



**CW61100B SERIES    HORIZONTAL LATHES**  
**CW61125B SERIES**

# **INSTRUCTION BOOK**

**(For Mechanical Unit)**

**GENERAL MANAGEMENT DIVISION OF LATHE**  
**SHENYANG MACHINE TOOL CO., LTD**  
**THE PEOPLE' S REPUBLIC OF CHINA**

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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**

It is necessary for you to read this INSTRUCTION BOOK carefully and thoroughly and be acquainted with all details of the INSTRUCTION BOOK before operating the machine. You have to install, operate and maintain the machine according to given requirements. And also after thoroughly acquainted with stipulations of all safety labels and following safe warns, you can be allowed to operate the machine to prevent the machine from being damaged or operator/other person from being injured.

If the faceplate is to be used to perform turning job in the machine, you must be sure to keep it in mind that spindle speed shall be less than the maximum speed allowed by the faceplate and pay attention to safety protection to ensure personal safety.

Although the instruction book has been carefully revised, but if you find there is still any questionable points, incorrect explanation or omission in it, please contact our factory.

In order to explain concrete details of the machine, some graphs in this book were drawn without door, covers or safe guards, etc., therefore, before operating the machine, put on all those covers, safe guards or close the doors according to this book, otherwise, some troubles may occur, resulting in the machine's major assembly or other attachments damaged.

User should properly keep this INSTRUCTION BOOK .As for puzzled problems, please get in touch with serving office for uses of the management and Sales 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

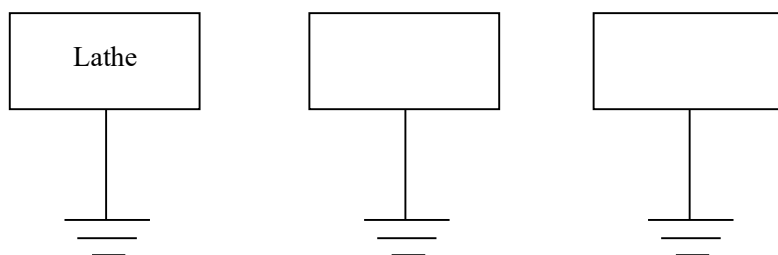
- 1.1 The performance values of wire used for connecting the electrical parts should be equal to or more than the specified values in this Book.
- 1.2 Never use the common terminal block with the equipments like welding machine or high frequency quencher, etc.
- 1.3 Power cable should be connected by skilled electrician.

#### 2 Grounding

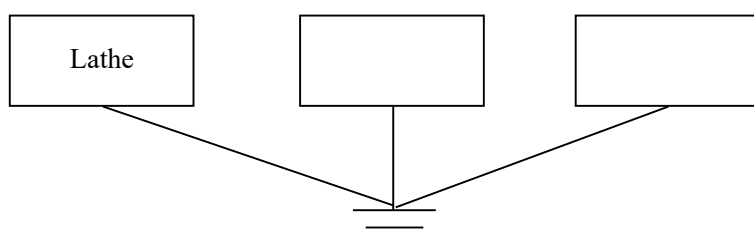
Cross section and grounding resistance as well as matters needing attention to grounding and the grounding wire used for the machine must be in accordance with the standard GB5226.1-2008 of People's Republic of China.

Grounding wire should be connected as shown by figures given below.

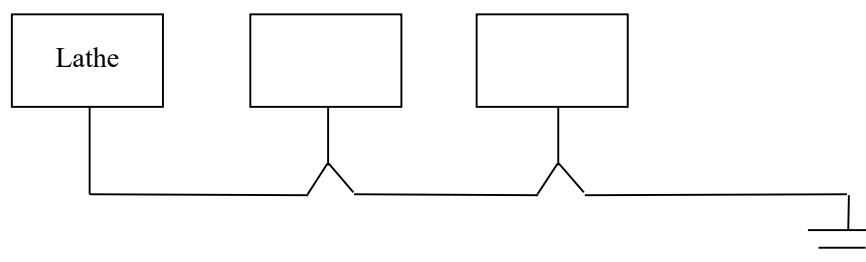
Independent grounding wire:



Common grounding wire



Never connect some equipment as shown in the figure in the following method:



**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 be recovered or reutilized to designated local recovering unit or designated discharging place..
- For any waste liquid, such as lubricating oil, coolant, etc. that cannot be recovered or reutilized and lead to polluting environment, they have to be drained off at locally designated place.

**CONTENTS**

1	SAFETY WARN .....	1
1.1	Notice to Operator and Maintainer .....	1
1.2	Basic Operation .....	1
1.3	Requirements before Switching on the Power Supply .....	2
1.4	Requirements after Switching-on the Power Supply .....	2
1.5	Routine Inspection .....	3
1.6	Preparation before Operating the Machine .....	3
1.7	Operation .....	4
1.8	Interruption of Machining .....	5
1.9	After Machining .....	5
1.10	Safety Equipment .....	6
1.11	Maintenance Operation .....	6
1.12	Prohibition .....	6
2	GENERAL DESCRIPTION .....	7
2.1	Applicable Scope .....	7
2.2	Identification Marking of Model .....	7
2.3	Application and Turning Range of the Machine .....	7
2.3.1	Application of the Machine .....	7
2.3.2	Turning Range of the Machine .....	7
2.4	Accuracy of the Machine .....	8
2.5	Noise of the Machine .....	8
2.6	Illumination of the Machine .....	8
2.7	Requirements of Environment to the Machine .....	8
2.8	Affection of the Machine to Environment .....	8
3	TRANSPORTATION, HANDLING AND INSTALLATION .....	9
3.1	Transportation of the Machine .....	9
3.2	Handling of the Machine .....	9
3.3	Installation of the Machine .....	9
3.3.1	Preparation Work before Installation .....	9
3.3.2	Power Interface .....	9
3.3.3	General Power Supply .....	10
3.3.4	Installation of the Machine .....	10
3.4	Cleaning and Trial-running .....	14
4	SPECIFICATIONS OF THE MACHINE .....	15
4.1	Description of Specifications .....	15
4.2	Specifications of the Machine .....	15
5	TRANSMISSION SYSTEM AND BEARING ARRANGEMENT .....	18
5.1	Main Drive System .....	18
5.2	Feed system .....	18
6	CONTROL SYSTEM OF THE MACHINE .....	23
6.1	Arrangement Drawing of Handles .....	23
6.2	Definition of Operating Directions of Handles and Handwheel of the Machine .....	25
6.3	Operating Procedures of the Machine .....	25

6.3.1	Preparing Procedures	25
6.3.2	Requirements of Loading and Clamping Workpiece	25
6.3.3	Requirements of the Machine for Tools	26
6.3.4	Manual Feed	26
6.3.5	Automatic Feed	26
6.3.6	Threads Cutting	27
6.3.7	Turning Tapers	27
6.3.8	Operation of Spindle Forward/reverse	28
6.3.9	Operation of Stopping Spindle	29
6.3.10	Operation to Stop the Machine	30
6.3.11	Re-start after Power-off of the Machine	30
6.3.12	Rescue in Emergency Status	30
6.3.13	Dismounting Operation of Tailstock Center	30
6.3.14	Operation to Avoid Sliding of Tailstock	31
6.3.15	Cleaning of Chips	31
7	ADJUSTMENT OF THE MACHINE	32
7.1	Adjustment of Spindle	32
7.2	Adjustment of Braking	32
7.3	Adjustment of Tool Post	33
7.4	Installation and Adjustment of Tool	33
7.5	Adjustment of Safety Clutch in the Apron	34
7.6	Adjustment of Tension of V-belts of Main Transmission	35
8	PROTECTION MEASURES OF SAFETY OF THE MACHINE	36
8.1	Disposition of Necessary Safety Warning Labels	36
8.2	Overload Safety Clutch	36
8.3	Over-clutch with Single Direction	36
8.4	Interlock Protection of Feed Rod and Leadscrew	37
8.5	Prompt of Remnant Risks	37
8.5.1	Danger Resulting from Material to be Turned	37
8.5.2	Danger Resulting from Throwing out of Bodies	38
8.5.3	Danger Resulting from Changing Safety Parts	38
9	MAINTENANCE AND LUBRICATION OF THE MACHINE	39
9.1	Maintenance of the Machine	39
9.2	Lubrication of the Machine	39
9.2.1	Distribution of Lubrication points, Trademark of Lubricant and Lubricating Cycle	39
9.2.2	Selection of Lubricating Oil	39
9.2.3	Lubricating Ways and Means	40
10	ARRANGEMENT OF ROLLING BEARINGS	42
11	DESCRIPTION OF HYDRAULIC SYSTEM	43
11.1	Function of Hydraulic System	43
11.2	Components and their function of Hydraulic System	43
11.3	Oil Lines of Hydraulic System	44
11.4	Maintenance of Hydraulic System:	44

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12	USE AND CLEANING OF CUTTING FLUID	46
12.1	Preparation before Pouring Cutting Fluid	46
12.2	Pouring of Cutting Fluid	46
12.3	Use of Cutting Fluid	46
12.3.1	Application of Cutting Fluid	46
12.3.2	Using Method of Cutting Fluid	46
12.4	Adding, Changing, Changing Period and Changing Method	48
12.4.1	Adding of Cutting Fluid	48
12.4.2	Changing of cutting Fluid	48
12.4.3	Changing Cycle of Cutting Fluid	48
12.4.4	Changing Method of Cutting Fluid	48
12.4.5	Cleaning Method and Matters Needing Attention of Cooling System	49
13	INSPECTION AND MAINTENANCE OF THE MACHINE	50
13.1	Routine Inspection	50
13.2	Periodic Inspection	51
13.3	Overhauling of the Machine	51
14	COMMON TROUBLES AND TROUBLE-SHOOTING	53
15	LIST OF WAERING PARTS AND THEIR DRAWING	55



## 1 SAFETY WARN

The machine is provided with many safe devices to prevent operator and the equipment from injury or damage, but operator should understand and be acquainted with the stipulations given by various safety labels as well as the following stipulations thoroughly before operating the machine.

### 1.1 Notice to Operator and Maintainer

- *Operator when intends to operate the machine should be trained and have the skill of operating the machine. And it is necessary for him/her to read the Instruction Book thoroughly and be completely acquainted with the content given by the instruction book. Moreover, only after possessing the skill of operating the machine before operating the machine, he/she can be allowed to operate this machine.*
- *Before operating the machine, operator should wear working overalls and safety shoes, put on protecting glasses and long hair should be put in the cap. And also put on mask if the workpiece made from cast material is to be turned.*
- *Maintenance shall be performed by qualified maintainer or person specially trained to avoid unexpected accident.*

### 1.2 Basic Operation

#### **Danger:**

- *Never touch the transformer, motors and any terminals etc. with high voltage with hand to avoid serious shock.*
- *Never touch any switch with wet hand, otherwise, also resulting in shock.*

#### **Warn:**

*It is necessary to confirm the switch to be used before using, no mistake is allowed.*

#### **Notice:**

- *There must be adequate working space to avoid unexpected accident.*
- *Separate earthing wire of the machine should be adopted and it is better that its length is as short as possible.*
- *The operator should be acquainted with the position of E-stop button, therefore, it can be found easily when necessary.*
- *You should at first press the emergency stop button as soon as any trouble occurs with the machine or the machine is under hazardous status, then the general switch of power supply. No switching on the power supply before the trouble is remedied.*
- *The general switch of power supply should be at once switched off when power is cutting.*
- *Water and oil may cause working floor slipping, resulting in danger; in order avoid*

*unexpected accident, working floor should be kept clean and dry.*

- *Do not dirty, nick or make down any warning tablets. Please order new one from our factory if some words on the tablet become not clear or it has been lost. And if you order a new one, it is necessary for you to provide the Part No. of the labels needed.*
- *Do not touch any switch without any meaning.*
- *Recommended lubricating oil and grease or approved oil possessing equivalent performance should be adapted.*

### 1.3 Requirements before Switching on the Power Supply

#### **Danger:**

- *All cables, wires or patch cord whose insulating covers are damaged will cause current leakage or shock, so check them carefully before switching on the power supply.*

#### **Notice:**

- **Cross section of the cables used for electrifying switch and main circuit switch fitted for the machine shall be in accordance with the cross section specified in the Electric Circuit Diagrams to meet the needs of 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 to see if the electrical system is correct before connecting power supply and pay attention whether the motor is moisture.**
- **The oil tank of the machine should be filled to the oil level and check it, refill it when necessary.**
- **For lubricating point, the kind of oil and relative oil position, please refer to their sign labels.**
- **Every switch and operating lever should be nimble, smooth and their actions should be checked.**
- **Electrician should wear insulating shoes of oil-proof, working overalls and put on other articles for safety protection.**

### 1.4 Requirements after Switching-on the Power Supply

#### **Notice:**

- **For operating the machine at the first time after unpacking or re-operating the machine under stop status for long time, it is necessary to make the machine being idle-running for several hours. And each moving parts shall be lubricated with fresh lubricating oil.**
- **Observe running direction of the motor carefully to see if it is in accordance with specified direction.**

- 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 or safeguard device is under good status.
- Check tension of the belts. If they are too loose, replace them with new suitable ones.

## 1.6 Preparation before Operating the Machine

### **Notice:**

- Tools should be adaptive with installing and clamping size of the tool post.
- Excessive worn tools can result in damage; therefore, they should be replaced by new ones beforehand.
- The working area should be provided with 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, the path is unblocked.
- Tools or any other 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 limitation specified range to avoid interference.
- Rust-protecting grease must be carefully cleaned with kerosene, wash the interior of the headstock with warm kerosene and clean the woolen thread for leading oil for every place before starting the machine. After all oil works are washed and dried, be sure to put them back to their original positions. Remove the oilpaper and grease on the guide ways; refill the guide way lubricating oil after cleaning. Never use abrasive cloth or other hard things 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.

**Check:**

- Before operating the machine, carefully check whether the electric system is satisfactory, the connecting wires and the plugs are correctly connected and there is any loose or imaginary connection 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 handle of the machine is nimble and make every operating handle being at its neutral step position.
- Check functions of all protecting devices such as power off while the protection door is open and interlock mechanism, etc.
- Before operating the machine, close the protecting cover and the door of belt cover well.
- Any person who is irrelevant with operating the machine should withdraw from the around working area.

**1.7 Operation****Danger:**

- Do not shift the handle for changing speed on the headstock in any case during running of spindle of the machine. Strictly prohibit starting when the machine is at the neutral step.
- Do not operate the machine with long hair. Long hair should be covered with cap when operating the machine.
- Do not operate the switches with gloves or wearing loose clothes to avoid accidental operation or accident of winding or involving in.
- Workpieces and turning tool must be tightly chucked, otherwise, personnel injury may result in..
- The chuck jaws must clamp workpieces to avoid themselves throw-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 or the spindle that is running by hand or other any way.
- Do not 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 chip during machining and do not touch the chip to avoid scald.
- Clean chip with special hook. Do not clean chip on the cutter by bare hand and to use brush for cleaning it.
- Installing and dismounting of the tool shall be carried out while the machine is stopped.
- Anyone excepting operator is not allowed to stay in the working area when the machine is working.

**Notice:**

- The chip-guarding screen should be used for defending when turning workpieces.
- The chuck guarding cover should be used for defending when the spindle running.

**1.8 Interruption of Machining****Notice:**

- The stop of feeding movement is not later than the stop of the main movement when the machine stops.
- After completion of turning one pressing, before operator wants to leave from the machine temporarily, the operator should turn off the stop button of the main motor and also the switch off the main power supply at the same time.

**1.9 After Machining****Notice:**

- After the machine stops, clean it and remove the chip. Remove the chip by means of special hook or other components and do not clean by bare hand.
- Do not do cleaning work before the machine stops.
- 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 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 when necessary.
- Clean the oil filter of oil plate.
- Before the work is over or you leave the machine, turn off the switch of the general power supply switch.

### 1.10 Safety Equipment

- Rear guarding cover
- Front guarding cover
- Guarding cover for chuck
- Belt cover
- Emergency stop button

### 1.11 Maintenance Operation

#### **Danger:**

- 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 plate 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 place. This plate should be easy to see and to pick off but uneasy to fall down.
- It’s dangerous to maintain the machine with power on, usually the main circuit switch should be turn off during maintenance.

#### **Warn:**

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

#### **Notice:**

- Travel limit device, approach switch or interlock cannot be dismantled or modified.
- Fuses and cables used for the machine should be certificated products manufactured by qualified manufacturer.
- 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 dismantled parts and dirty oil far away from the machine to keep safety.

### 1.12 Prohibition

- Shifting change-speed levers when the spindle is running is prohibited.
- Shifting levers on the feed box when running at the high and middle speed is prohibited.
- The abnormal operation is prohibited, such as loading, unloading and checking workpiece, shooting trouble and clearing chip while the machine is running.

- **While operating the machine, wearing loose overalls and adornments that are obstructive to work and with long hair are prohibited.**
- **Starting up, operating, maintaining the machine and opening the cabinet door and touching the electric parts without authorization of any body is prohibited.**
- **Touching the tailstock when the spindle is running is prohibited.**

## **2 GENERAL DESCRIPTION**

### **2.1 Applicable Scope**

The machines described by this INSTRUCTION BOOK belong to series machines including CW61100B and CW61125B.

### **2.2 Identification Marking of Model**

Take CW 61100B as an example:

C-Lathe; W-Universal; The front two numbers 61-Horizontal lathe; The last three numbers 100-1/10 of max. swing dia. over bed; B-Improved series No.

