V -belts	
Size	B-1800 (internal circle length)
Number	5
Type of clamping motor	Y112M-4 B3
Power	4 kW
Speed	1450 r/min
V-belts	

Size			B-1245
Number			2
Rapid motor:			
Type			Special motor for middle flange
Power			1.1 kW
Speed			1450 r/min
Motor for hydraulic pump:			
Type			Y802-4 B3
Power			0.75 kW
Speed			1380 r/min
Control and lubricating system			
Type of gear pump			CB-B10
Delivery capacity of gear pump			0.01m^3/min
Pressure			2.5Mpa
Cooling device (attachment)			
Cooling pump			
Type			AOB-25
Power			90W
Flow			0.025 m^3/min
Overall dimensions and gross weight of the machine			
Size:	1000mm	1500mm	3000 mm
Height:	1620mm	1620mm	1620 mm
Width:	1908mm	1974mm	1974 mm
Length:	3700mm	4190mm	5690 mm
Net weight	Approx. 7876kg	Approx. 8500kg	Approx. 11200kg

5 DRIVING SYSTEM AND BEARING ARRANGEMENT

Refer to Fig. 4, please.

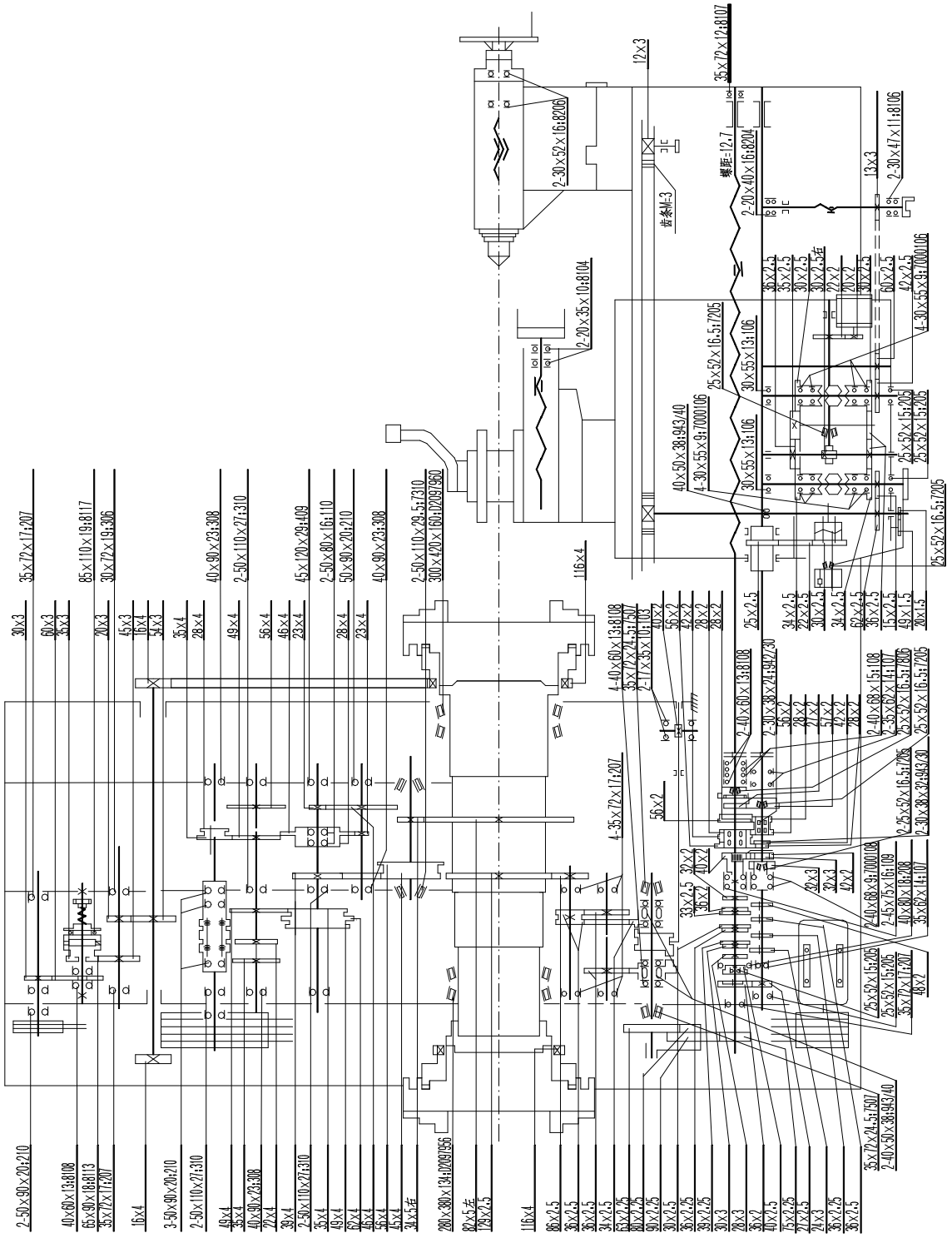


Fig.4 Driving system and bearing arrangement of the machine

6 STRUCTURE OF THE MACHINE

6.1 Headstock

(1) By means of the front and the rear nuts, clearance of the double row cone roller bearings supporting the spindle can be adjusted.

(2) Hydraulic clutch is mounted on shaft I, it is used to realize braking of the main drive system and engaging with the driving.

(3) A single-jaw clutch is mounted on shaft X to realize forward and reverse of the leadscrew, so that threads being turned is not splitted.

(4) Pinch roller is set on the shaft XII. When clamping lever is under clamping/releasing position of front and rear chucks, travel valve of the pinch roller can cut off oil way of the shaft I to control spindle transmission, which plays the part of safety and interlock.

(5) Clamping and releasing workpieces of the front and the rear chuck can be realized by power, also manually. Electric control switch is provided at the end of shaft XIV, and when the clamping motor overloads, the pull rod will press against the switch, and the motor will stop immediately. In addition, through adjusting the spring nut, the clamping force can be changed.

(6) Delay of spindle braking must be controlled for more than 6 seconds.

6.2 Tailstock

(1) If you want to remove the center of the tailstock, you may withdraw the center sleeve until the end of leadscrew withstands the center, thus, the center is taken out.

(2) When the tailstock is used to turn longer taper pipe, the tailstock can be transversely moved. If it is necessary to align the centerline of tailstock to be in accordance with that of the spindle, the mark on the tailstock body must conform to that of the tailstock base.

6.3 Adjustment of Clearance Between the Carriage Nut and the Leadscrew

Refer to Fig. 5, please.

The leadscrew nut of the cross slide is open-type, when the leadscrew slips because of the wear of leadscrew and the nut, adjust the screw for tightening the nut to make it being under elastic deformation to hold on a proper clearance.

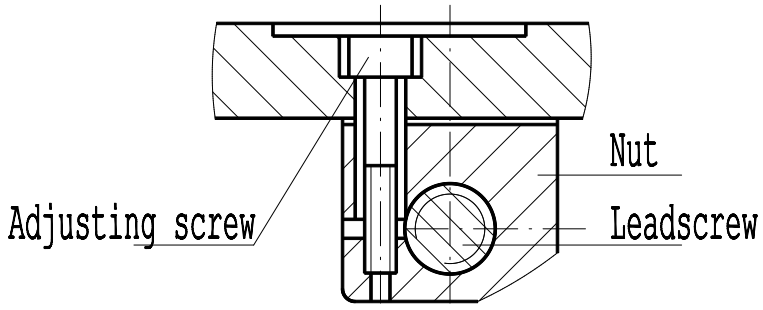


Fig.5

6.4 Apron

(1) Interlock device between the leadscrew and the feed rod:

When split nut is pressed with the leadscrew to cut threads, sector plate press the interlock screws insert into the holes of positioning bushes, which makes the shafts X, VIII and X VII for longitudinal feed cannot move and rotate in longitudinal direction, in another word, it cannot rapidly travel in longitudinal direction and carry out working feed. It is necessary for operator of the machine and relative service personnel to guarantee the interlock screw is at safe and reliable position.