### **2.3 Application and Turning Range of the Machine**

#### **2.3.1 Application of the Machine**

The machine can perform various turning work, such as endface, external cylindrical surface, turning inner holes, cutting of various threads in Metric, Whitworth, Module, Diametral threads etc. of various workpiece. Except those, by means of the compound rest, the machine can alone cut short taper by power, and by means of the compound rest and through longitudinal feed motion it can also turn long taper by power. The machine is also used for drilling, trepanning, boring, etc. Owing to its powerful power and strong rigidity, the machine is suitable to turn various workpieces made from ferrous or non-ferrous metals.

The dimensions of workpieces produced on the machine can achieve the accuracy of Grade IT7 with lower value of surface roughness.

The machine possesses foot-pedal function, also having hand braking function, therefore, the machine is convenient in operation, sensitive and reliable in braking.

CW61100B is basic-type product and its max. swing diameter over bed is of 1000 mm. CW61125B, is a new product which is higher than its basic-type And its max. swing diameter over bed is of 1250 mm.

These two products can all be provided with digital display unit (Provided according to the contract) which can display traveling of the carriage with clear digits and the resolution is 0.005 mm. So it is advantageous to raise the machine's machining accuracy and producing efficiency.

#### **2.3.2 Turning Range of the Machine**

Turning range of the machine should be determined according to size and specification of the machine. Operation of the machine over the specification is forbidden. Otherwise it will result in personal injury or death caused by accidents.



## 2.4 Accuracy of the Machine

Accuracy of the machine is in accordance with the standard GB/T4020-1997 《Accuracy Test for Horizontal Lathes》 of the People's Republic of China.

## 2.5 Noise of the Machine

According to the test of GB/T16769-1997 «Sound Pressure Test of Noise for Metal Cutting Machines», sound pressure level of idle running noise of the machine is  $\leq 83\text{dB(A)}$ .

## 2.6 Illumination of the Machine

In order to meet the needs of illuminating intensity in working zone of the machine in normal illuminating case in workshop, The specifications are as follows:

Type of illuminating light for working	JC38B
Voltage:	24V
Power:	40W

The illuminating light of the machine can move with the apron together for ensuring that the operator observes workpiece being turned without interfering shadow, dizzy and frequent flashing.

## 2.7 Requirements of Environment to the Machine

*The machine is to be used in environment available following specified practical environment conditions and running conditions.*

- *Environmental temperature: Within the range of  $5^{\circ}\text{C}$ - $40^{\circ}\text{C}$  and the average temperature shall not be more than  $35^{\circ}\text{C}$  for 24 hours.*
- *Relative humidity: Range of 30%-95%, and the principle of humidity changing is no condensation result in.*
- *Sea elevation: Lower than 1000 m.*
- *Atmosphere: There is no excessive dust, acidity gas, corrosive gas and salt component.*
- *Sun light does not directly light up the machine or heat radiation makes the machine resulting in temperature rising to make changing of environment.*
- *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.*

## 2.8 Affection of the Machine to Environment

The machine does not produce harmful effects to environment and also does not discharge harmful gas and liquid.

### 3 TRANSPORTATION, HANDLING AND INSTALLATION

#### 3.1 Transportation of the Machine

We have taken some measures such as moisture-proof, anti-vibration and anti-shock during packing the machine, therefore, the machine can bear transport and storage under temperature from  $-25^{\circ}$ - $55^{\circ}$ C and also transport and storage in short time within 24 hours under status of temperature of  $70^{\circ}$ C.

Material of the packing case is wooden that cannot pollute environment.

#### 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 over incline the case. If rolls are used for the transport of the case, it is important that the inclination of condition or the slope should not exceed  $15^{\circ}$ , the diameter of the rolls used must not be over 70 mm. Never place the case on a prismatic body or upside down.

When lifting the unpacked machine with a crane (the lifting capacity more than 20 tons), use strong steel bars with  $\phi 80$ -90 mm, 1500~1800 mm long, and made them insert into the elliptical hanging holes of bed. Then Unite the steel rope to the steel stick (see Fig. 5, refer to Table 3 for the position of gravity center) and keep balance with carriage. The wooden blocks should be padded between the strong steel wire ropes and the position touched with the wire ropes of the machine avoiding damages to the machine.

#### 3.3 Installation of the Machine

##### 3.3.1 Preparation Work before Installation

Installation of the machine should be in accordance with the stipulations given in the Chapter 2.7. Besides, pay attention to the following:

- **The machine shall be installed in workshop with arrester.**
- **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 position with vibration resource, it is necessary to dig a canal around the machine or make similar measures for anti-vibration.**

##### 3.3.2 Power Interface

The terminal block of power supply is located on the switchboard in the electric cabinet.

### 3.3.3 General Power Supply

The voltage of power supply and the frequency available for this machine will be determined according to concerned contract. Refer to Table 1.

Table 1 Pressure of power supply and frequency

Frequency	Rated Voltage			
50Hz	~220V	~380V	~420V	~440V
60Hz				

Allowed fluctuation range of the voltage and the frequency:

Voltage: Stabilizing voltage value is rated voltage timed by 0.9~1.1

Frequency: Stabilizing frequency value is rated frequency timed by 0.99~1.01 (continuous working);

Stabilizing frequency value is the rated frequency timed by 0.98~1.02 (short-time working)

### 3.3.4 Installation of the Machine

The performance of a machine is greatly influenced by an installing way. If the guide ways of a machine is precisely machined, the original accuracy cannot be obtained due to the reason of bad installation of the machine. So the required machining accuracy can not be obtained easily. And most troubles of the machine are caused by this reason.

#### 3.3.4.1 Foundation of the Machine

Comprehensive check and test of the machine had been carried out before consignment of the machine from the factory. Incorrect installing may effect the accuracy and the performance of the machine. Note: For the machine installation, a plane installation place should be first found, then, build the foundation according to specified ambient requirements and the Foundation plan Fig. 5 and Table 2. Install the adjusting vertical iron at two sides of bed legs (the vertical adjusting iron and the screws should be made by the customer according to Fig. 3 and Fig. 4) and return oil pipeline according to Fig. 1, Fig. 2, Fig. 3 and Fig. 4.

The floor space of the machines not only includes the space required by operating machine but also the space required for maintenance (distance for water tank and for maintenance), the foundation plan shows the space for machine itself and maintenance.

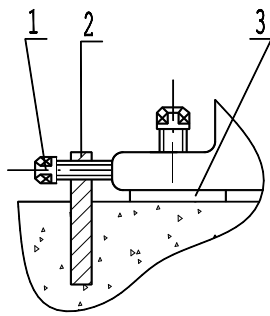


Fig. 1 Installing diagram of adjusting vertical iron

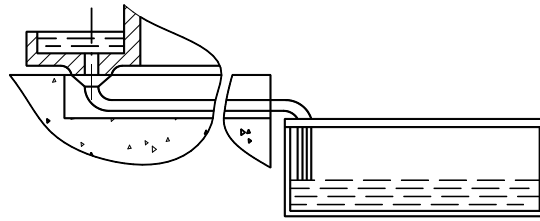


Fig. 2 Installing diagram of oil return pipe

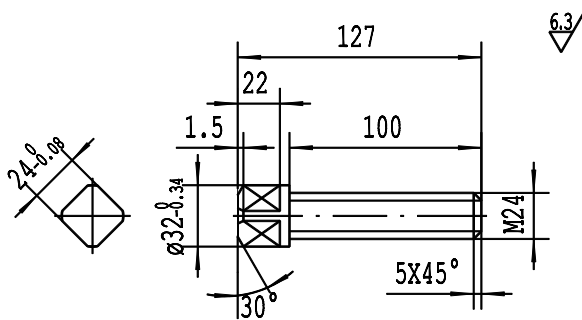


Fig. 3 Installing Part 1

Part No.	1
Material	45
Quantity	The same to foundation hole n

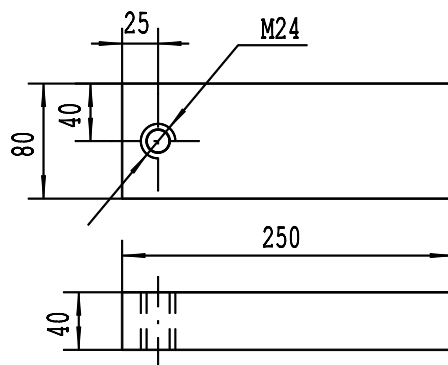


Fig. 4 Installing Part 2

Part No.	2
Material	45
Quantity	The same to foundation hole n

Note: The position of the electric cabinet and the depth of the foundation is determined by the customer.

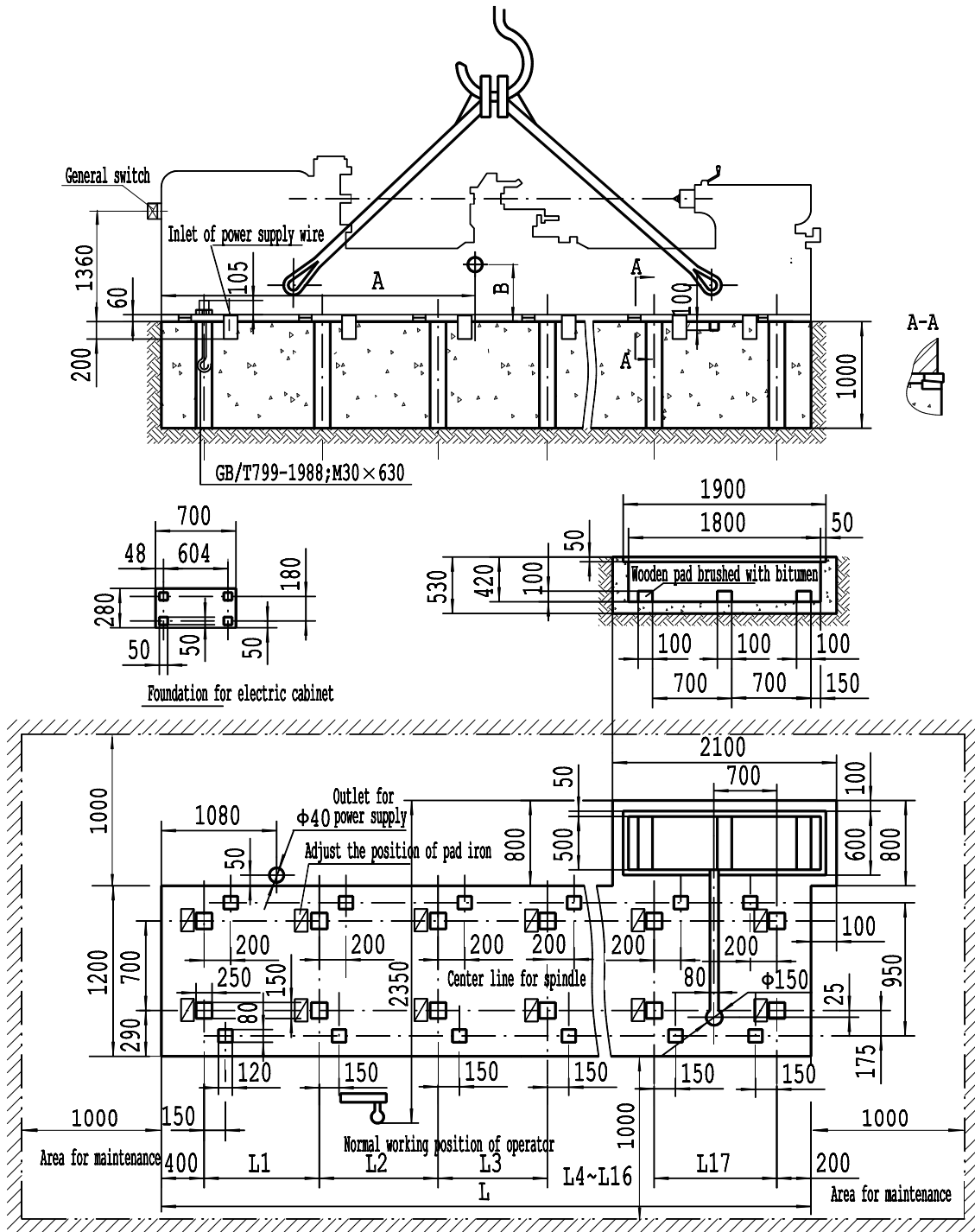


Fig. 5 Foundation plan of the machine

Table 2

Centers Distance	L1	L2	L3	L4	L5	L6	L7	L8	L9
1500	1250	1250							
3000	1000	1000	1000	1000					
5000	1000	1000	1000	1000	1000	1000			
6000	1000	1000	1000	1000	1000	1000	1000		
8000	1000	1000	1000	1000	1000	1000	1000	1000	1000
11000	1000	1000	1000	1000	1400	300	1300	1000	1000
12000	1000	1000	1000	1000	1400	300	1300	1000	1000
14000	1000	1000	1000	1000	1400	300	1275	1425	300
15000	1000	1000	1000	1000	1400	300	1275	1425	300
Centers Distance	L10	L11	L12	L13	L14	L15	L16	L17	L
1500								1400	4500
3000								1400	6000
5000								1400	8000
6000								1370	9000
8000								1370	11000
11000	1400	300	1275					1425	14000
12000	1400	300	1300	1000				1400	15000
14000	1300	1000	1000	1400	300	1275		1425	17000
15000	1300	1000	1400	300	1300	1000	1000	1400	18000

Table 3 Position of machine gravity

Centers Distance	1500	3000	5000	6000	8000	11000	12000	14000	15000
A	1950	3010	3800	4150	5100	6500	7150	8050	8550
B(CW61100B)	495								
B(CW61125B)	525								

Note: The length unit of table 2 and table 3 is mm.

### 3.3.4.2 Installing Procedure

- Put the iron plate of 60mm×60mm×10mm same to the foundation bolts (Part 3 should be made by the user) under every adjusting screw in the vertical direction of bed.
- Roughly adjust installing accuracy of the machine. The accuracy of installation is tested by a level that is placed respectively at two ends of bed ways. The reading of the level should not be over 0.02/1000 in both longitudinal and transverse direction. If not so, adjust the adjusting screw in the vertical direction of bed.
- After doing this, pour cement mortar into the foundation bolt holes. When the mortar has fully dried out, make finish adjustment.
- For fining adjustment of the accuracy of the machine. On one hand, adjust the adjusting screw in the vertical direction; on the other hand, adjust the screws on the adjusting vertical iron at two sides until the machine accuracy meets the requirement.
- All the foundation bolts should be tightened to avoid impairing the accuracy of installation.
- After the accuracy meets the requirement, cover the upper entrance of cooling tank by a wooden plate, fill cement mortar around the bed leg smoothly to prevent ingress of lubricating oil.

### 3.4 Cleaning and Trial-running

After installation, clean off the rust-proof grease from the machine with cotton waste soaked with kerosene. Do not clean the lathe with emery cloth or other hard material. And then, cover the machine with film of oil for preventing rusting. The operator should be acquainted well with the machine structure, operation and lubrication. Check the working condition of every part of the machine manually. Before the machine is connected to the mains, check whether the electrical system is in proper order, and specially respect to moisture, then connect the mains and also check the condition of idle running of the machine and then start working. Pay great attention to check whether the direction of motor runs is in accordance with the specified direction.

## 4 SPECIFICATIONS OF THE MACHINE

### 4.1 Description of Specifications

The machine has many types and sizes. You should first confirm which one is your machine before reading this Instruction Book and other descriptions.

### 4.2 Specifications of the Machine

(See Table 4 and Table 5)

Table 4

Item	Type of the Machine	
	CW61100B	CW61125B
Max. swing dia. over bed	1000mm (39")	1250mm (49")
Max. length of workpiece to be turned (mm)	1500; 3000; 5000; 6000; 8000; 11000; 12000; 14000; 15000	
Max. turning length (mm)	1300; 2800; 4800; 5800; 7800; 10800; 11800; 13800; 14800	
Distance between spindle center and plane guideway of bed	500 mm	625 mm
Max. swing dia. of workpiece to be turned over carriage	610 mm (24")	865 mm(34")
Max. dia. of bar stock inserted in the spindle bore	12 1mm (5")	
Dia. of spindle bore	130 mm (5")	
Front taper bore of spindle	Metric 140	
Number of spindle forward	21	
Number of spindle reverse	12	
Spindle speed	n(1) Forward	3.15—315 r/min
	Reverse	3.5—278 r/min
	n(2) Forward	2—200 r/min
	Reverse	2.24—178 r/min
Number of longitudinal/transverse feed of carriage of spindle per revolution	56	
Feeding	Longitudinal feed of spindle carriage per revolution	0.10—12 mm (0.004"—0.473")
	Transverse feed of spindle carriage per revolution	0.05—6 mm (0.002"—0.236") (equal to 1/2 time of longitudinal feed)
	Feed of spindle cross slide per revolution	0.025—3 mm (0.001"—0.118") (equal to 1/4 time of longitudinal feed)
	Fine feed (special change gears)	Equal to 1/2 time of standard feed



Item		Type of the Machine	
		CW61100B	CW61125B
Range of turning threads	Number of metric threads	44	
	Range of metric threads	1~120 mm	
	Number of inch threads	31	
	Range of inch threads	24~1/4 t.p.i.	
	Number of module threads	45	
	Range of module threads	0.5~60 mm	
	Number of diametral pitch threads	38	
	Range of diametral pitch threads	1/2~56 DP	
	Inch special thread(special change gears)	11.5、19、27 t.p.i.	
Carriage	Vertical distance from spindle center to tool installing reference face	48 mm	
	Tool cross section	45 mm×45 mm	
	Swing of compound rest slide	±90°	
	Max. travel of saddle	1450; 2950; 4950; 5950; 7950; 10950; 11950; 13950; 14950	
	Max. transverse travel of cross slide	520 mm (20")	630mm (24")
	Max. travel of compound rest slide	300 mm (12")	
	Travel of compound rest and cross slide	0.05 mm (0.002")	
	Rapid travel of carriage	3740 mm/min	
	Rapid transverse of cross slide	1870 mm/min	
	Rapid transverse of compound rest	935 mm/min	
Tailstock	Dia. of center sleeve	160 mm (6")	
	Max. travel of center sleeve	300 mm (12")	
	Taper of center sleeve	Morse no.6	
Main motor	Type	Y200L2—6B3	
	Power	22 kW	
	Speed	970 r/min	
Rapid motor	Type	JC0 21—2	
	Power	1.5 kW	

	Item	Type of the Machine	
		CW61100B	CW61125B
	Speed	3000 r/min	
Cooling pump	Type	AOB—50	
	Power	0.12 kW	
	Speed	50 L/min	
Oil pump	Type	CB-B10	
	Power	120 W	
	Speed	1450 r/min	
Max. loading weight of the machine between two centers		5000 kg	

Table 5

Machine type (mm)	1500	3000	5000	6000	8000	11000	12000	14000	15000	
Machine length (mm)	4600	6100	8100	9100	11100	14100	15100	17100	18100	
Machine width		2150mm								
Height of machine	CW61100B	1700mm								
	CW61125B	1825mm								
Net weight (kg)	CW61100B	9200	10700	13000	13700	15700	18900	19700	21300	22100
	CW61125B	10200	11900	14500	15400	17900	20400	21200	22800	23600

## 5 TRANSMISSION SYSTEM AND BEARING ARRANGEMENT

The machine can be provided with hand-braking device, also with foot-pedal braking device. The transmitting path and transmission parts of the machine with hand-braking device are completely same with the machine with foot-pedal braking.