(2) Adjustment of safeguard of apron:

A single direction over-run clutch is mounted at the left end of apron, and the function is to avoid interference between motions of the feed system and the rapid motion system, preventing feed rod from rotating at high speed while rapid moving (for the structure, see Fig.6 Section View A-A). An overload safety device is mounted on the worm shaft, and the device consists of a spiral double-jaw clutch and cylinder-type spring. Under normal working condition, feed power from the feed rod is transmitted to the worm shaft through a clutch, and when overload occurs in the feed system, the clutch will be automatically unengaged, thus, motion of the apron can be cut off.

Expanding force of the spring has been well adjusted before the machine is sent off and it shouldn't be adjusted at will, otherwise, the safety function will lose. If it cannot transmit sufficient torque, adjustment may be done by adjusting nut (1) to change the pressure of spring to clutch.

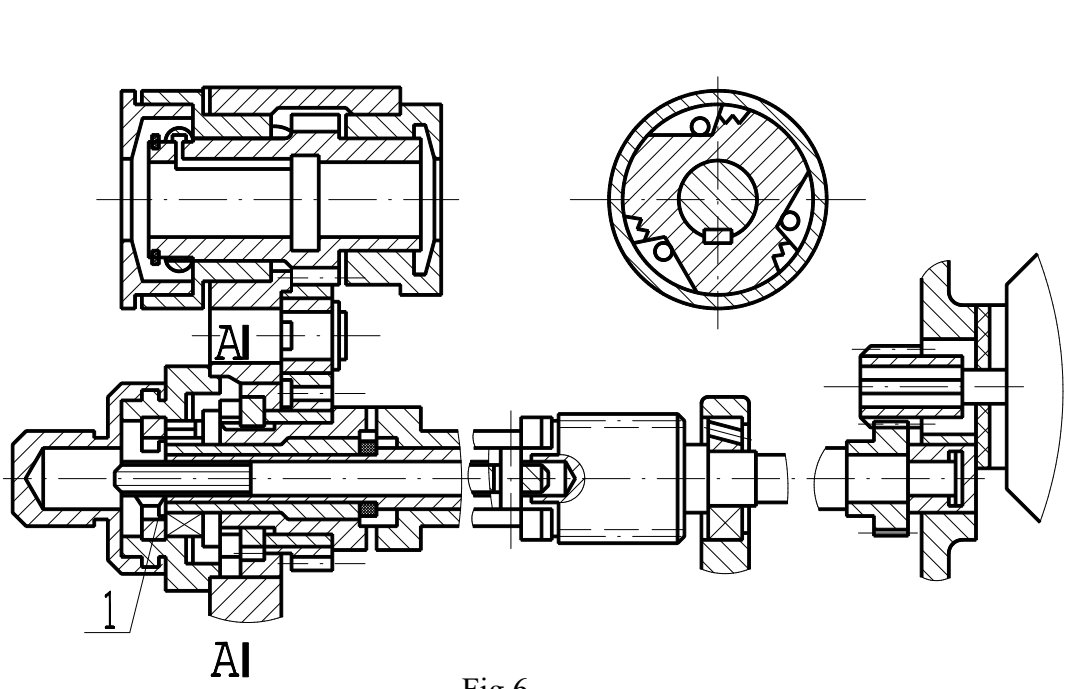


Fig.6

6.5 Taper Attachment

The taper attachment for the machine of 3000 mm in size is in the copying structure of

sliding plate type.

The taper attachment is used for turning threads of taper pipe. While turning taper threads, you should loosen the locking screw on the taper attachment and the carriage to the needed angle, and then tighten the two nuts of both ends to lock the locking screw. And make the scale on the attachment comply with the taper and the corresponding scale is the direct reading of needed taper. When taper attachment is not used to turn taper threads, first the sleeve should be withdrawn from the attachment, and then tighten the screws on the carriage.

6.6 Adjustment of Chuck Jaws

There are two sets of chuck jaws available for selection: one set is used to turn steel pipes of ϕ114-250 mm, the other set for turning steel pipe of ϕ200-340 mm, and the two kinds of chuck jaws can be selected according to practical requirements.

7 CONTROL OF THE MACHINE

Refer to Fig.7, please.

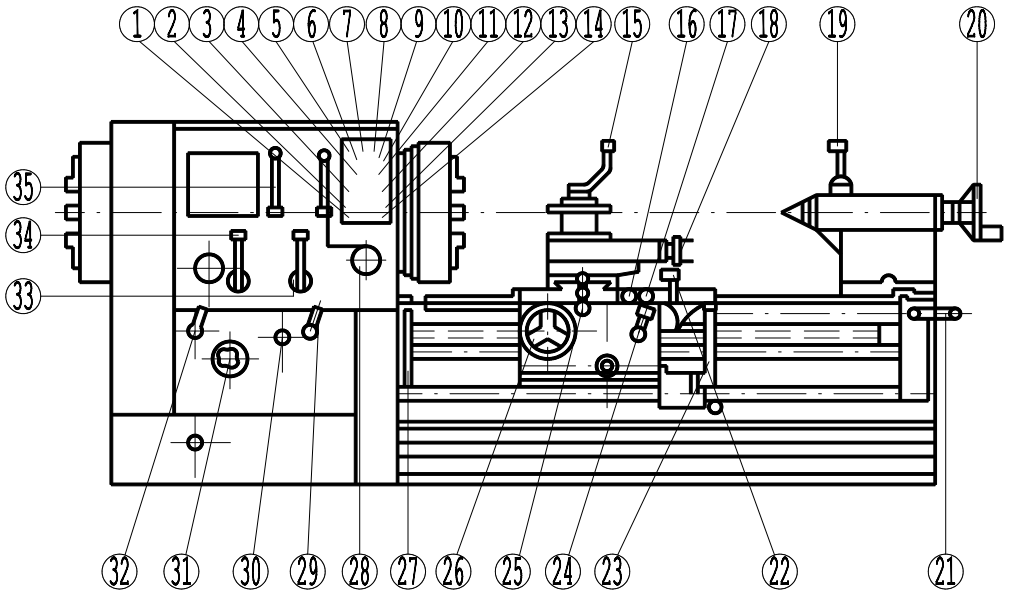


Fig.7 Arrangement of the control levers of the machine

No.	Name	Function
1	Button	Selecting button for spindle brake
2	Button	Button for spindle jog
3	Button	Button for spindle start
4	Button	Button for spindle stop
5	Button	Button for spindle forward
6	Button	Button for main motor stop
7	Button	Button for spindle reverse
8	Button	Button for starting hydraulic pump
9	Button	Button for starting cooling pump
10	Button	Button for starting hydraulic pump stop
11	Button	Button for cooling stop
12	Button	Button for clamping chuck
13	Button	Button for releasing chuck
14	Button	Button for general stopping the machine
15	Handle	Handle for indexing and tightening of square tool post

No.	Name	Function
16	Button	Button for spindle start
17	Button	Button for spindle stop
18	Handle	Handle for moving upper rest
19	Lever	Lever for clamping and releasing center sleeve
20	Handwheel	Handwheel for moving tailstock sleeve
21	Lever	Lever for tailstock moving
22	Button and lever	Button for rapid motor and control lever for longitudinal and traverse moving
23	Lever	Control lever for big leadscrew forward/reverse
24	Handle	Control lever for split nut
25	Handle	Handle for moving lower rest
26	Handwheel	Handwheel for longitudinal moving of carriage
27	Lever	Big leadscrew forward/reverse
28	Handle	Handle for engaging/un-engaging front and rear chucks
29	Lever	Lever for engaging leadscrew and feed rod
30	Lever	Lever for adjustment of pitch and feed rate
31	Hand wheel	handwheel for adjustment of pitch and feed rate
32	Lever	Exchange lever for Metric and inch thread
33	Lever	Speed change lever for spindle
34	Lever	Speed change lever for spindle
35	Lever	Speed change lever for spindle

In order to prevent the machine from being damaged, it is necessary to well know the functions of each control handle and button before operating the machine. Only after the completion of the trial run can be machine be applied to real production.

7.1 Operating Procedures of the Machine

- Turn the switch of general power supply right to the position of “ON”, and switch on the switch for illuminating light.
- Load the workpiece and clamp it firmly in chuck in accordance with requirements of workpiece to be clamped.
- According to the different material of workpiece to be turned, select the tool available for correspondingly material and parameters.
- Select the proper spindle speed with change-speed lever on the headstock. If the gear standing up occurs during changing speed for the spindle, rotate the spindle by hand to realize the speed change of the spindle.

- Shifting the handle 30 and handwheel 31 on the gear box to select the proper feed amount.
- Using the automatically feed handle and the rapid traveling button for longitudinal/traverse feed of the slide makes it moving to the position near the workpiece.

Notes:

Owing to that height of operator may be different, the foot pedal should be disposed at operator's operating position of the machine for convenient operation, also to avoid that water or oil makes floor slipping with resulting in danger of slipping up of operator. In general, the suitable height of the foot pedal is 100-150 mm.

7.2 Requirement of the Machine to Tools

Tool size: Tool size should suit the installation of tool post of the machine. The tool shank of various turning tools to be used on the tool post should be 32mm × 32mm in the section. And the tool tip of turning tool installed must be at equal height with spindle centerline.

Tool material: Tool material should suit the material of workpiece to be turned. In general case, for example, tungsten-cobalt alloy (YG) tool is available for turning fragile material such as cast iron and some non-ferrous metal. Tungsten-titanium-cobalt alloy (YT) for turning plastic material such as steel workpiece and the tool made from high speed steel is often used to turn workpiece with irregular shape and possessing larger impact performance. Besides, the tool made from high speed steel is often used as finishing turning tool, such as larger feed turning tool with wide edge and finishing thread tool, etc., and forming turning tool.

Geometric parameter of tool should suit the turning requirements.

7.3 Operation of Spindle Stop

During the turning, if it is needed to stop running of the spindle after completing adjustment of the machine, the change of parts or completion of turning, it is necessary to press the button for spindle stop.

7.4 Operation of Machine Stop

- Move the carriage to position near the end of tailstock by means of the lever for automatic longitudinal/traverse feed and traversely to the position close to the end of the lever.
- Press the stop button for main motor to make the main motor stop running.
- If coolant is being used, it is necessary to turn off the switch for the cooling pump.
- Switch off the switch for illuminating light.

- Turn off the general switch of power supply.

7.5 Re-start after Power-off add Emergency stop of the Machine

7.5.1 Restart after Power-off of the Machine

It is necessary to switch off the general power supply when suddenly power-off during working of the machine. When power-on, switch on the general power supply, and then press the start button for main motor.

7.5.2 Restart after Emergency Stop

When there is a trouble with the machine or the machine is under critical status, push the E-stop button. If you want to re-start the machine, first of all, turn the E-stop button to make it recover, and then press the start button for main motor.

7.5.3 Rescue under Emergency Status

At first, push the red Emergency Stop button and cut off the power supply, then take efficient emergency-treatment measures to relieve sick or injured person if operator is involved in or wound by related rotating part of the machine, for example, manually turn the rotary part to make the involved article withdrawing.

7.5.4 Chip Cleaning

Chip accumulated during turning should be thoroughly cleaned out from the machine at the end of work every shift.

When cleaning chip, it is necessary for you to use special hook or other proper outfits, and to wear protection gloves to avoid injury from chips.

8 HYDRAULIC SYSTEM OF THE MACHINE

Oil sources of the hydraulic system of the machine and the lubricating system are all from the same gear pump. The oil tank is set at the end of the bed under rear chuck, the volume of the oil tank is 60L, and the gear pump and the motor of the oil pump are mounted on the cover of the tank. Oil suction filter in the tank is jointed into the suction oil mouth of the oil pump, the mouth of pressing oil of the oil pump is set on the hydraulic operating plate mounted the headstock, pressure is regulated by the spill valve P-B10B. In normal case, range of adjusted pressure is 0.8-1.2Mpa. After pressure oil goes into the hydraulic system it first goes through plate-type filter, then, into the hydraulic cylinder to control all kinds of actions. Refer to the Hydraulic principle diagram in detail (see Fig.8).

8.1 Function of Hydraulic System

(1) Spindle running

(2) Spindle braking

(3) Lubricating (including headstock, coupler and feed box)

8.2 Elements of the Hydraulic System and Their Applications

Refer to the table below.

Name	Type	Application	Qty	Remarks
Gear pump	CB-B10	Supplying oil of hydraulic system	1	Mounted on the cover of the oil tank
Low pressure overflow valve	P-B10B	For adjustment pressure	1	
Solenoid valve	34E2-10BY	For spindle rotating or spindle braking	1	
Travel valve	23C-25B	Action insurance	1	In headstock
Switch of pressure meter	K-3B	Measure the pressure of each point	1	
Pressure meter	Y-60Z (2.5Mpa)	Showing pressure of every point	1	Axial
Single-way throttle	L1-10	Adjusting start speed or braking speed	1	In headstock
Above elements are standard elements of our country. If they are needed to be replaced, please order them according to their names and types.				
Oil filter	S1-12TY 38-1B	Keep the oil of the system clean	1	Standard of our factory

8.3 Three Kinds of Pressures Observed by the Pressure Meter Switch and Pressure Gauge

(1) Lubrication pressure P1:

When the pressure meter points to P1, pressure shown on the pressure meter is the lubrication pressure. Lubricating pressure is established by distribution of flow rate and it was set up during assembling of the machine in our workshop.

(2) Pressure before oil filtration (pressure difference of oil filtration) P2: Pressure difference = P2-P3. When pressure difference is more than 0.1Mpa, the oil filter should be cleaned. When measuring P, make the switch of pressure meter aim at P2, in this case the reading shown on the meter is the pressure of P2.

(3) Working pressure P3:

While adjusting, first, make the switch of the pressure meter point at P3, then turn the lever of the overflow valve of low pressure, turning it clockwise to raise pressure, and counter-clockwise turn to relief pressure. The pressure meter can show relative reading required. After adjustment, tighten the locking nut on the overflow valve.