### 5.1 Main Drive System

A workpiece is mounted in chuck or between two centers and driven by motor through driving mechanism (See Fig. 6 ), a power from the motor is transmitted to shaft I of headstock through V-belts and then to the spindle through gears of other shafts. The spindle can obtain various speed by change the position of the spindle handle. (See Table 6)

### 5.2 Feed system

There are three ways that can make the carriage move longitudinally.

- (1) Through feed box, feed rod and apron mechanism, makes the gear engaged with the rack rotating for moving the carriage.
- (2) Through the feed box, the leadscrew and the split nut carriage is moved.
- (3) By means of the handwheel and through engaging the gears which are set within the apron with rack the carriage is moved.

The inner gear system in the feed box is transmitted by the shaft X in the headstock through change gears in the change gearbox.

Each cross feed equals to 1/2 times of relative longitudinal feed.

For the change of each thread and relative feed, please refer to Fig. 7.

Change the positions of gear and the handle according to the feed table of the machine when turning various threads. If the customer wants to turn special threads, the change gear ratio should be calculated as following:

For cutting Metric threads:

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

For cutting Module threads

$$J = \frac{M\pi z}{IT}$$

For cutting Inch threads:

$$J = \frac{25.4}{ITN}$$

For cutting Diametral threads:

$$J = \frac{25.4\pi z}{PIT}$$

Where:

J-----Change gear ratio

I-----Feed box gear ratio

T-----Pitch of leadscrew (mm) (t.p.i)

t----- Pitch of workpiece (mm)

N----- t.p.i of workpiece

M----- Module (mm)

P----- Number of diametral pitch

Z----- Number of threads to be cut



Fig. 6 Transmission system diagram of the machine

Table 6 Spindle speed and working ability

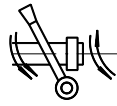
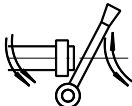






Control knob									Efficiency	Working Ability of spindle						Weakest Part						
	Forward		Forward		Reverse		Max. Torque (N·m)			Output Power (kW)												
	n1	n2	n1	n2	n1	n2	n1	n2			n1	n2										
Black	3.15	2		3.15	2				0.75	12593	12593		16.5	16.5								
Green	4	2.5					3.6	2.25														
Black	5	3.15		5	3.15																	
Green	6.3	4					5.6	3.6														
Black	8	5		8	5																	
Green	10	6.3					9	5.6														
Black	12.5	8		12.5	8																	
Green	16	10					14	9									9830					
Black	20	12.5		20	12.5												7879					
Green	25	16					22.4	14									6292	6292				
Black	31.5	20		31.5	20												4998	4998				
Green	40	25					36	22.4									3940	3940				
Black	25	16		25	16				0.80	6723	6723		17.6	17.6								
Green	31.5	20					27.8	17.8			5331	5331										
Black	40	25		40	25						4195	4195										
Green	50	31.5					45	27.8			3352	3352										
Black	63	40		63	40						2666	2666										
Green	80	50					70	45			2097	2097										
Black	100	63		100	63						1666	1666										
Green	125	80					112	70			1353	1353										
Black	160	100		160	100						1049	1049										
Green	200	125					178	112			833	833										
Black	250	160		250	160						676	676										
Green	315	200					278	178			529	529										

Table 7 Various threads and feed of machine with Metric leadscrew

Item	Metric thread	Module thread	Inch thread	Diametral pitch thread	Longitudinal feed	Transverse feed
						
Each handle of feed box	1	2	4	8	4	4
	2	2.25	4.5	9	4 1/2	4
	3	2.5	5	10	5	5
	4	2.75	5.5	11	5 1/2	5
	5	3	6	12	6	6
	6	3.25	6.5	13	6 1/2	6
	7	3.5	7	14	7	7
	8	3.75	7.5	15	7 1/2	7
Coarse pitch level on headstock	1	8	16	32	2	2
	2	9	18	36	2 1/4	2
	3	10	20	40	2 1/2	2
	4	11	22	44	2 3/4	2
	5	12	24	48	3	2
	6	13	26	52	3 1/4	2
	7	14	28	56	3 1/2	2
	8	15	30	60	3 3/4	2
1:1	I	II	III	IV	I	II
	II	III	IV	I	II	III
	III	IV	I	II	III	IV
	IV	I	II	III	IV	I
	I	II	III	IV	I	II
	II	III	IV	I	II	III
	III	IV	I	II	III	IV
	IV	I	II	III	IV	I
	I	II	III	IV	I	II
	II	III	IV	I	II	III
	III	IV	I	II	III	IV
	IV	I	II	III	IV	I
	I	II	III	IV	I	II
	II	III	IV	I	II	III
	III	IV	I	II	III	IV
	IV	I	II	III	IV	I
8:1	I	II	III	IV	I	II
	II	III	IV	I	II	III
	III	IV	I	II	III	IV
	IV	I	II	III	IV	I
	I	II	III	IV	I	II
	II	III	IV	I	II	III
	III	IV	I	II	III	IV
	IV	I	II	III	IV	I
	I	II	III	IV	I	II
	II	III	IV	I	II	III
	III	IV	I	II	III	IV
	IV	I	II	III	IV	I
	I	II	III	IV	I	II
	II	III	IV	I	II	III
	III	IV	I	II	III	IV
	IV	I	II	III	IV	I
1. Compound rest feed is equal to 1/4 of longitudinal feed						
2. .Max. permissible force of feed mechanism: PZ=45000N, PX=18000N						

## 6 CONTROL SYSTEM OF THE MACHINE

### 6.1 Arrangement Drawing of Handles

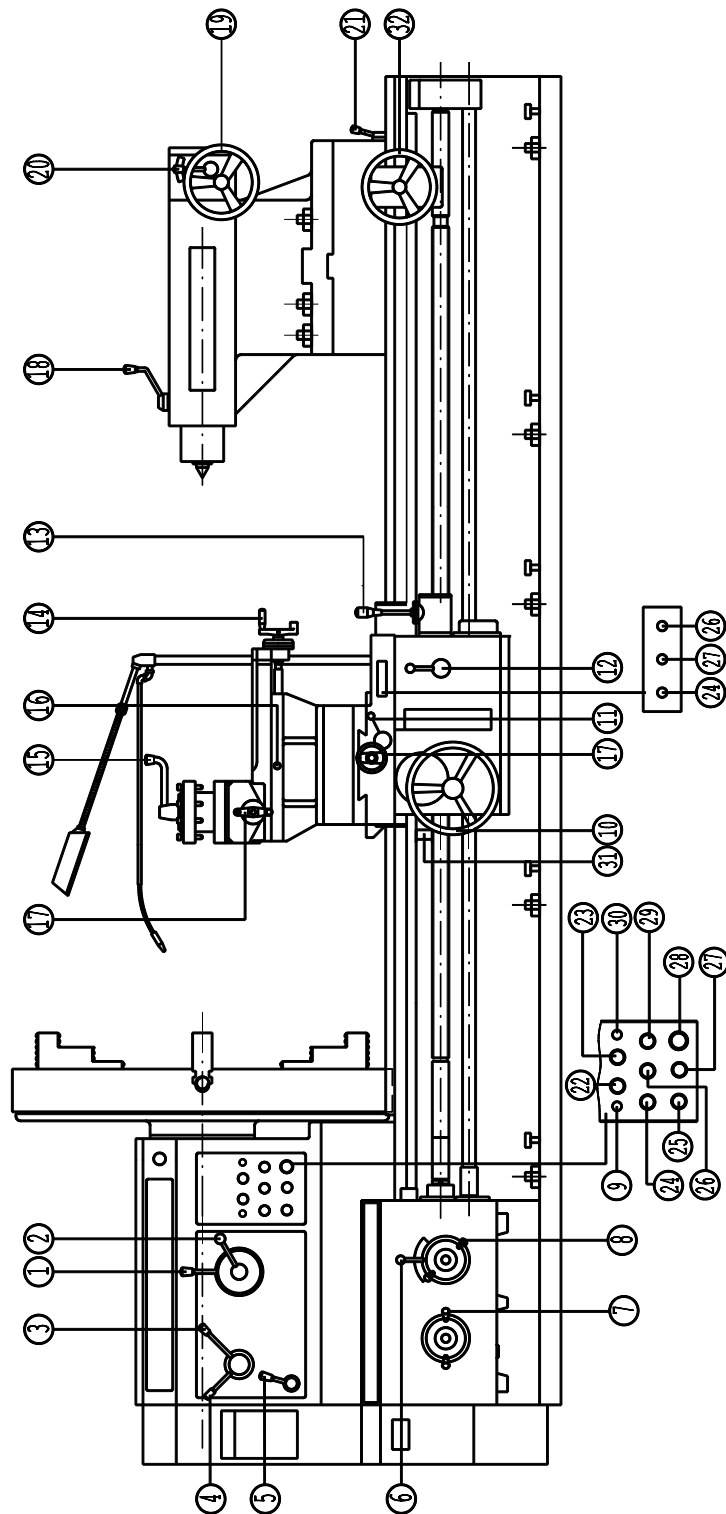


Fig. 7 Control of the machine



(Continued from last page)

No.	Name and Function
1	Change speed lever for spindle
2	Change speed lever for spindle
3	Left & right thread lever
4	Coarse pitch lever
5	Changing lever for forward/reverse of spindle
6	Metric and Inch thread changing lever
7	Pitch & feed changing lever
8	Pitch & feed changing lever
9	Signal light for forward /reverse
10	Level of longitudinal movement for carriage
11	Lever of engaging feed rod and leadscrew in saddle
12	Control lever for split nut
13	Longitudinal or cross feed changing lever and knob for rapid movement
14	Travel lever for compound rest
15	Lever for tightening or loosening the square tool post
16	Changing lever for manual or power feed of compound rest
17	Cross slide traverse handle
18	Clamping lever for tailstock center sleeve
19	Handweel for moving center sleeve of tailstock
20	Changing lever for rapid or slow travel of the tailstock sleeve
21	Tailstock locking pin lever
22	Push button for stopping and braking spindle
23	Push button for starting coolant
24	Push button for spindle reverse
25	Push button of spindle inching
26	Push button for spindle forward
27	Push button for stopping main motor
28	Push button for emergency stop
29	Push button for starting main motor
30	Signal light for general power supply
31	Control lever for lubricating guideway
32	Handwheel for moving tailstock

## 6.2 Definition of Operating Directions of Handles and Handwheel of the Machine

The relationship between the operating directions of the handwheel for moving the carriage in longitudinal direction, the handwheel for moving the cross slide in cross direction and the handle for moving the compound rest and corresponding movement of the carriage, the cross slide and the compound rest of the machine is in accordance with the standard GB/T17161-1997 (eqv.ISO447;1984) «Operating Direction of Control Devices of the Machine». When the handwheel is clockwise rotated (viewing from operator's facing to the shaft end used for installation of the handwheel), the controlled carriage makes straight movement toward right, the cross slide and the compound rest make straight movement far from operator.

## 6.3 Operating Procedures of the Machine

### 6.3.1 Preparing Procedures

- Turing right the switch of general power supply, and then rotate the handle to the position ON. Switch on the switch for illuminating light.
- Load the workpiece and clamp it firmly in chuck in a way in accordance with requirements of workpiece to be clamped.
- Select the tool of different material and parameters of which can be in accordance with requirements of the material of workpiece to be turned.
- Using the handle and the speed tablet on headstock can select spindle speed. During changing speed, rotate the spindle by hand to solve it if the gears' standing up occurs.
- Shifting connection lever of feed rod and leadscrew, Metric and Inch thread changing lever, coarse pitch lever, Pitch & feed changing lever according to the Table of Threads and Feed can obtain proper feed.
- Using the automatically feed handle and the rapid traveling button for longitudinal/traverse feed of the slide makes it moving to position near the workpiece.

### 6.3.2 Requirements of Loading and Clamping Workpiece

Different loading and clamping methods should be used owing to that shapes, sizes and quality of workpieces to be machined are different.

- It is necessary to keep balance with the chuck when the workpiece is mounted on the chuck. When you want to turn heavy shaft workpiece, you should use the method that one end of the workpiece is chucked and the other end of it tightened up with the tailstock center.
- Longer workpiece or workpiece which is completed for turning through many time loadings should be clamped between two centers, for example, turning long shaft and long leadscrew or workpiece which needs milling and grinding after turning.

- Thin and longer shaft workpiece ( $L/d \geq 25$ ) should be turned in case of follow rest or steady rest to increase rigidity.

### 6.3.3 Requirements of the Machine for Tools

Tool size: Tool size should suit the installation of tool post of the machine. Distance from the supporting plane of tool to the spindle center line of the machine is 48 mm, turning tools to be used on the tool post should be 45 mm × 45 mm. And the tool tip of turning tool installed must be equal height with center line of the spindle.

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 high speed steel tool is often used to turn workpiece with irregular shape and possessing larger impact performance, also often used as finishing turning tool, such as larger feed turning tool with wide edge, finishing thread tool, forming turning tool, etc.

Geometric parameters of the tool should suit the turning requirements.

### 6.3.4 Manual Feed

- Press the start button for main motor and shift the lever for changing forward/reverse of spindle to the forward, with the spindle running.
- Shift the joystick lever for longitudinal or cross feed of slide to the neutral position in the cross-way groove, manual controlling handwheel for longitudinal travel of carriage and the handwheel for traversing of cross slide and then, forward/reverse handwheel and level, thus, forward/reverse feed of slide can be realized.
- The compound rest slide can be turned to certain angle according to turning requirement, then, manual rotating the handle can realize longitudinal, traverse and slant direction turning.
- After the tailstock is manually moved to the position where the workpiece can be turned, lock it on the bed by the quick clamping lever of tailstock, then manually controlling the lever for traveling of tailstock quill can manually perform drilling, augmenting hole, reaming, tapping threads, etc.

### 6.3.5 Automatic Feed

- Press the start button for main motor, then shift the changing forward/reverse levers to forward, with spindle running.
- Manual controlling the handwheel for longitudinal travel of carriage and the handle for traveling of cross slide can modify the distance between the tool and the workpiece to select suitable feed depth.
- Automatic feed of forward/reverse and automatically withdrawing of longitudinal/traverse can be obtained through shifting the joystick lever. The joystick

lever is shifted to the neutral position in cross way groove, the feed stop feeding.

- If rapid moving of the carriage is needed during the controlling, you should press on the button set on the top of the joystick, when releasing it, rapid moving stops.

**Note:** If the rapid button is out of order, it is necessary to immediately shift the lever for automatic feed of the carriage in longitudinal/traverse direction to the neutral position and then switch off the general power supply.

### 6.3.6 Threads Cutting

There are two kinds of methods for cutting threads.

#### 6.3.6.1 No Opening the Split Nut

Shift the control lever for split nut to the position engaging with leadscrew, to cut threads with forward/reverse of spindle. In general case, this method is used to cut the pitch of threads cut which cannot be exactly divided by the pitch of leadscrew.

#### 6.3.6.2 Opening Split Nut

After shifting the control lever for split nut to the position engaging with leadscrew to cut threads, cut threads with forward of spindle. When completion for cutting threads, shift the lever to make the split nut unengaged with the leadscrew, then return the carriage to original cutting position, after feeding, make the split nut engaging with the leadscrew again to cut threads. This method is in general uses to cut threads pitch of which can be exactly divided by the pitch of leadscrew of the machine.

- Shift the coarse/changing pitch lever on the headstock to select L&R threads or coarse pitch threads and then, select suitable spindle speed by the levers.
- Shift the lever and the handles to select suitable metric, Inch system, Modular and diametric threads by means of different changing gears according to the Table of Threads and Feeds on the changing gearbox.
- Move the carriage to the position of threads to be cut by the forward/reverse feeding lever and rapid moving lever, then, shift the lever to the neutral position in the crossway groove.
- Press the start button for main motor, and then shift the lever for changing forward/reverse of spindle to the forward position, with the spindle running.
- Modify the distance between the tool and the workpiece through manual controlling the handwheel and the handle, and then make the tool moving for a certain distance away in longitudinal direction to select suitable feed depth.
- After the lever for split nut is shifted to the position engaging with the leadscrew, turning can be carried out in any way given by “6.3.6.1 and 6.3.6.2”.

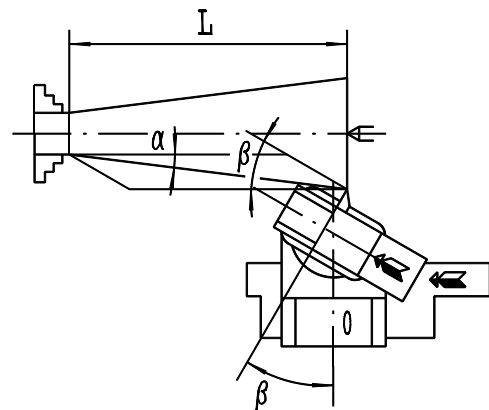
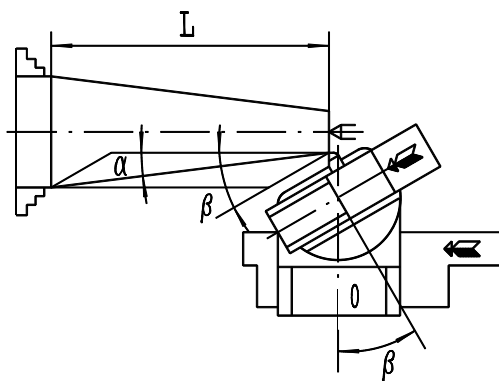
### 6.3.7 Turning Tapers

The cross slide on the saddle can traverse. In the saddle there is not only a leadscrew for

driving the cross slide, but also a feed rod for driving the upper slide, the motion of the feed rod transmits the leadscrew of the upper slide with power through bevel and spur gears for driving the upper slide and make the upper slide perform turning job with power.

By means of power feed the upper slide can be used to turning taper of any angle of the generating line's length less than 300mm. Before taper turning operation, compound rest should be swivelled and locked in the desired slope position (shown by Fig.8 and Fig.9).

While for turning tapers of the generating line's length of more than 300mm, the turning operation may be proceeded with simultaneous power feed of both the longitudinal feed and upper slide's feed. To turn long taper, the cross-grooved guiding cover of the joystick lever on the right side of the apron should be set in a direction  $45^{\circ}$  from normal, for this purpose, the cross-grooved guiding cover on the lever should be turned by  $45^{\circ}$  to the longitudinal feed direction. First push down the spring pin at cover side when to turn the cover, and set angle of the compound rest slide should be calculated according to the following formula:



When by means of compound motion to turn taper, the angle  $\alpha$  should not be more than  $14^{\circ}$ .

Fig. 8 Turning forward taper

Fig. 9 Turning reverse taper

$$\beta = \arcsin(A \times \sin \alpha) + \alpha$$

(Available for turning both forward and reverse tapers)

The max. turning length is calculated according to the following formula:

$$L = A \times 300 \pm \cos \beta \times 300 \text{mm}$$

Metric leadscrew lathe:  $A=4$ ; English system leadscrew lathe:  $A=3.74$ .

### 6.3.8 Operation of Spindle Forward/reverse

Forward and reverse of the spindle can be controlled by the push buttons and solenoid sliding valves and lever, etc.(refer to Fig. 10). The oil cylinder pushing the friction discs is mounted on shaft I, the piston is a fixed member, and the cylinder is a sliding member. When the start lever for forward/reverse of the spindle is in the position of "forward"

rotation (left hand), press the “forward” push-button (black), pressure oil is entering into the right cavity of cylinder, the friction discs 3 is firmly compressed and the gear 4 is driven to obtain a forward rotation, on the contrary, press reverse push-button (green), pressure oil is entering into the left cavity of the cylinder, the friction discs 1 is pressed, giving a acceleration forward rotation of spindle through gear 2. When machining load is not big, under the case mentioned above, acceleration forward rotation can be directly controlled by the push-button without stopping spindle.

When the forward-reverse lever of the spindle is at the position of “reverse” rotation (right hand), press forward push-button (black), pressure oil is entering into the right cavity of the cylinder, giving a forward rotation of spindle, in the contrary, press reverse push-button (green), force oil flowing into the left cavity of the cylinder, giving reverse of spindle.

**Note:** When the diameter of the chuck is more than 500 mm, the spindle reverse speed should not exceed 160 r/min.

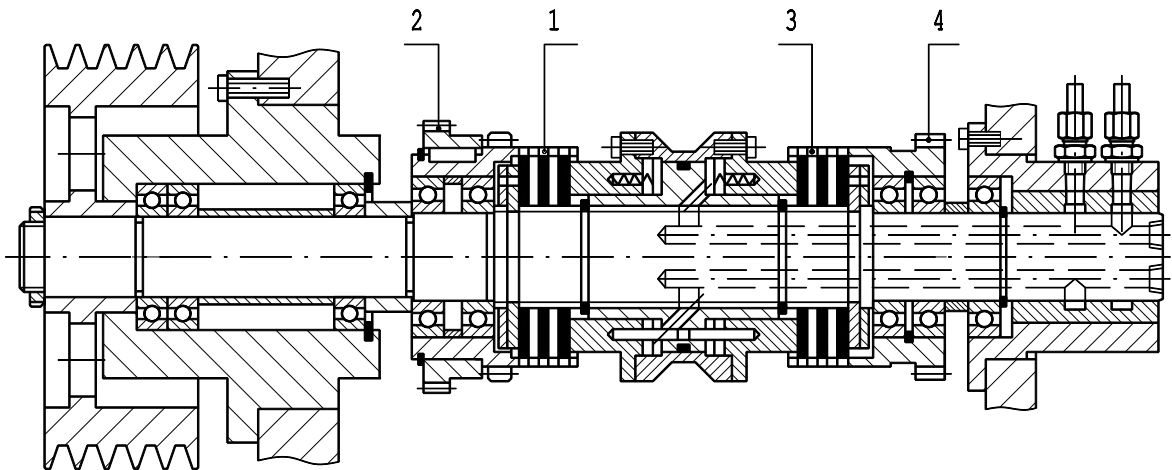


Fig. 10 Structure of I shaft

### 6.3.9 Operation of Stopping Spindle

Operating procedures are as follows if needing to stop running of the spindle after the end of adjusting the machine, changing parts or completion of turning.

For the machine with manual braking: press the braking button, the spindle will stop running.

For the machine with foot-pedal braking: step the foot-pedal braking switch, the spindle stops running.

**Note:** When the spindle speed is less than 160 r/mm, switch the braking/loosing button to braking position if the spindle is stopped. When the spindle speed is more than 160 r/mm, switch the braking/loosing button to loosing position if the spindle is stopped. When the speed is decelerated, switch the spindle to braking position to stop spindle immediately to prolong the life of braking friction disc.

### 6.3.10 Operation to Stop the Machine

- Move the carriage to position near the end of tailstock by means of the automatic lever for longitudinal/traverse feed and transversely to the position close to the end of the cross slide handwheel.
- Press the braking button to stop spindle.
- Press the stop button for main motor to make the main motor stop running.
- Press the stop button for cooling pump if coolant has been used.
- Turn the general switch to the position “OFF”.

### 6.3.11 Re-start 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, turn the switch of the general power supply right to the Position ON, following, push the start button of the main motor, then, shift the lever to forward position or reverse position to start the spindle. If the spindle rotate at high speed, it is necessary to rotate the spindle at low speed for 0.5~1 minute.

### 6.3.12 Rescue in Emergency Status

At first, push the red Emergency Stop button and cut off the power supply then take efficient emergency treatment measures to relive 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.

### 6.3.13 Dismounting Operation of Tailstock Center

The center sleeve of tailstock can be moved axially through handwheel 1 and lever 2 (shown by Fig. 11). The sleeve can be rapidly traversed with turning handwheel 1 when lever 2 is at the position of 1:1, the sleeve can be slowly traversed with turning handwheel 1 when lever 2 is at the position of 1:20.

To remove the tailstock center, revolve handwheel 1 to withdraw the center sleeve to limiting position, and continuously revolve it, thus the center can be pushed out of its sleeve with leadscrew.

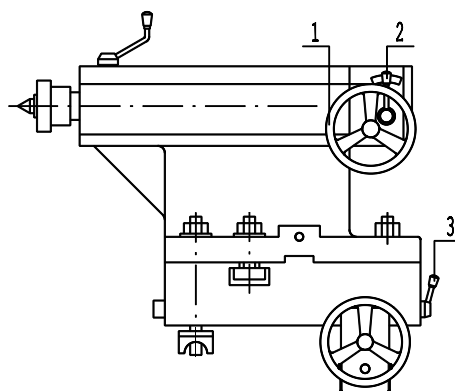


Fig. 11 Outline of tailstock

### **6.3.14 Operation to Avoid Sliding of Tailstock**

In order to avoid sliding between the tailstock and the bed when workpiece is held between the two centers, it is necessary to shift the stop pin lever 3, which is mounted on the base of tailstock, firmly against the workpiece to make the stop pin be truly inserted into the bed rack.

### **6.3.15 Cleaning of Chips**

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

When cleaning chips, it is necessary for you to use special hook or other proper outfits, and to wear protection gloves to avoid prick or scrap the body due to chips.



## 7 ADJUSTMENT OF THE MACHINE

Accuracy of the machine affects turning quality directly and clearance of the machine can directly affect the accuracy of the machine. Except those, adjustment of some mechanism of the machine relates to production efficiency and operating safety, therefore, in order to guarantee turning quality and operating safety to raise production efficiency, operator should master the adjusting methods of clearance and other mechanism of the machine.

### 7.1 Adjustment of Spindle

The spindle structure (see Fig. 12) is three-point structure and the spindle employs rolling bearing and the spindle nose is short taper flange structure. Excessive clearance in spindle bearings directly effects turning accuracy. The rotating accuracy of the spindle includes two kinds, i.e. radial run-out and axial slip of it. Radial run-out of the spindle is guaranteed by two double row roller bearings at the front of spindle while axial slip by single row ball thrust bearing at the rear of spindle. Check method is according to items 6 and 4 in the TEST CERTIFICATE. If the readings can not meet the requirements, it is necessary to adjust radial clearance of two double row roller bearings on the rear point by nut 2, and adjust the axial clearance of centripetal force ball bearing.

After that, run the spindle idle at high speed for an hour and observe the bearing temperature should not exceed 70° C, otherwise, loose the nuts a little.

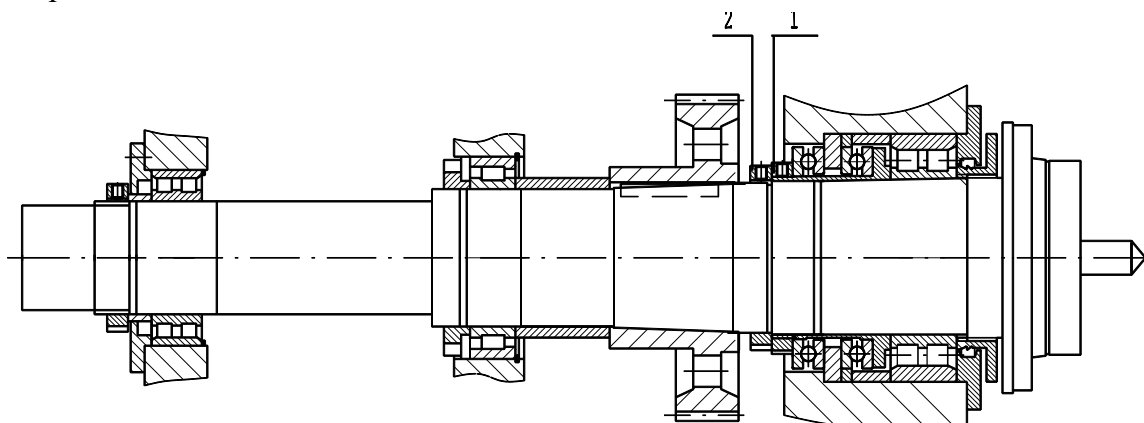


Fig. 12 Structure of rolling spindle

### 7.2 Adjustment of Braking

The spindle brake device employs hydraulic control (shown by Fig. 13) and is mounted on the shaft III. The spindle stops by the hydraulic device though braking shaft III as soon as the brake push-button is pressed. After the brake device is used for a long time or too heavy workpiece is turned, if friction discs of the brake device may be worn out and lost its sensitivity, throttle valve can be adjusted to increase the oil pressure to keep the braking time.

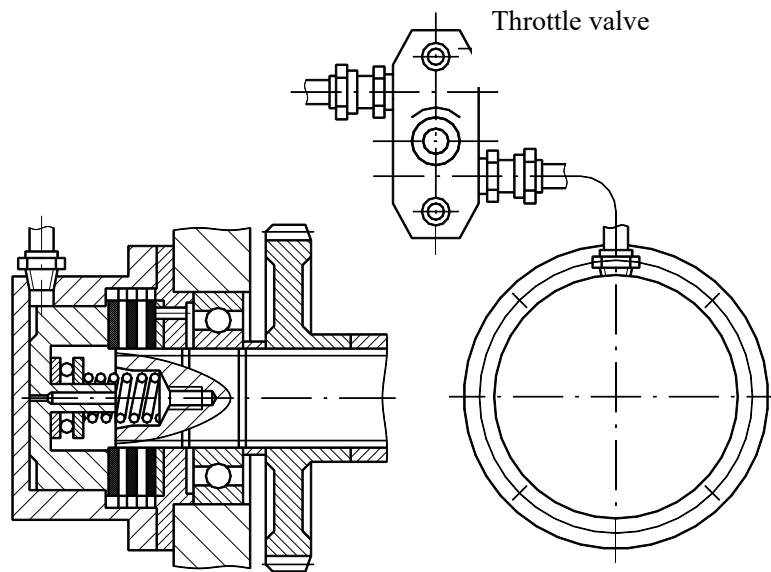


Fig. 13 Braking device

### 7.3 Adjustment of Tool Post

Leadscrew nut of cross slide is opening (see Fig. 14), Nut 1 should be tightened in case that too much clearance is produced due to the abrasion of the leadscrew and the nut. The nut will be deformed to eliminate the clearance between the leadscrew and the nut.

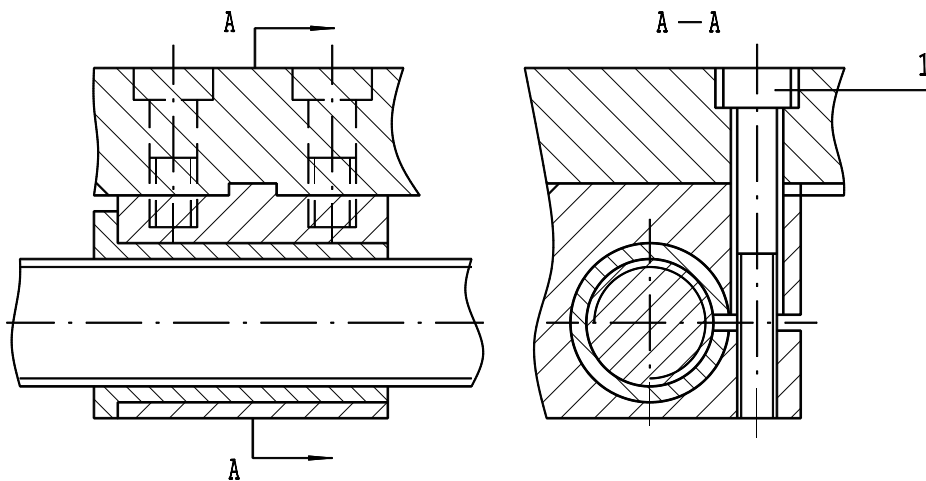


Fig. 14 Adjustment of the nut

### 7.4 Installation and Adjustment of Tool

Unscrew the locking screws of square tool post, install the turning tools in the tool slots of the tool post and, in general case, the extension length from the tool holder is not more than 1~1.5 times of tool thickness, extension length of the tool end is about 65 mm from the body of tool post. Then, adjust height of the tool tip by means of tool pad to make it keep equipments with the center of workpiece (spindle center), (also adjust it according

to the center line of tailstock center). After completion of adjusting tool tip height, screw up the screw (5).

**Notice:**

**If the height of tool tip and the center line of workpiece are not the same, working angle of the tool can be changed, resulting in some problems such as not cutting to center of the workpiece.**

**The tool pad under turning tool should be flat and align with the tool post, it is better that the number of used tool pads is not more than two pieces.**

### 7.5 Adjustment of Safety Clutch in the Apron

Over-run clutch is located at the left end of the worm shaft in apron (See Fig. 15) to avoid the interference of motion between the feed system and the rapid traverse system. Spiral end face clutch and helical cylindrical spring are mounted at the middle of the shaft. In general case, feed power is transmitted from the feed rod to a worm shaft. When over-load occurs in the feed system, the clutch will be automatically disengaged, the tool post immediately stops working, at the same time; the eccentric 2 is driven to pull the pulling rod 3 to make the engaging lever disengaged, so the clutch's reliability can be secured. Before dispatch, the clutch had been well tested and adjusted in our shop. It is no allowable to adjust it at will. If it cannot transmit sufficient torque, adjust compressing force between cylindrical spring and the clutch by means of nut 1.