(4) After of each point has been observed, that means when you do not need to use the gauge, turn the lever to “L” to cut off pressure oil way to protect the pressure gauge.

8.4 Maintenance of Hydraulic System

(1) Before operation of new machine, first it is necessary to clean the oil suction filter.

(2) Oil which must be filtered can only be oiled into the oil tank and oil quantity should be maximum.

(3) The system employs pure and clean machine oil HL46.

(4) Before starting the motor oil pump, release the spill valve of low pressure, and start oil pump and observe if the oil pump has oil. According to need adjust pressure and inspect whether every pipe line has leakage oil or air, also to start the main motor to check if the machine has forward revolving and braking actions.

(5) Checking the pressure of every parts every shift to check if they are in normal status, if not normal adjust or clean the filter in time (S1-12 TY38-1B).

(6) A single restrictor, which is used for adjusting spindle starting and braking speed, is connected with the oil pipe line in series in the headstock.

(7) Two-position 3-way travel valve 23C-25B2 is jointed in the pipe line in the headstock which is controlled by the cam mounted on the shaft of transmitting wheel of the clamping system. When the front and the rear chucks clamp or unclamp, the cam leaves from the travel valve, oil in the oil cavity of spindle rotating back flows through the travel valve into the headstock, which plays the part of guard.

(8) In order that the machine can normally work, it is necessary of ten to observe working pressure and make necessary adjustment, but adjusted pressure should not be too high. Used oil should be always kept pure and clean and clean every filter, headstock

and oil tank.

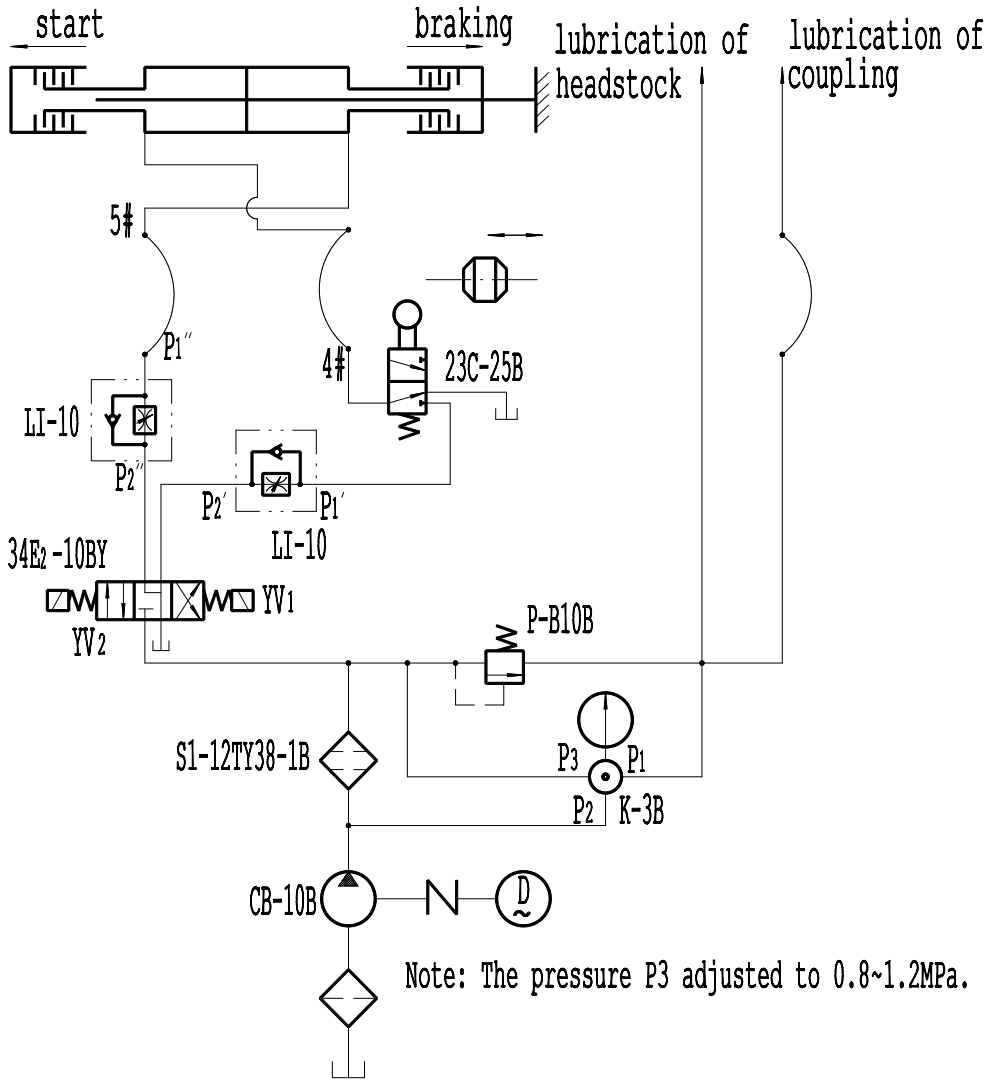


Fig. 8 Principle drawing of hydraulic system

9 SAFEGUARD OF THE MACHINE

9.1 Disposition of Necessary Warn Labels

Although the machine has taken many safety measures, there are still some potential and un-obvious risks. In order to promote operator, the machine is disposed with necessary warn labels. For illustration of the warning labels, see Fig. 9 and Fig. 10.

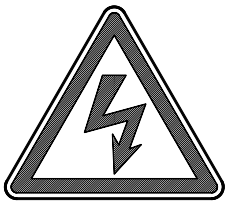


Fig. 9 Label for “Danger! Electricity!” (ISO3864)

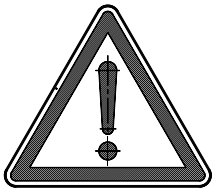


Fig. 10 Label for “Mind you Safety!” (ISO3864)

9.2 Limit Touch-stop Device

In order to guarantee that the carriage can stop moving forward automatically while feeding by power to a certain position, the machine is provided with a limit touch-stop device. The touch-stop switch of the carriage is set at the end of the carriage close to the headstock. When the carriage feeds to a certain position, touching the touch-stop switch, the carriage stops moving.

9.3 Prompt to Remnant Dangers

Although the machine has taken safeguard measures to reduce the dangers, the dangers that cannot be avoided and restricted sufficiently still exist in the design of the machine. Therefore, the operator is recommended to take the following measures for protection.

9.3.1 Danger Resulting From Material Machining

Dust producing from cast iron workpiece being turned is harmful to people. Operator should wear proof-dust respirator for protection. For turning of special material, such as magnesium alloy, turning liquid cannot be used, because the turning liquid can cause hydro-generation (boosting burn), resulting in burning.

9.3.2 Danger Resulting from Throwing out of Bodies

The protecting cover which are supplied with the machine can reduce the dangers from throwing-out of bodies, but those dangers cannot be completely eliminated, operator must pay attention to the following:

- Obey the warning of the label for safety instruction.
- Workpiece to be turned and tools to be used must be firmly clamped.
- Workpiece to be turned is not allowed to be chucked exceeding the clamping range.
- Speed of spindle is not allowed to be more than maximum speed allowed by chuck.

9.3.3 Danger Resulting from Changing Safety Parts

Owing to that the machine can turn various workpieces with different shapes and sizes, sometimes, different clamping devices are needed to be changed to meet the needs of turning. After replacement, if the tightening devices are not firmly fixed, it may result in danger to safety; therefore, it is necessary to carry out following check after every replacement.