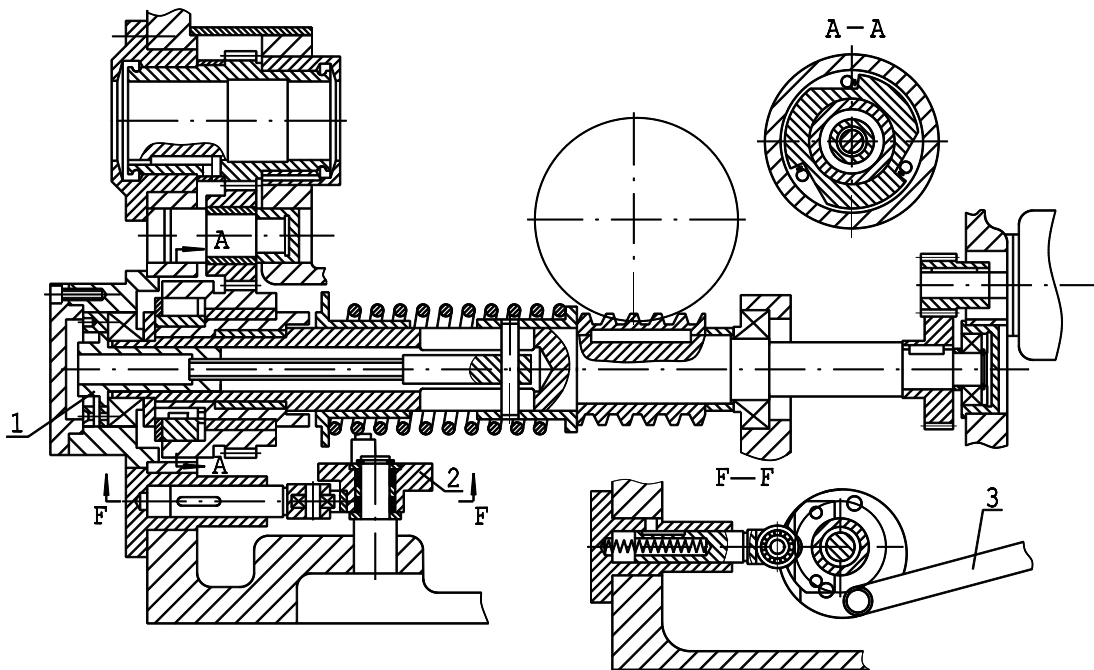


Fig. 15 Safety device for overload

## **7.6 Adjustment of Tension of V-belts of Main Transmission**

Main drive motor is mounted on the rear of the machine. Loose the locking screw of motor and adjust the screw over the motor pad. The nuts can make the motor move through sliding piece to adjust the position of the motor to make the distance between the two pulleys to be increased or shortened to keep normal tension of the V-belts.

## **8 PROTECTION MEASURES OF SAFETY OF THE MACHINE**

### **8.1 Disposition of Necessary Safety Warning Labels**

Although the machine has had many safety measures, there are still some potential and un-obvious risks. In order to promote operator, the machine is disposed with necessary safety warning labels.

### **8.2 Overload Safety Clutch**

The machine is provided with overload safety clutch. It can guarantee safe working through the coupling of overload safety clutch, In the apron of the machine, compressing spring to make the cam slipping when sudden changing with load appears or some trouble occurs during the period of automatic feed of the machine. For the protecting principle, see the “Adjustment of Overload Safety Clutch” in the Chapter 7.

### **8.3 Over-clutch with Single Direction**

In order to guarantee that normal feed movement can be cut-off when switching on the rapid motor of the machine and that the mechanism can safely run, the front end of the safety clutch of apron is provided with an over-clutch with single direction. See Fig.15 Structure of overload safety clutch and single direction over-clutch of Chapter 7 Maintenance and Adjustment of the Machine. In normal feed case, power source from the feed rod does movement counter-clockwise through the gears set on the outer ring of over-clutch with single direction and through the rollers being wedgedly tightened to drive the inner ring and to make the left cam of safety clutch rotating, further, make the worm driving the worm wheel feed mechanism rotating. After the rapid motor is started, the worm rotates counter-clockwise through the sear. Because the inner ring of the over-clutch with single direction rotates faster than the outer circle of it in this time, the rollers being wedgedly tightened is released to make the inner outer rings no relation with each other and them rotating separately. The power cannot be transmitted from the feed rod to realize protection to rapid speed. When the rapid motor stops the outer ring rotates faster than the inner ring, the rollers is wedgedly tightened again to recover normal feed action.

Owing to the fact that over-clutch with single direction is used, although the feed rod rotates clockwise, (in this time, the outer ring of the over clutch also rotates clockwise), the rollers are not wedgedly tightened, thus, relates other mechanism does not also rotate. Therefore, when the handle on headstock is shifted to the position of reverse feed, only the leadscrew is driven to rotate counter-clockwise for cutting left threads. In this time, because the feed rod is driven to rotate clockwise, the over-clutch with single direction functions and the apron is not driven. Also the rapid motor is not allowed to rotate reversibly, otherwise, the over clutch with single direction fails to have protection, resulting in the motor to be damaged.

#### 8.4 Interlock Protection of Feed Rod and Leadscrew

In order to prevent the feed rod and the leadscrew from rotating together, the apron is provided with interlock protection of feed rod and leadscrew (see Fig. 16). When the split nut is engaged with leadscrew, the eccentric part of handle shaft 1 will come into the gap of the round arc of the shaft 2, at the same time, the interlocking wheel 3 round arc of shaft 1 will come into the slot of interlocking block 5 on the shaft 4. Meanwhile, the single handle at the right side of apron should be at the neutral position of crossway slot and cannot move towards any direction of left, right, front and rear. When the split nut disengages with leadscrew, handles 1, 2 and handles 4, 5 disengaged at the same time, the single handle can move freely in the crossway slot. When the single handle is pulled to any direction of crossway slot, due to excursion and deflexion of shaft 2 and interlocking block 5, handles 1, 2 cannot come into handles 2, 5, so the split nut cannot engage with the leadscrew.

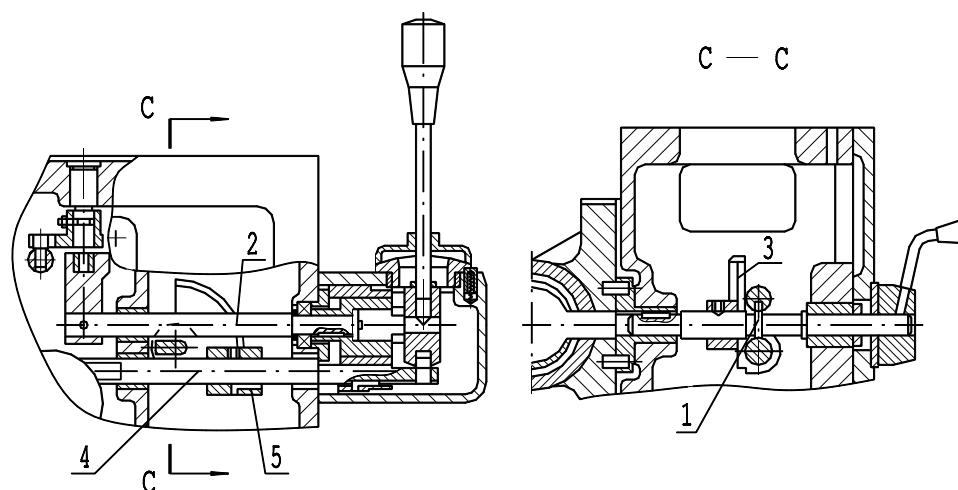


Fig. 16 Interlocking mechanism of feed rod and screw

#### 8.5 Prompt of Remnant Risks

Although the machine adopts much safety protection measures while designing to avoid risks, there still exists some unavoidable and unlimited danger. Therefore, the recommendation is made that operator should properly avoid the following risks.

##### 8.5.1 Danger Resulting from Material to be Turned

Dust producing from cast iron workpiece being turned is harmful to people. Operator should wear the proof-dust mask to get 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.

### 8.5.2 Danger Resulting from Throwing out of Bodies

The protecting cover which is supplied with the machine can reduce the danger 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.**

### 8.5.3 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, for example, 3-jaw chuck is replaced by 4-jaw chuck or face plate. 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 the sizes are correct according to concerned drawing and technical document.

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.

## 9 MAINTENANCE AND LUBRICATION OF THE MACHINE

### 9.1 Maintenance of the Machine

- The oil level in all oil tanks shall always be not under the center of oil leveler, otherwise the machine may be damaged due to ineffective lubrication.
- All oiling points shall be filled with pure oil at regular intervals.
- Frequently inspect the working of oil pump ensuring proper lubrication of the headstock and feedbox.
- Check and adjust the tension of V-belts of the motor at regular intervals. For adjusting method, refer to Chapter 7.
- Never start the spindle immediately after starting the main motor of the machine. It is necessary to wait that the lubricating pump work normally and there is oil flowing through the oil window when starting the spindle to make the machine work.
- With the spindle running at high speed, the changing speed handle is not absolutely allowed to be shifted in any case.
- The leadscrew is used for thread cutting only. Never use it for turning operation so that its accuracy and serving life can be ensured.
- When applying steady rest or follower rest, contacting surface of supporting block and workpiece should be lubricated.
- 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. For practical lubricating method, refer to “Lubricating of the Machine.”

### 9.2 Lubrication of the Machine

All rubbing 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 method, etc.

#### 9.2.1 Distribution of Lubrication points, Trademark of Lubricant and Lubricating Cycle

For the distribution of lubricating points, refer to Fig. 17.

#### 9.2.2 Selection of Lubricating Oil

Except the lubricating point for middle gear of change gear support of the machine, lubricant used for all other lubricating points is HL46 lubricating oil, the moving viscosity of which is 41.4-50.6 (mm<sup>2</sup> /s), its solidifying point is less than -10°C, mechanical impurity not more than 0.007% and flashing point not less than 180°C.



Using temperature of used Calcium-base grease No. 2 and its using temperature is not higher than 55°C and its solidifying point less than -5°C, dripping point not less than 80°C, penetration 265-295 when 25°C, mechanical impurity (extracting method) not more than 0.4%, free alkali not more than 0.2% and moisture not more than 2%. User may regulate them according to temperature of working environment.

### 9.2.3 Lubricating Ways and Means

- The headstock and the feed box adopt the external cycling pressing lubricating system. The oil tank and the apron should be renewed once every 50-60 days for the shops with two-shifts but for the first and the second changing oil time, it takes place for 10-20 days, thereafter, in order to discharge the dirt remained during trial running. After draining the used oil the oil troughs and wicks should be thoroughly washed with clean kerosene. Filter the oil before refilling. The oil level should not be less than the central line of the leveler.
- The lubricating oil pumps into the headstock and feed box by the oil pump driven through V-belts to put the lubrication to the spindle box and feeding box. Examine if there is oil in the spindle box. On the top of feed box body there is a storage oil channel which is used for making oil from the oil pump to lubricate every lubricating point, and at last lubricating oil returns to the oil tank.
- After the main drive motor runs on for one minute, oil mist occurs in the headstock to lubricate the lubricating points of each part and then the spindle can be started.
- An oil tank is under the apron; oil lever in the tank should be always kept up to the mark of oil leveler. The apron is provided with oil storage. All bearings and worm in the apron are oiled by knitting wool. Apart of gears is immersed in oil. The other parts in the apron are lubricated by oil mist producing during rotating. If oil lever in the apron is below the oil mark of oil leveler, fill oil into the apron through the oil add hole.
- The lubrication of the carriage and guideway for bed is controlled by rotating handle at the left side of apron body. Shift the handle to the arrow position of label "Oil" when lubricating oil is needed while Shift the handle to the arrow position of label "No Oil" when lubricating oil is not needed
- The tool post and the small leadscrew are lubricated by an oil gun. The slide and the cross leadscrew are lubricated by an oil gun, too.
- There is a threaded plug on the shaft end of change gear. Turn it every shift to make ZG-2 calcium base grease in the box to lubricate the shaft and the bush.
- The tailstock sleeve and the leadscrew transmission are lubricated according to arrangement of tailstock body by an oil gun once every shift.
- The rear bearings of leadscrew and the feed rod are lubricated by oil gun of lubricating point of arrangement of rear bracket , fill oil once every shift.

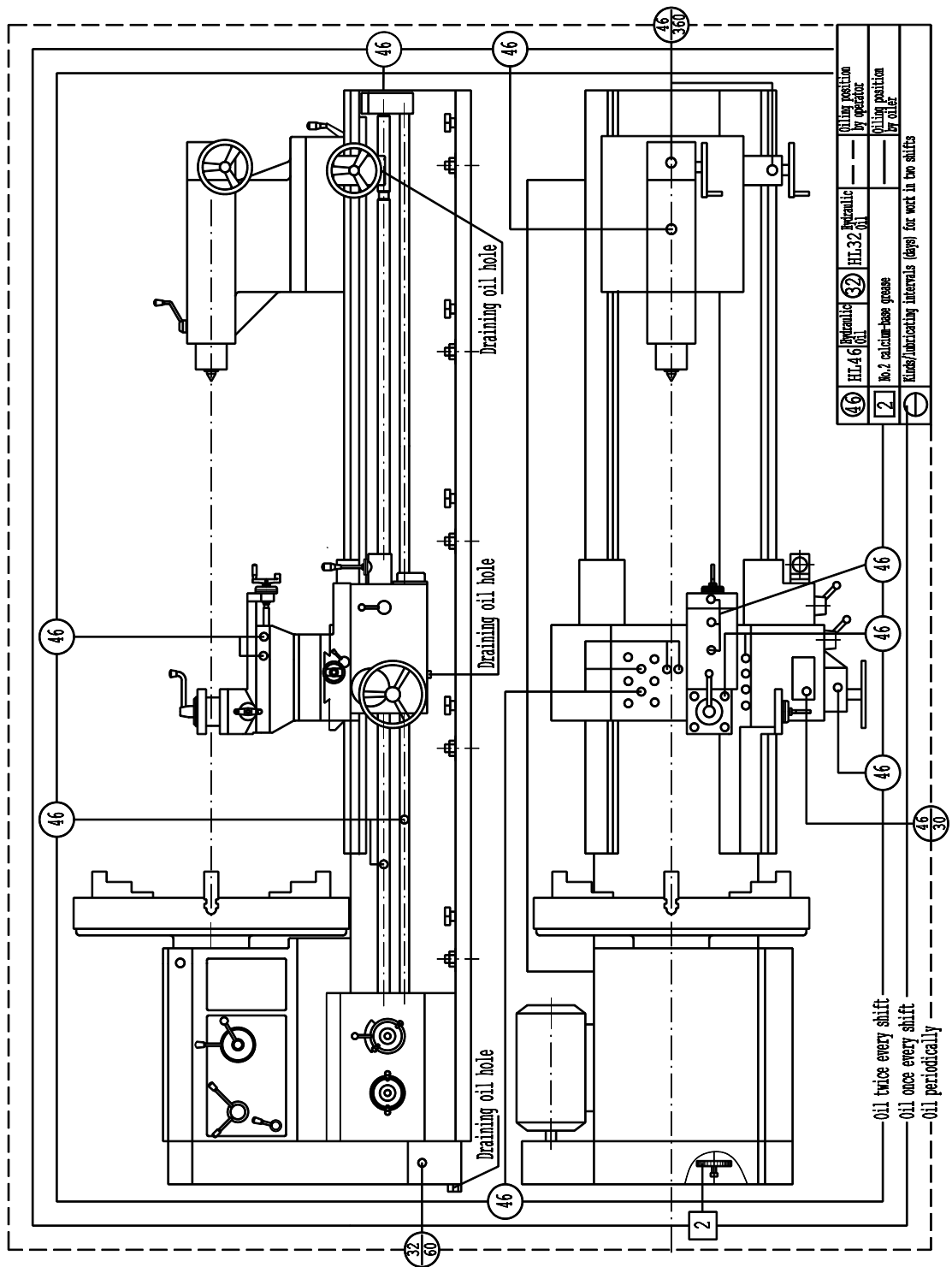


Fig. 17 Lubrication chart of the machine

### 10 ARRANGEMENT OF ROLLING BEARINGS

(See Fig. 18)