- Check the sizes of chucking device to be used and confirm that if coupling sizes are correct according to concerned drawing and technical documents.
- Install the chuck according to the installing method assigned of the chuck and ensure that chuck is firmly fixed.
- Carry out trial-run after the installation.

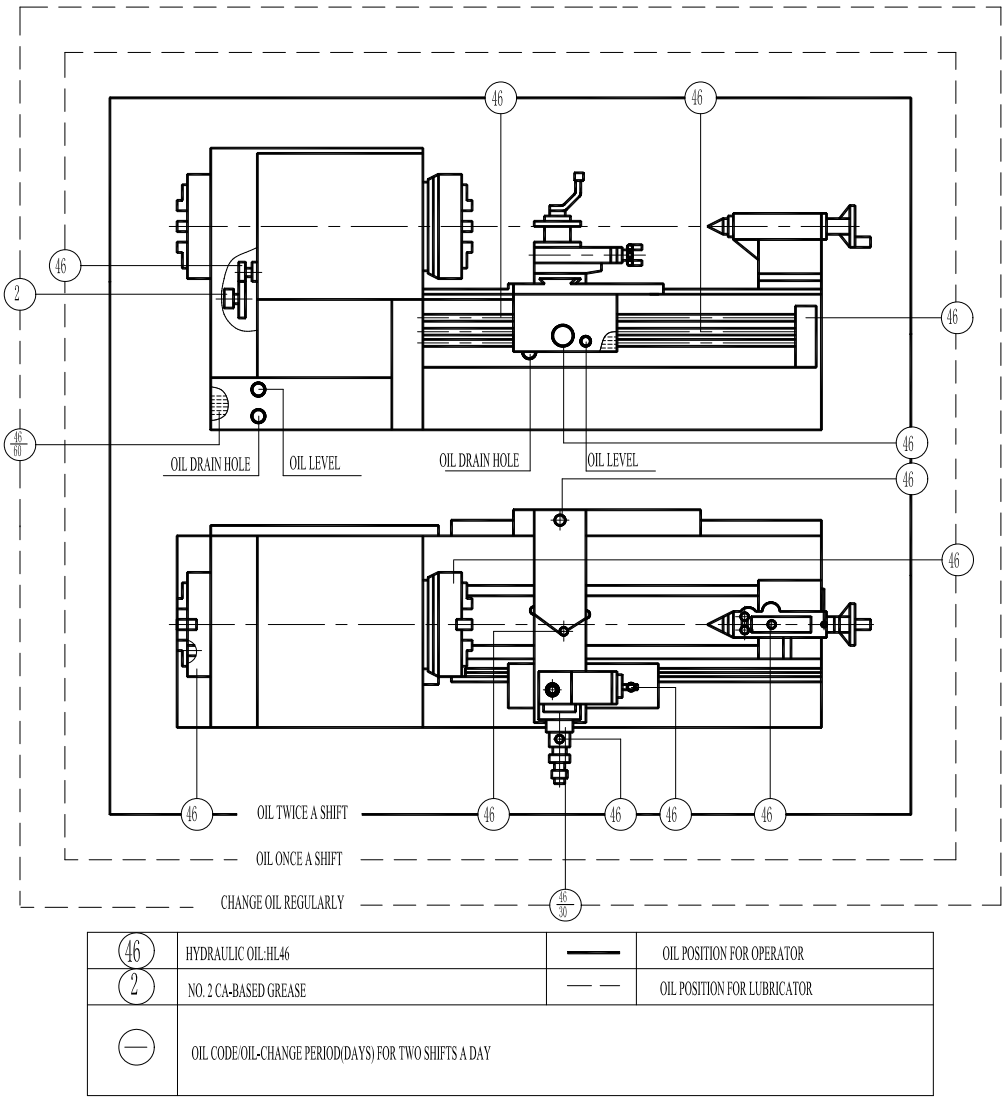
10 MAINTENANCE AND LUBRICATION OF THE MACHINE

10.1 Maintenance Of The Machine

- The oil level in all oil tanks shall always be maintained on the center of oil leveler, otherwise the machine may be damaged due to ineffective lubrication or overheating.
- All oiling points shall be filled with pure oil at regular intervals.
- Frequently inspect working status of oil pump to guarantee the sufficient lubricating oil for headstock and feed box.
- Check and adjust the tension of V-belts of the motor at regular intervals.
- Don’t start spindle immediately when power on of the machine each time. It is only permissible for the spindle to be started while the lubricating pump is under normal working condition and the oil available to the oil-window.
- The copper filtering net of the oil filter at entering oil position of the headstock should be weekly cleaned for ensuring pureness of lubricating oil
- The leadscrew is used for thread cutting only. Never use it for turning operation so that its accuracy and serving life can be ensured.
- It is necessary to add lubricating oil into the lubricating box for lubricating guide way every shift for ensuring adequate lubricating when the carriage moving.

10.2 Lubrication of the Machine

All friction surface of the machine should be regularly and systematically lubricated to ensure the reliability of operation and to reduce the wear of the parts of the machine and power consumption. Operator should know the distribution of all lubricating points, the trademark of lubricants, the lubricating cycle, the lubricating methods, etc. For specific lubricating points of the machine, please refer to the Lubrication Chart (Fig. 11).



46	HYDRAULIC OIL:HL46	———	OIL POSITION FOR OPERATOR
2	NO. 2 CA-BASED GREASE	— —	OIL POSITION FOR LUBRICATOR
—	OIL CODE/OIL-CHANGE PERIOD(DAYS) FOR TWO SHIFTS A DAY		

Fig.11 Lubrication chart of the machine

11 USAGE AND CLEANING OF CUTTING FLUID

11.1 Preparation before Using Cutting Fluid

Before pouring cutting fluid, user should read the technical material for the applied cutting fluid in detail and be acquainted with various technical performances, chemical components and the matters needing attention and dispose cutting fluid strictly according to disposing method of the cutting fluid. At the same time, also confirm whether the cooling system is firm and has been cleaned.

11.2 Pouring of Cutting Fluid

Pour the cutting fluid disposed according to the technical requirements for the oil pan to make it flowing into the water tank and to ensure sufficient amount for using.

Note:

Pouring cutting fluid over the coolant pump is absolutely forbidden to avoid that the motor for the coolant pump is burnt.

11.3 Usage of Cutting Fluid

- Principally, it is necessary to use cutting fluid to turn workpiece of steel, ream holes and cut threads.
- When the cutting fluid is to be used, first turn on the switch for cooling pump to start the cooling pump. While using, make the nozzle of the cooling pipe point to the position being machined to bring the cooling function of the cutting fluid into play.

11.4 Add, Changing, Changing Cycle and Method of Cutting Fluid

11.4.1 Add of Cutting Fluid

During the turning, if the cutting fluid is not sufficient, it is necessary to ad the cutting fluid in time.

11.4.2 Changing of Cutting Fluid

During the period of cutting fluid being used, operator can judge whether the cutting fluid exceeds the time limit of quality guarantee (generally, the quality warranty is 2~3 months, and for details, refer to the technical documents of cutting solution) through observing whether the cutting fluid has layer(s), peculiar smell, etc. If the above occur, it is necessary to change cutting fluid.