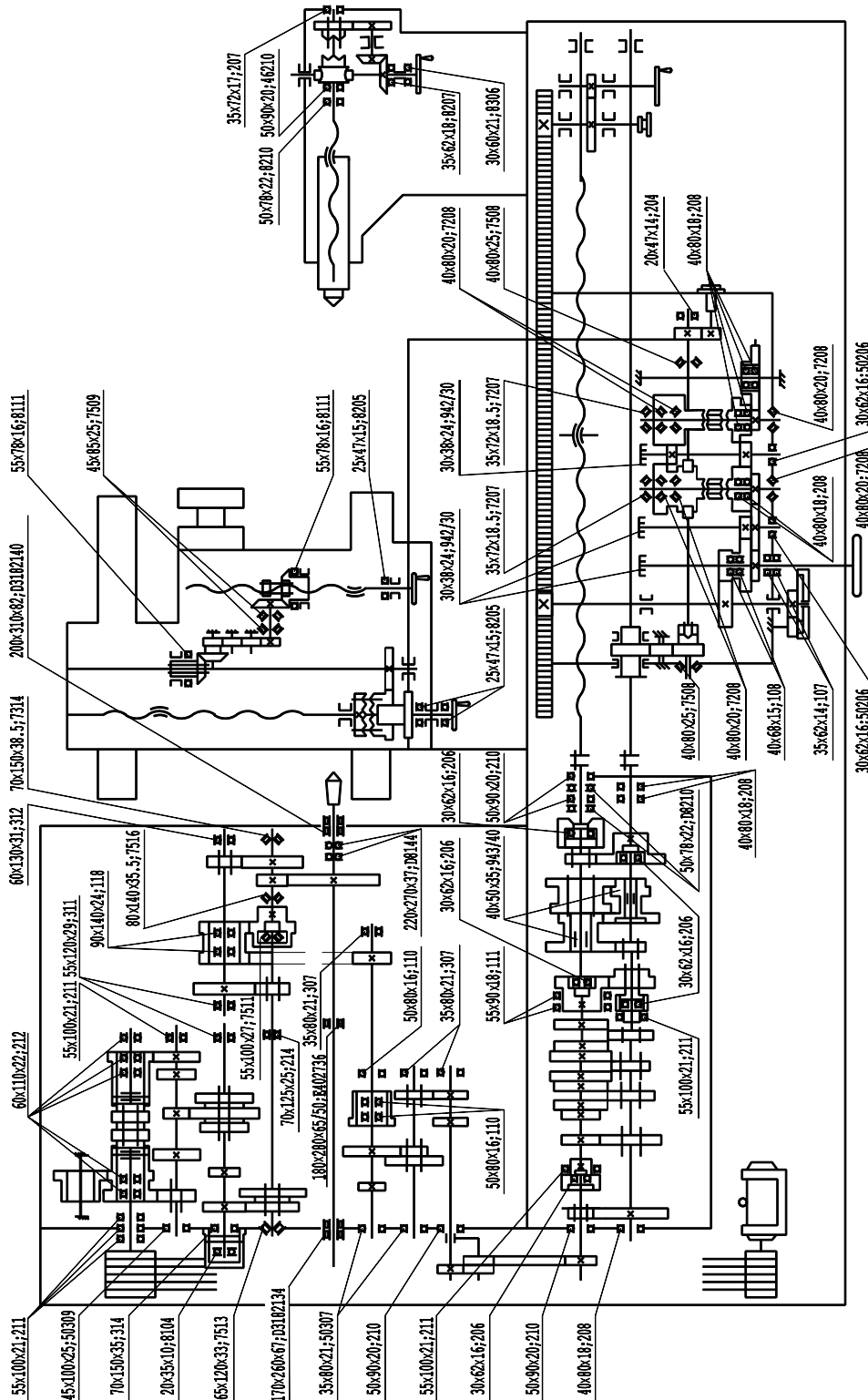


Fig. 18 Arrangement diagram of rolling bearings

## 11 DESCRIPTION OF HYDRAULIC SYSTEM

### 11.1 Function of Hydraulic System

- Forward/reverse and stop of spindle
- Braking or not braking
- Lubrication (including gears and bearings of spindle box and feeding box)

### 11.2 Components and their function of Hydraulic System

Note: The voltage of solenoid valve is AC 24V..

Table 8 List of action of electro-magnet

No. / Name	YV3	YV2	YV1	Remarks
Stop	—	—	—	
Forward	—	—	+	
Brake	+	—	—	
Reverse	—	+	—	
Forward acceleration	—	+	—	Change by a machinery

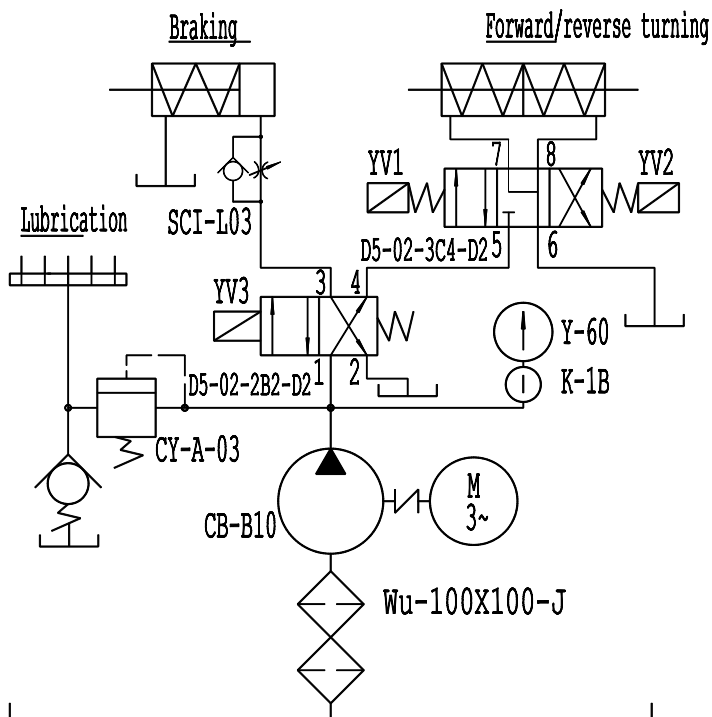


Fig. 19 Principle chart of hydraulic system

- Nominal delivery capacity of CB-B10 gear pump is 10 ml/r (1450 r/min), real delivery capacity is about 9 L/min. due to belt slipping. WU-100×100-J net oil filter is provided with in the oil entering mouth of the pump.
- Type D5-02-3C4-D2 three-position four-way solenoid valve: Two electromagnets of this valve are used respectively to control forward and reverse rotation of spindle. (Forward acceleration of the spindle is obtained by means of a lever), when the electromagnets de-energize on, the friction clutches are disengaging by action of spring force in the cylinder.
- Type D5-02-2B2-D2 two –position four-way solenoid valve:  
The solenoid valve has function to brake energized and cut “forward and reverse” oil line. And the valve is de-energized and prepare for forward and reverse oil line. Interlocking on the oil line is used for preventing damage due to mistaking actions.
- Type CY-A-03 low pressure spill valve:  
By means of it the working pressure of the system is regulated up to 0.8-1.2Mpa and its reading is indicated by an oil pressure meter.
- A safety valve:  
It is mounted on the control plate and well adjusted by one time. The valve consists of a steel ball and spring. The ball is held by the spring. In general time the valve is closed. This valve is used for release oil in case that lubricator and oil line is blocked. The pressure of the valve should be 0.8-1.2Mpa. And it is necessary to adjust the pressure at the lower limit.

### 11.3 Oil Lines of Hydraulic System

- Spindle stop: When electromagnets YV1, YV2, YV3 are all de-energized, in this case, the oil lines 1-4-5 remains close, due to the act of spring force in oil cylinder, oil lines 3-2 and 6-7-8 is under returning oil status. Excessive oil in pump overcomes spring force of CY-A-03, sliding valve starts to move, and the pressure oil lubricates system directly through oil pipes.
- Forward rotation of the spindle: YV3 and YV2 are de-energized, and YV1 is energized. Oil flows into the cavity of the tank through oil-lines 1-4-5-7. The spindle is forward rotation. And oil lines 6-8 are under turning oil state.
- Brake condition: YV3 is energized, and YV2 and YV1, de-energize. Oil flows through oil lines 1-3, oil flows into the cylinder. And oil lines 4-2 are under returning oil.

### 11.4 Maintenance of Hydraulic System:

- The oil to be used must be filtered before refilling in the tank.
- To keep clean and good lubrication performance, the filter and the oil tank should be

thoroughly cleaned periodically and the oil must be renewed in time (change oil once 3 months).

- To maintain the stability of working, the system should not leak
- Overpressure is not allowed. To guarantee working in normal case, the pressure should be adjusted to lower pressure limit.

## 12 USE AND CLEANING OF CUTTING FLUID

### 12.1 Preparation before Pouring Cutting Fluid

Before pouring cutting fluid, user should in detail read the technical material for used cutting fluid 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 cleaning and firm.

### 12.2 Pouring of Cutting Fluid

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

**Notice:**

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

### 12.3 Use of Cutting Fluid

#### 12.3.1 Application of Cutting Fluid

On principle, it is necessary to use cutting fluid to turn workpiece of steel, ream holes and cut threads.

#### 12.3.2 Using Method of Cutting Fluid

If you want to use cutting fluid to turn workpiece, first, open the switch for coolant pump to start the coolant pump. When using cutting fluid, let the jet aiming at the position to be turned of workpiece, so that the cutting fluid can play the role of cooling.

Selection and concerned specification of cutting fluid

Common recommended cutting fluid:

Castrol Hysol GS water-solubility cutting fluid (Disposing ratio: 1:40)

Compound cutting fluid (Disposing ratio: 1:15)

For specification of cutting fluid, see Table 9 and Table10.

Table 9 Specifications of Castrol Cutting Fluid

Item	Specifications	Test Method
Appearance	Limpid fluid with light yellow	BAM300
Density (g/ml); at 20°C	0.9975	IP365
pH (Dilutability 5%)	9.2	BS1647

Item	Specifications	Test Method
Corrosion Test	Steel 0%	IP287
	Aluminum, no color changing	—
Foam test (Sec)	10	IP312
Application	Available for turning ferrous metals such as iron and alloy steel with low/middle strength, etc.	
Feature	Castrol Hysol GS water-solubility cutting fluid is a kind of semi-synthetic cutting fluid with biological stability and without phenol and nitrite, it is characterized by a good low foams.	

**Note: In order to keep excellent biological stability of the product, its dilutability should not be lower than 3.5%.**

Table 10 Specifications of compound Cutting Fluid

Item	Specifications			
	I (Common Type)	II (Antirust Type)	III (Extreme Pres. Type)	IV (Multiefficiency Type)
Appearance of enriched products	Liquid state: No layer or precipitation, showing even liquid status. Paste state: No foreign matter separated out and showing even paste status. Solid state: Even powder which has no indurated block and easy to dissolve in water.			
Dilute Liquid	Penetrability	Vitreous or semi-vitreous		
	PH value	8~10		
	Foam performance mL/10min	<2		
	Corrosion test	Cast iron: No rust, shine is like new. Red copper, aluminum: No rust, no colour changing		
Feature	Compound cutting fluid consists from various water-solubility addition agents and water, there is no mineral oil in its composition. And its enriched product can be liquid state, past state and solid powder state. Before use, after it is disluted with water in a certain it is disluted with water in a certain scale, it becomes vitreous or vitreous or semi-vitreous dilute liquid.			
Application	Available for rough turning of common cast iron and steel workpiece.	Available for finishing turning of workpiece which needs high proof-rust.	Available for heavy duty turning.	Available for turning many kinds metals (ferrous metals, copper, aluminum, etc).

GB/T6144-1985

**Flammable or poisonous cutting fluid is forbidden.**



## 12.4 Adding, Changing, Changing Period and Changing Method

### 12.4.1 Adding of Cutting Fluid

You should add cutting fluid in time during the period of machining in case that the flow of cutting fluid is not enough.

### 12.4.2 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 (the time limit of quality guarantee of normal cutting fluid is 2~3 months, for the detailed information, please refer to the technical document of cutting fluid for customer) through observing whether the cutting fluid has layer(s), peculiar smell, etc. If the phenomenon above appears, the cutting fluid should be changed.

### 12.4.3 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 8 hours every day. Exceeding more than two months, adds it in time. If working time a day is 16 hours or 24 hours, the using cycle of cutting fluid is one month or lack of one month. User should in time add cutting fluid according to practical using condition.

### 12.4.4 Changing Method of Cutting Fluid

**Note:**

**Different kind cutting fluids should not be used in mix. 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 flow into the container.
- 2) Switch off the power supply of the machine, then, switch off coolant pump, and last, dismount the power supply line.
- 3) Disconnect the coolant tank from the pipe of front and rear loading oil disc, then, dismount the upper cover of the coolant tank.
- 4) Clean out the coolant tank with cleaning water, and swipe the coolant tank.
- 5) Pour cutting fluid disposed as a certain disposing ratio until up to the required fluid level.
- 6) Connect the coolant tank from the pipe of front and rear loading oil disc.
- 7) Connect the coolant pump with the power supply line.
- 8) Switch on the switch of the power supply of the machine, then switch on the switch of coolant 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.

### 12.4.5 Cleaning Method and Matters Needing Attention 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.

- 1) Switch off the power supply of the machine, then, switch off coolant pump, and last, dismount the power supply line.
- 2) Disconnect the coolant tank from the pipe of front and rear loading oil disc, then, dismount the upper cover of the coolant tank, clean the extra cutting fluid.
- 3) Wash the coolant pump mouth with clean water .
- 4) Clean the filtering net and precipitation in the coolant tank with clean water and clean out the coolant tank.
- 5) Pour cutting fluid disposed as a certain disposing ratio until up to the required fluid level.
- 6) Connect the coolant tank from the pipe of front and rear loading oil disc.
- 7) Connect the coolant pump with the power supply line.

**Notice:**

**When dismount the power supply line of the coolant pump; avoid the power supply line to be damaged.**

**Do not make water falling down the plug of the power supply to avoid circuit -shorting of electrical system.**

## 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, with longer serving life and increased 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, give priority to operators to carry out the process, and the inspector and maintainer cooperate. While checking, it is necessary to switch off the power supply.

Table 11 Routine inspection

No.	Checked Position	Checked Items
1	Electrical system	<p>Check whether the emergency stop button is sensitive and reliable or not.</p> <p>Check whether the motor is normal running or not, and there is any abnormal temperature raising.</p> <p>Check whether the electric wire and the cable are damaged or not.</p> <p>Check whether the travel switches, buttons function normally or not, and their action is reliable or not.</p>
2	Control system	<p>Check whether the switch and the operating lever are reliable or not.</p> <p>Check whether the clearance of change gear and shaft sleeve is loose or not.</p>
3	Cooling and lubricating systems	<p>Check whether cutting fluid and lubricating oil is in accordance with requirements or not.</p> <p>Check whether the liquid levels in the oil tank and the cutting fluid tank is in accordance with the requirements or not.</p> <p>Check whether every lubricating point has been reasonably lubricated or not.</p> <p>Check whether cutting fluid has been obviously polluted or not and whether the quality of lubricating oil is qualified or not.</p> <p>Check whether the chip-scraper has been damaged or not.</p>
4	Safety guards	<p>Check whether the limit position device of apron, the protection cover of chuck and the chip guard can normally function or not.</p>
5	Motor device	<p>Check whether tension of the belts of motor has been proper or not, and if there is any cracks.</p> <p>Check whether the pulley can normally run or not.</p>
6	Front chip guard screen	<p>Check whether they are dirtied, resulting in a decline in visibility.</p>

### 13.2 Periodic Inspection

After a certain time of working of the machine, owing to there is wear between the parts touching each other, working performance of them can be gradually affected, it is necessary to check them regularly. In general case, operator of the machine should take charge of this job by coaching of inspector and maintainer.

Inspecting period may be determined according to the Table 12, also do collected inspection and maintenance after the machine works for 500 hours.

Table 12 Periodical inspection

No.	Checked Object	Inspection and Maintenance	Interval
1	Electrical device	Check and tighten the each connect screw. Check the grounding device. Check the interlocking of moving parts.	Six months
2	Control system	Check the braking device (hand-brake and foot-pedal brake).	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 working for eight hours 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 chips in oil hole, oil rope and the oil felt or not. Check the quality of the oil.	One year
5	Safety protection	Check whether the safety devices are reliable, and adjust the over-load safety clutch.	Six months
6	V-belts	Appearance check: Tension and looseness. Clean the belts.	Six months
7	Miscellaneous	For the change gears, it is necessary to check whether shaft sleeve is shake or not, and adjust the clearance of the gears. Adjust the friction discs and brake. Adjust the compressing plate of carriage.	One year  Six months Six months
8	Front chip guard screen	Check whether the front chip guard screen is besmirched to affect visibility. If it is affected, the besmirchment should be lightly cleaned with soft dishcloth dipped in absluent, then, cleaned out with clean dishcloth.	1 month
Note: Unless otherwise specified, the time interval is determined on the basis of two-shift work.			

### 13.3 Overhauling of the Machine

The machine should be overhauled once for five years in the case that two shifts a day is

executed 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 accuracy and level the machine according to the TEST CERTIFICATE.

## 14 COMMON TROUBLES AND TROUBLE-SHOOTING

Table 13 Common trouble and trouble-shooting

Trouble Phenomenon	Cause Analysis	Trouble-shooting and Remedy	Remarks
The motor does not rotate when the start button is pressed.	1) The general switch of power supply has not been switched on.	Switch on the general switch.	
	2) Touching of the start button is bad.	Check the terminal of the start button.	
The spindle does not stop running as soon as possible after the machine stops.	1) Wear out of the friction clutch	Change the friction disc.	
	2) The oil pressure is too low	Adjust the check valve and increase the oil pressure.	
There is no oil flowing in the oil window of headstock.	1) The oil level in the headstock has been too low.	Add oil until to the line of oil leveler.	
	2) There is air in the pump body in the pipeline due to bad sealing interface.	Pour oil in the pump body and seal every interface well.	
There is taper with cut threads.	Rigidity of tool used is not good, or the tool has been installed too low or the cutting edge is too blunt.	Extend the diameter of the tool rod properly. Tip of the tool be higher than the centerline. Grind the tool edge to make it sharp.	
The automatic feed handle on apron is easy to unengaged.	1) The compressing spring of un-engaging worm in apron is too loose.	Screw in the adjusting nut of un-engaging worm.	
	2) The positioning spring of automatic feed handle is loosened	Tighten the spring.	
Spindle speed is reduced or automatically stop of the machine when heavy-cutting.	1) The friction clutch has been adjusted too loose or it has been worn.	Re-adjust friction clutch, and repair or change friction discs.	
	2) The transmitting belts of the motor are too loose or seriously worn.	Tighten the transmitting belts properly or change the transmitting belts worn seriously.	
There is deforming during the period of turning the screw of the thin long screw rod by means of follower rest.	1) Adjustment of the follower rest is not proper.	Re-adjust the touching position of the tracing head of follower rest and workpiece to make feeded workpiece without deforming.	
	2) Spindle speed is too high.	Speed is reduced when finishing.	