11.4.3 Changing Cycle of Cutting Fluid

The quantity of cutting fluid poured every time can be used for two months according to calculation of work for eight hours every day. While the cutting fluid has been used for more than two months, add it in time. If working time per day is 16 hours or 24 hours, the using cycle of cutting fluid is one month or less than one month. User should add cutting fluid in time according to practical using condition.

11.4.4 Changing Method of Cutting Fluid

Notices:

Different kinds of cutting fluids should not be used in mixture. It is necessary to clean out the cooling system before changing cutting fluid.

Changing methods of cutting fluid are as follows:

1) Set the jet of cutting fluid in the prepared container, start the coolant pump to make cutting fluid flowing into the container.
2) Switch off the power supply of the machine, then, the switch of coolant pump, and at last, remove the aero-plug of the coolant pump from the power supply line.
3) Pull out the coolant tank from the rear guard, then, drain remaining cutting fluid from the draining hole of the coolant tank.
4) Screw out the screws for locking the coolant pump and the coolant tank, then, dismount the coolant pump.
5) Clean the coolant tank with cleaning water and mop up the coolant tank.
6) Fix the coolant pump and the coolant tank, then, pour cutting fluid disposed as a certain disposing ratio until up to the required fluid level.
7) Push back the coolant tank to the specified position in the rear guard.
8) Connect the aero-plug of the coolant pump with the power supply line.
9) Switch on the switch of the power supply of the machine, then the switch of cooling pump and observe the cycle flowing of cutting fluid for 3-5 minutes, if the flowing of cutting fluid is normal, the cutting fluid can be used.

11.5 Cleaning Method and NOTICE of Cooling System

In general case, the cooling system of the machine should be cleaned after the machine has been used for six months to ensure that it can be normally used. The cleaning method is given below.

- Switch off the power supply of the machine, then the switch of the coolant pump, and at last, remove the aero-plug of the coolant pump from the power supply line.
- Pull out the coolant tank from the rear guard, then, drain remaining cutting fluid from the draining hole of the coolant tank.
- Screw out the screws for locking the coolant pump and the coolant tank, then, dismount the coolant pump.
- Wash the coolant pump mouth with clean water.
- Clean the deposition in the coolant tank with clean water and mop up the coolant tank.
- Fix the coolant pump with the coolant tank.
- Push back the coolant tank to the specified position in the rear guard.

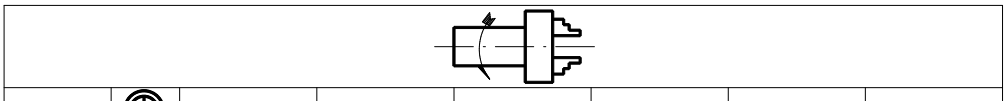
- Connect the aero-plug of the coolant tank with the power supply line.

Note: (1) When dismount the aero-plug of power supply of the coolant pump, do not exert with too strong force to avoid the aero-plug to be damaged.

(2) Do not make water falling down the plug of the power supply to avoid short-circuit of electrical system.

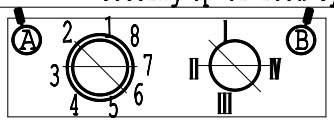
12 SETTING-UP OF THE MACHINE

12.1 Setting-up of Spindle Revolution and Its Working Capacity(50Hz; 1-14t/in)



Lever positions		5.6	8	11.5	16	22	32
		45	64	90	130	178	254
Marks	red	blue / yellow	blue / yellow	blue / yellow	blue / yellow	blue / yellow	blue / yellow
Lever positions							
Load allowed by spindle Nm		25833 / 328	18081 / 231	12573 / 164	9045 / 113	6576 / 82	4508 / 57.7
Transmitting efficiency of machine		0.76 / 0.79					

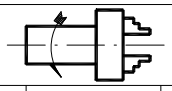
Setting up of feed system



Note:The ratio of longitudinal feed to cross feed is equal to 1:1.

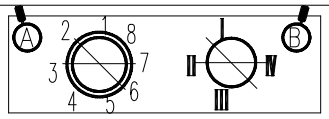
	mm				1/in				mπ				DP				mm/r				25.4/r			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
1	1	2	4	8	8	4	2	1	0.5	1	2	4	16	8	4	2	0.095	0.19	0.38	0.76	0.0037	0.0074	0.0149	0.0298
2			4.5	9	9	41/2	21/4	11/8			2.25	4.5	18	9	41/2	21/4	0.104	0.21	0.42	0.85	0.0041	0.0083	0.0167	0.0335
3	1.25	2.5	5	10	10	5	21/2	11/4		1.25	2.5	5	20	10	5	21/2	0.123	0.25	0.49	0.98	0.0048	0.0097	0.0193	0.0387
4			5.5	11	11	51/2	23/4	13/8			2.75	5.5					0.132	0.26	0.53	1.06	0.0052	0.0104	0.0208	0.0417
5	1.5	3	6	12	12	6	3	11/2		1.5	3	6	24	12	6	3	0.142	0.28	0.56	1.13	0.0056	0.0112	0.0223	0.0446
6							31/4	15/8			3.25	6.5					0.16	0.32	0.64	1.28	0.0063	0.0126	0.0253	0.0506
7	1.75	3.5	7	14	14	7	31/2	13/4		1.75	3.5	7	28	14	7	31/2	0.17	0.34	0.68	1.36	0.0067	0.0134	0.0268	0.0536
8			7.5	15							3.75	7.5					0.18	0.36	0.72	1.44	0.0071	0.0141	0.0283	0.0566

12.2 Setting-up of Spindle Revolution and Its Working Capacity(60Hz; 1/2-28t/in)



Lever position		7	10	14	19	26	38
		54	77	108	156	214	305
Marks	Red	Blue / Yellow	Blue / Yellow	Blue / Yellow	Blue / Yellow	Blue / Yellow	Blue / Yellow
Lever position							
Allowed load by spindle Nm		25833 / 328	18081 / 231	12573 / 164	9045 / 113	6576 / 82	4508 / 57.7
Transmitting efficiency of machine		0.76					
		0.79					

Setting up of feed system



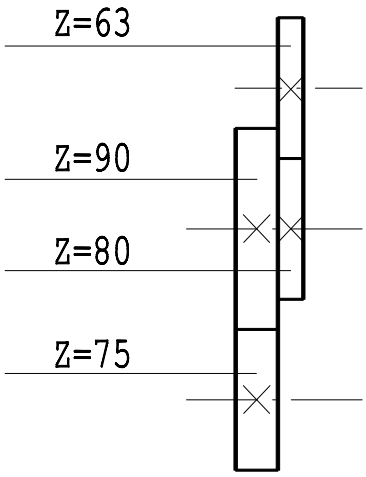
Note: Ratio of longitudinal feed is 1:1.