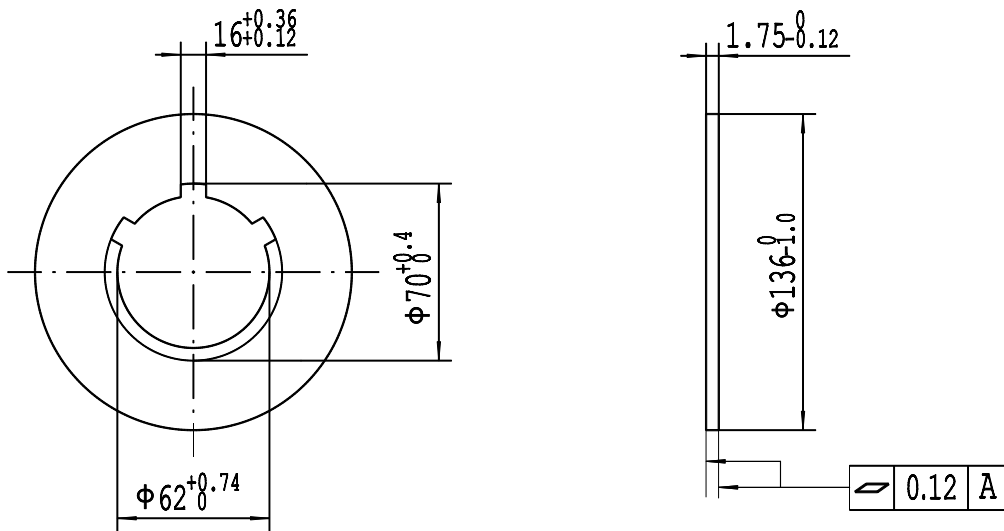
Trouble Phenomenon	Cause Analysis	Trouble-shooting and Remedy	Remarks
	3) Feed amount is too large.	The feed amount selected is in range of 0.05-0.1 mm.	
Vibrating caused by the imbalance of the spindle	There is no balancing owing to the fact that the assembling accessories for the spindle are not balancing or unbalancing after workpiece is clamped.	Adopting bobweight or change the clamping status to get rid of the vibration.	
<p>Note: 1. It is necessary for specialized people to perform maintenance for serious trouble in the headstock if it is necessary to open the headstock, and the other people are absolutely not allowed to open the headstock for repair.</p> <p>2. Re-trial running should be done after the trouble related to safe performance is remedied.</p>			

**15 LIST OF WAERING PARTS AND THEIR DRAWING**

Table 14 List of wearing parts

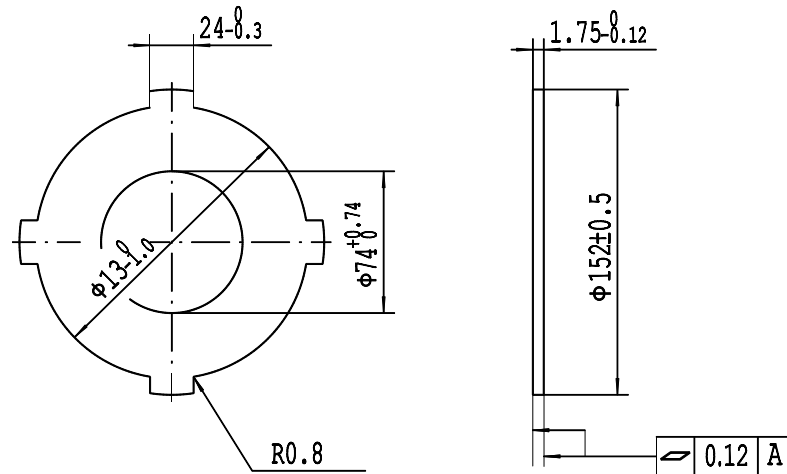
No.	Fig. No.	Part name	Part No.	Material	Qty.	Remarks
1	20	Friction disc	10B02022	15	25	
2	21	Friction disc	10B02023	15	24	
3	22	Plastic guideway plate	10B05267	TSF	1	
4	23	Plastic guideway plate	10B05263 10B05264 10B05266	TSF	1, each	
5	24	Leadscrew	10B04012	45	1	
6	25	Nut	10B04015	MTII	1	
7	26	Leadscrew	10B05012	45	1	
8	27	Nut	10B05015	ZQSn6—6—3	1	
9	28	Wormwheel	10B06335	ZQSn6—6—3	1	
10	29	Nut	10B04115	ZQSn6—6—3	1	
11	30	Leadscrew	10B04112	45	1	
12	31	Leadscrew	10B05112	45	1	
13	32	Nut	10B05115	ZQSn6—6—3	1	
14	33	Worm	10B06132	45	1	
15	34	Bearing support	10B11344	GCr15	4	
16	35	Bearing bush	10B11338	45	2	
17	36	Shaft bush	10B11332	ZQSn10—22	2	





Heat treatment: S0.5-C55

Fig.20 Friction disc (10B02022)



Heat treatment: S0.5-C55

Fig. 21 Friction disc (10B02023)

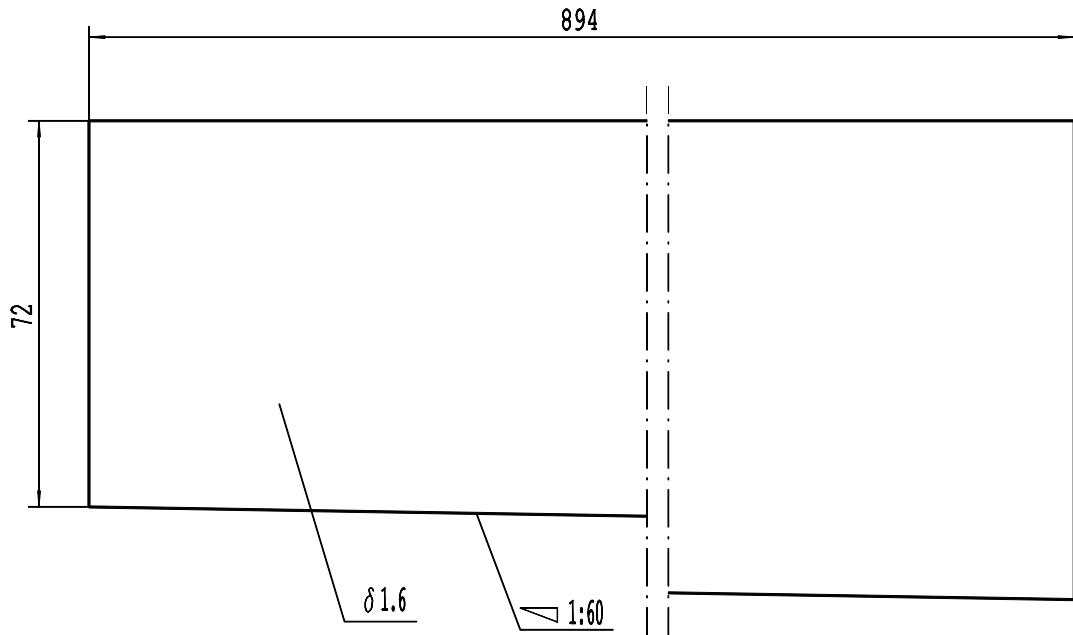
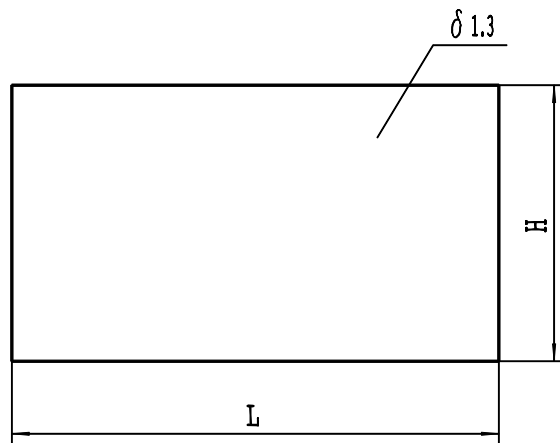


Fig. 22 Plastic guideway plate (10B05267)



10B05263	90	1038
10B05264	38	1038
10B05266	95	894
Part No.	H	L

Fig. 23 Plastic guideway plate (10B05263) (10B05264) (10B05266)

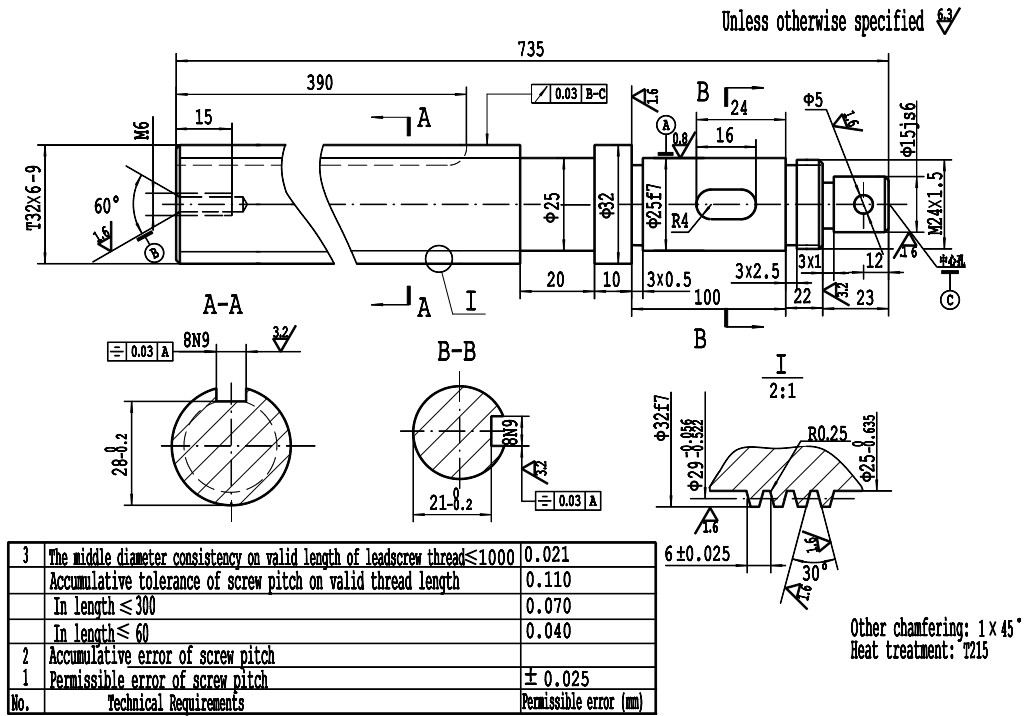


Fig. 24 Leadscrew (10B04012)

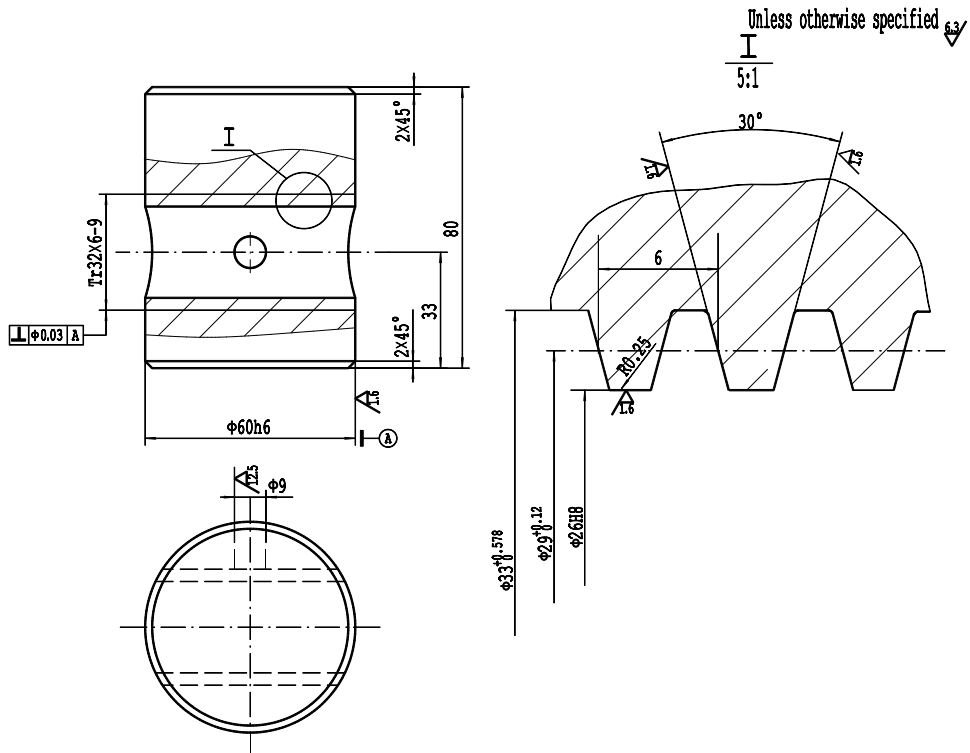


Fig. 25 Nut (10B04015)

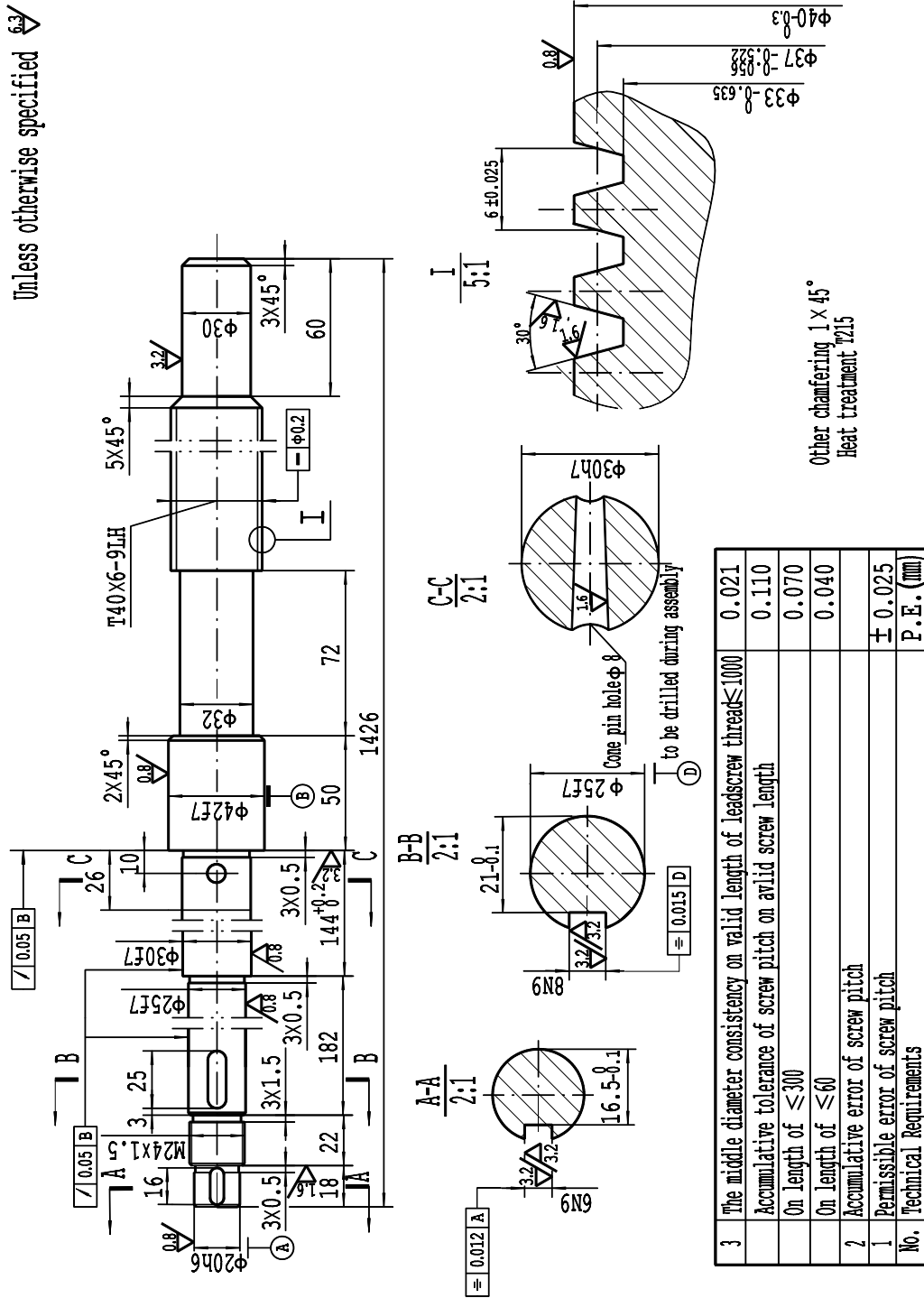


Fig. 26 Leadscrew (10905012)