	mm				1/in				mπ				DP				mm/r				25.4/r			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
1	1	2	4	8	16 / 4	8 / 2	4 / 1	2 / 1/2	0.5	1	2	4	16	8	4	2	0.095	0.19	0.38	0.76	0.0037	0.0074	0.0149	0.0298
2			4.5	9	18 / 4 1/2	9 / 2 1/4	4 1/2 / 1 1/8	2 1/4 / 9/16			2.25	4.5	18	9	4 1/2	2 1/4	0.104	0.21	0.42	0.85	0.0041	0.0083	0.0167	0.0335
3	1.25	2.5	5	10	20 / 5	10 / 2 1/2	5 / 1 1/4	2 1/2 / 5/8		1.25	2.5	5	20	10	5	2 1/2	0.123	0.25	0.49	0.98	0.0048	0.0097	0.0193	0.0387
4			5.5	11	22 / 5 1/2	11 / 2 3/4	5 1/2 / 1 3/8	2 3/4 / 11/16			2.75	5.5					0.132	0.26	0.53	1.06	0.0052	0.0104	0.0208	0.0417
5	1.5	3	6	12	24 / 6	12 / 3	6 / 1 1/2	3 / 3/4		1.5	3	6	24	12	6	3	0.142	0.28	0.56	1.13	0.0056	0.0112	0.0223	0.0446
6							6 1/2 / 1 5/8	3 1/4 / 13/16			3.25	6.5					0.16	0.32	0.64	1.28	0.0063	0.0126	0.0253	0.0506
7	1.75	3.5	7	14	28 / 7	14 / 3 1/2	7 / 1 3/4	3 1/2 / 7/8		1.75	3.5	7	28	14	7	3 1/2	0.17	0.34	0.68	1.36	0.0067	0.0134	0.0268	0.0536
8			7.5	15							3.75	7.5					0.18	0.36	0.72	1.44	0.0071	0.0141	0.0283	0.0566

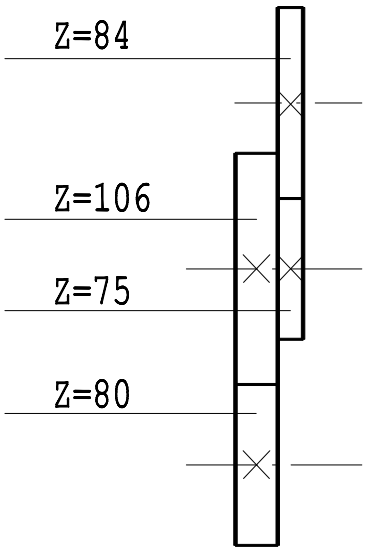
12.3 Setting Up of Transmitting System

(1) Normal threads can be got by arrangements of levers on the headstock and the feed box through the change gears. And for cutting Module and Diametral pitch threads, two exchange gears can be only changed as follows.

For cutting Metric system and Inch system threads cutting

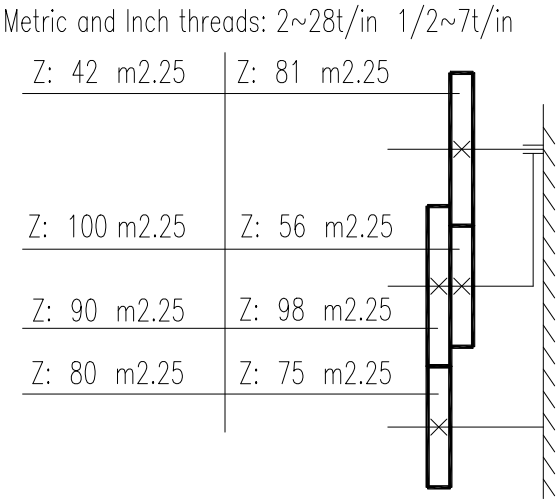


For cutting Module and Diametral threads cutting

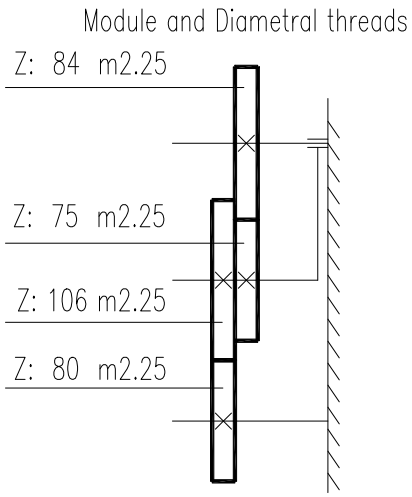


(2) Normal threads can be got by arrangements of levers on the headstock and the feed box through the change gears. And for cutting Module and Diametral pitch threads, two exchange gears can be only changed as follows.

For cutting Metric system and Inch system threads cutting



For cutting Module and Diametral threads cutting



(3) Setting equation for various threads

For metric threads:

$$J = \frac{Zt}{IT}$$

For inch threads:

$$J = \frac{Z25.4}{ITN}$$

For module threads:

$$J = \frac{Zm\pi}{IT}$$

For diametral threads:

$$J = \frac{Z25.4\pi}{ITP}$$

Where: J: transmission ratio of change gears
I: transmission ratio of feed box
T: pitch of leadscrew (1/2″)
t: pitch of workpiece (mm)
z: number of threads to be cut
m: module (mm)
N: t.p.i of workpiece
P: number of diametral pitch

13 INSPECTION AND MAINTENANCE OF THE MACHINE

Maintenance of the machine is necessary day-to-day work that keeps to the machine under good working status, prolongs serving life and increases production efficiency of the machine.

13.1 Routine Inspection

After the 500-hour operation, it is necessary to carry out the regular check and maintenance for the machine. In most cases, this kind of work should give priority to operators to carry out it, and the inspector and maintainer cooperate it. While checking, it is necessary to switch off the power supply first.

Table 1 Routine Inspection

No.	Checked Position	Checked Items
1	Electrical system	Check whether the emergency stop button is sensitive and reliable or not. Check whether the motor is normally running or not, and whether there is any abnormal temperature rising. Check whether the electric wire and the cable are damaged or not. Check whether functions of the travel switches and buttons are normal or not, and whether their action is reliable or not.
2	Control system	Check whether every control handle/lever and button is reliable or not. Check whether the clearance of change gears is proper, and whether the sleeve is loose or not.
3	Cooling and lubricating systems	Check whether cutting fluid and lubricating oil is in accordance with requirements or not. Check whether the liquid levels in the oil tank and the cutting fluid tank is in accordance with the requirements or not. Check whether every lubricating point has been reasonably lubricated or not. Check whether cutting fluid has been obviously polluted or not, and whether the quality of the lubricating oil is up to the standard. Check whether the chip-scraper has been damaged or not.
4	Safeguard devices	Check whether the limit position device of apron, the protection cover of chuck and the chip guard can normally work or not.
5	Motors	Check whether tension of the V-belts is proper or not, and whether there is any cracks on the surface of the belts. Check whether the pulley can normally run or not.

13.2 Periodic Inspection

After a certain time of working of the machine, owing to the wear between the parts that touch each other, working performance of them can be gradually affected, it is necessary to check them regularly to guarantee the accuracy of the machine, in general case, operator of the machine should take charge of this job with the assistance from inspector and maintainer.

Inspection can be carried out according to Table 2 or implement centralizing inspection and maintenance after 500-hour running of the machine.

Table 2 Periodic inspection

No.	Checked Position	Inspection and Maintenance	Period
1	Electrical device	Check and tighten each wiring screw. Check the earthing device. Check the interlock of moving parts.	Six months
2	Control system	Check the braking device (manual, foot-pedal braking).	Three months
3	Cooling system	Clean the chip pan. Change the cutting fluid. Clean the filtering net and the water tank.	At proper time. Two months (calculated as eight-hour work per day) Six months
4	Lubricating system	Check the lubricating pump and the oil distributor. Check whether the pipeline is blocked or not; whether there is chip in oil hole, oil rope and the oil felt or not. Check the oilness.	One year
5	Safety protection	Check whether the safety protection devices are reliable or not and adjust the over-load safety clutch, etc.	Six months
6	V-belts	Check for appearance tension and looseness. Clean the belts.	Six months
7	Miscellaneous	For the change gears, it is necessary to check whether sleeve is shaken or not, and adjust the backlash of the gears. Adjust the clearance of friction discs and the brake. Adjust the compressing plate of carriage.	One year Six months Six months

Note: Unless otherwise specified, the time interval is determined on the basis of two-shift work per day.

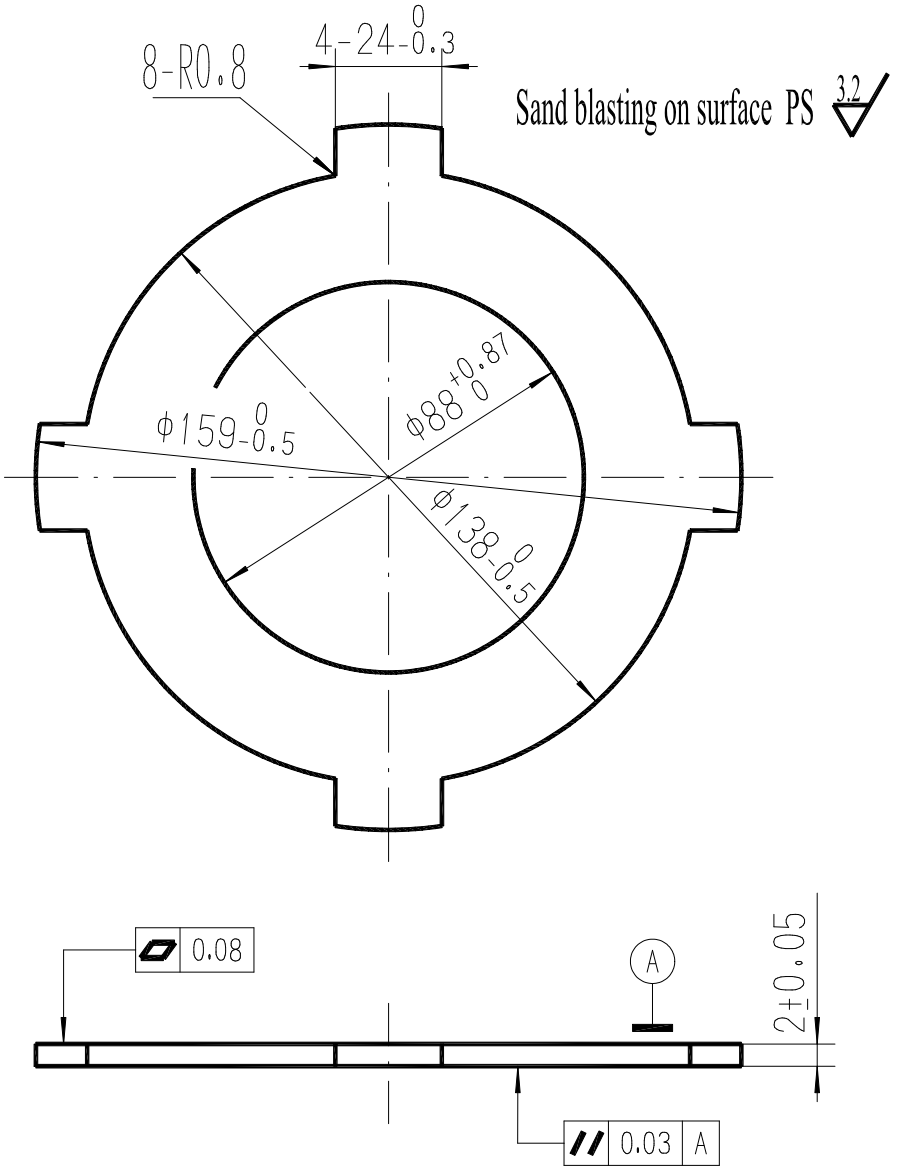
13.3 Overhauling of the Machine

The machine should be overhauled once for five years on the basis of two-shift work per

day and stipulated regulations are obeyed. During the overhauling, you should adjust, repair or change worn part(s) according to practical conditions. After overhauling and before coming into production, it is necessary to check the accuracies and level the machine according to the TEST CERTIFICATE.

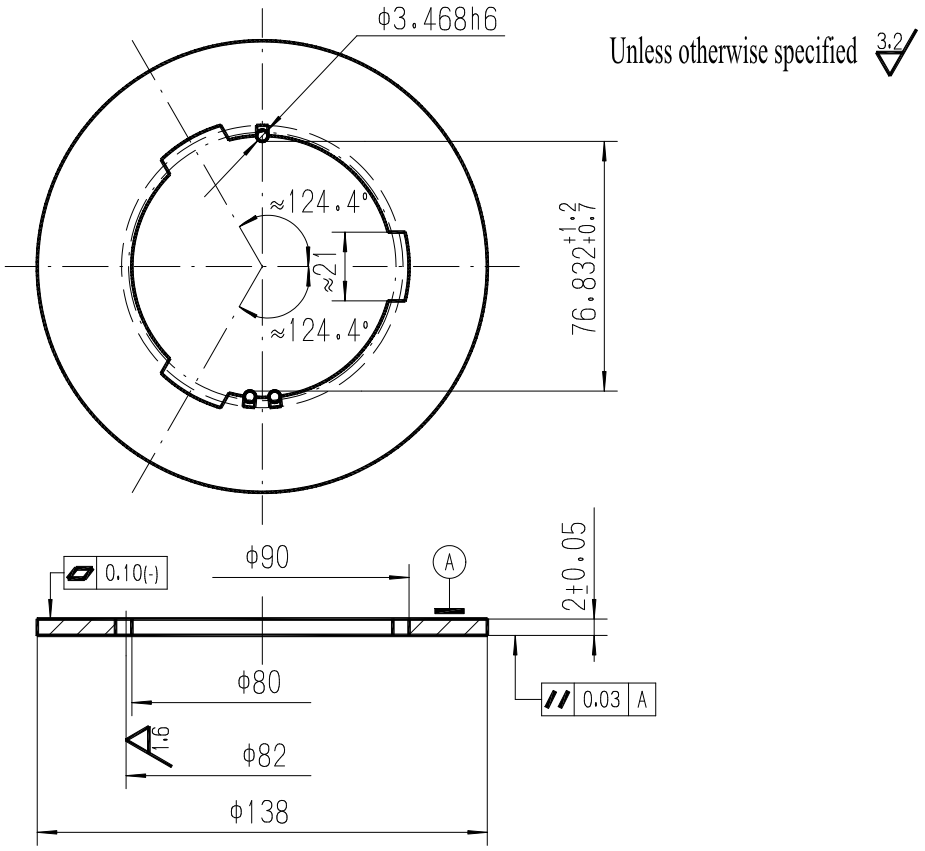
14 LIST OF WEARING PARTS

No.	Part Name	Part No.	Matl.	Qty.	Mounted Position	Remarks
1	Internal friction disc	S1-245B-245B02026L	20Cr	16	Headstock	
2	External friction disc	S1-245B-02025L	20Cr	14	Headstock	



External friction disc: 245B02025L

Material:15 H.T.:S-C59



Internal friction disc:245B02026L

Technical Requirements	
Normal module	2
No. of teeth	41
Accuracy	Grade 8-8C
Addendum height	1 mm
For the three grooves of the internal hole, three teeth shall be eliminated for each.	
Deburring and sand blasting on surfaces	
Material	15
Heat Treatment	S-C59

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