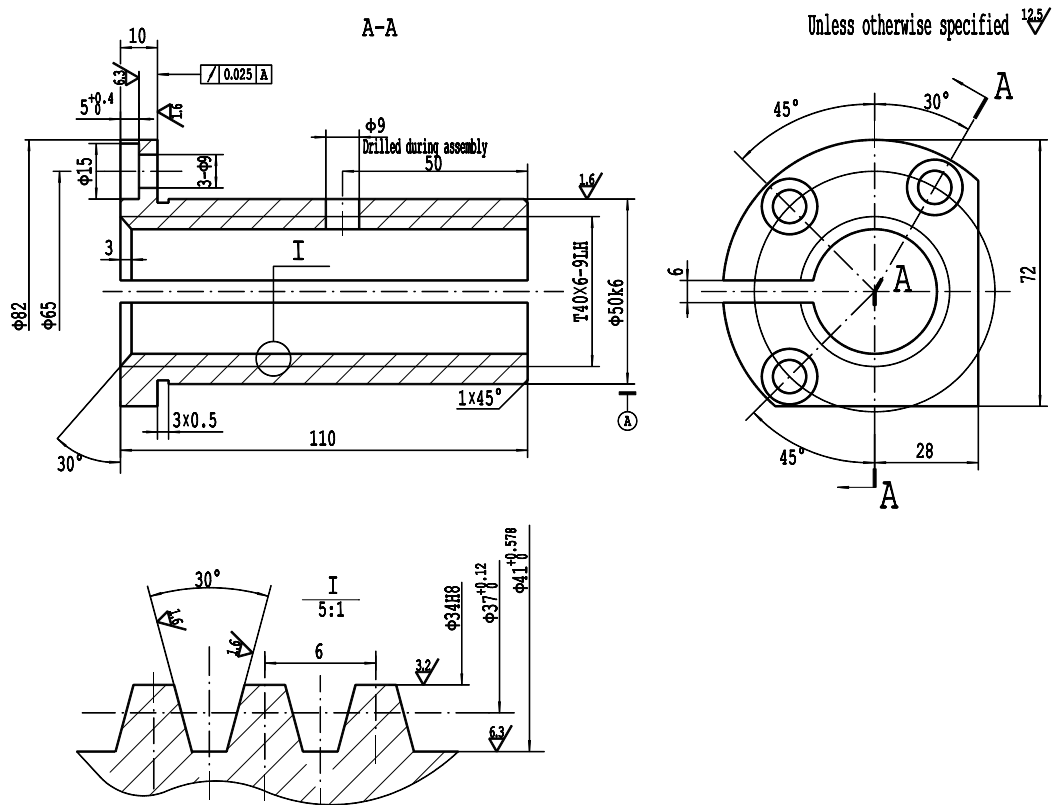
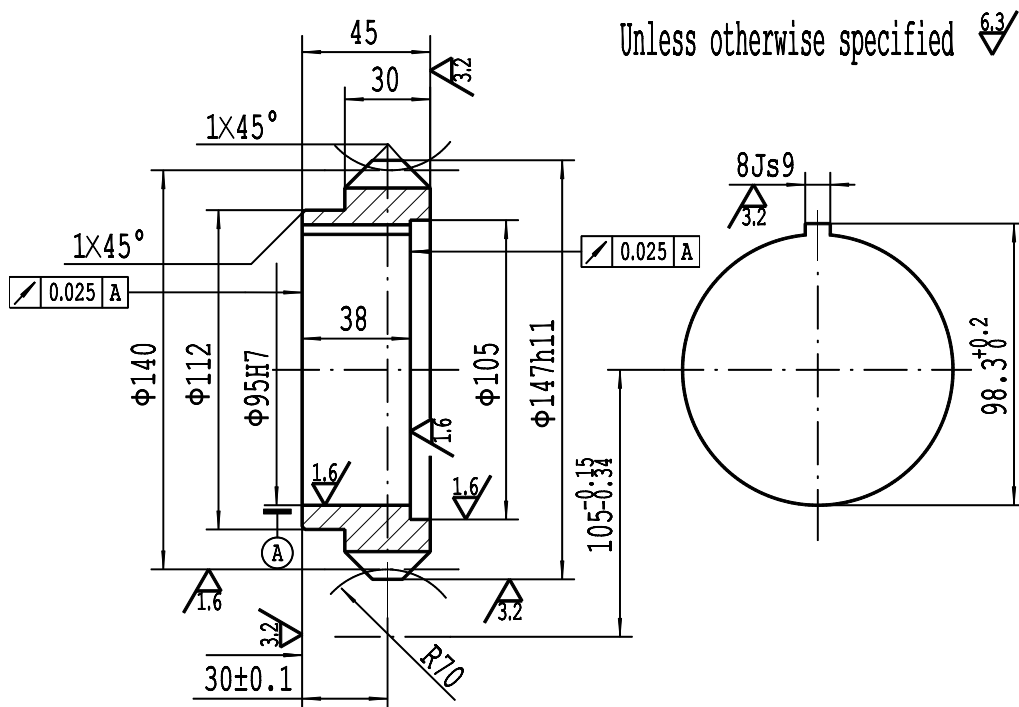


Fig. 27 Nut (10B05015)



No. of teeth	40
Accuracy	80Dc
Module of worm	
No. of threads	4
Helix angle	11°18'36"
Helix direction	Right hand
Lead	43.984
Outer diameter	77
Axial module	3.5
Run out of pitch cone	0.09
Permissible error in distance between the axis of the worm wheel and the milling cutter in milling operation	-0.15
	-0.34
Bearing of worm teeth by red lead method:	
Profile bearing	60%
Lengthwise bearing	65%
Fitting part No.	06132

Fig. 28 Wormwheel (10B06335)

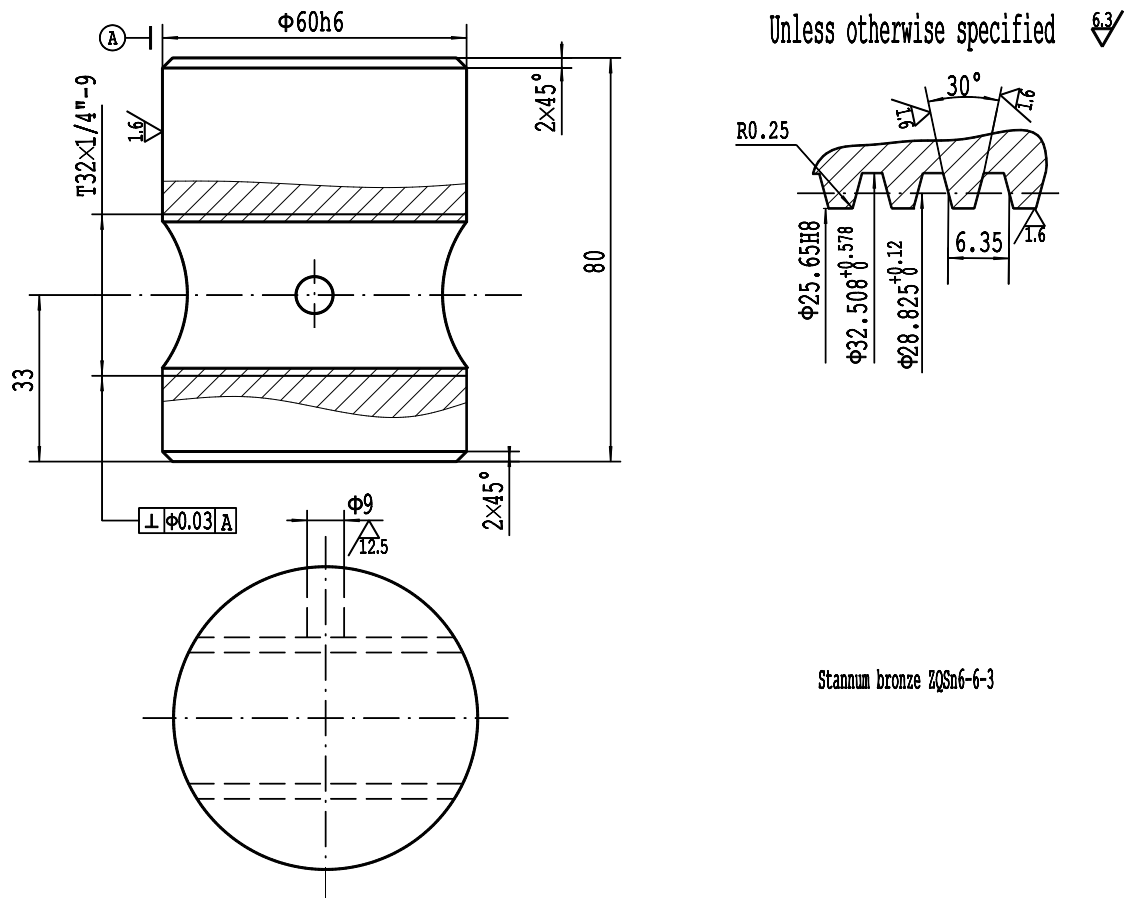


Fig. 29 Nut (10B04115)

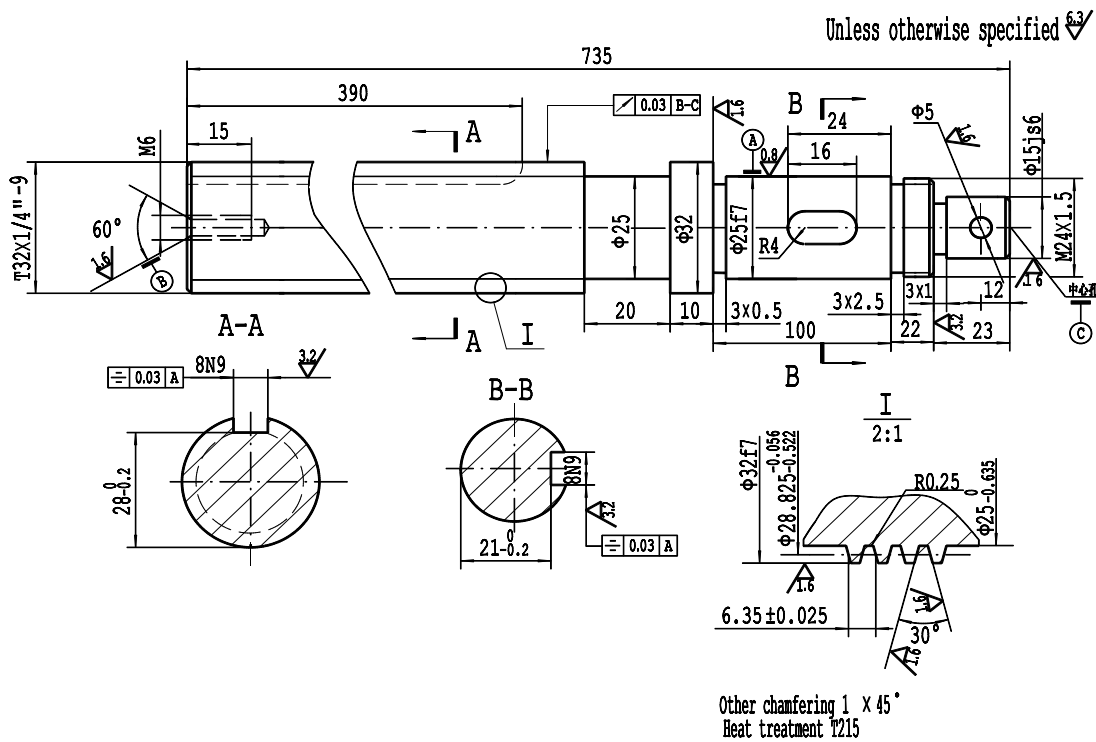
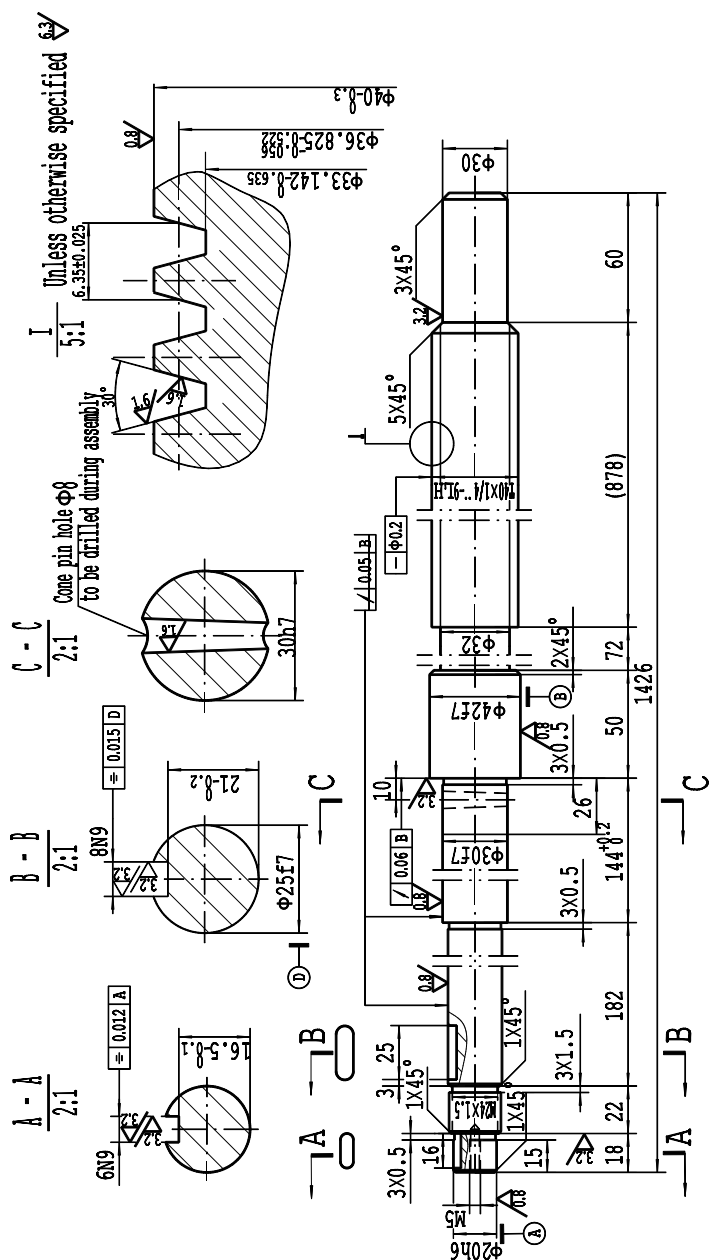


Fig. 30 Leadscrew (10B04112)

3	The middle diameter consistency on valid length of leadscrew thread ≤ 1000	0.021
	Accumulative tolerance of screw pitch on valid thread length	0.110
	In length of ≤ 300	0.070
	In length of ≤ 60	0.040
2	Accumulative error of screw pitch	
1	Permissible error of screw pitch	±0.025
No	Technical Requirements	Permissible Error (mm)





Other chamfering 1x45°  
Heat treatment T215

Fig. 31 Leadscrew (10B05112)

3	The middle diameter consistency on valid length of leadscrew thread $\leq 1000$	
	Accumulative tolerance of screw pitch on valid thread length	
	In length of $\leq 300$	
	In length of $\leq 60$	
2	Accumulative error of screw pitch	
1	Permissible error of screw pitch	
No	Technical Requirements	Permissible Error mm

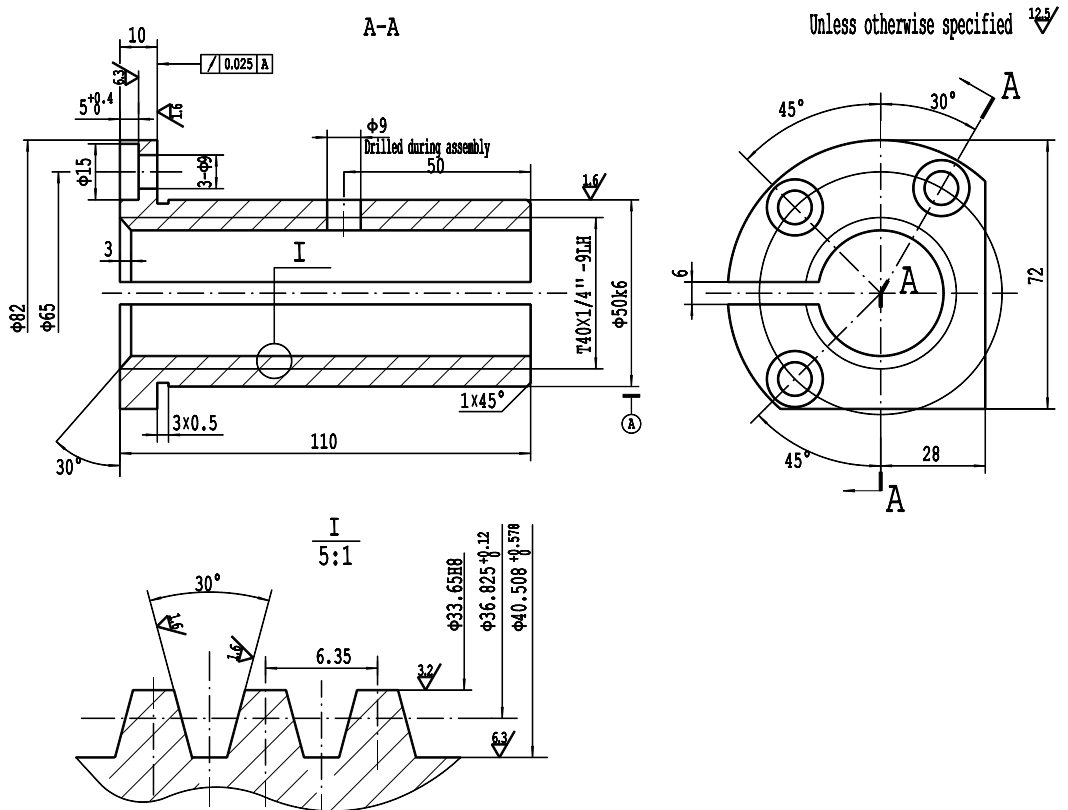


Fig. 32 Nut (10B05115)

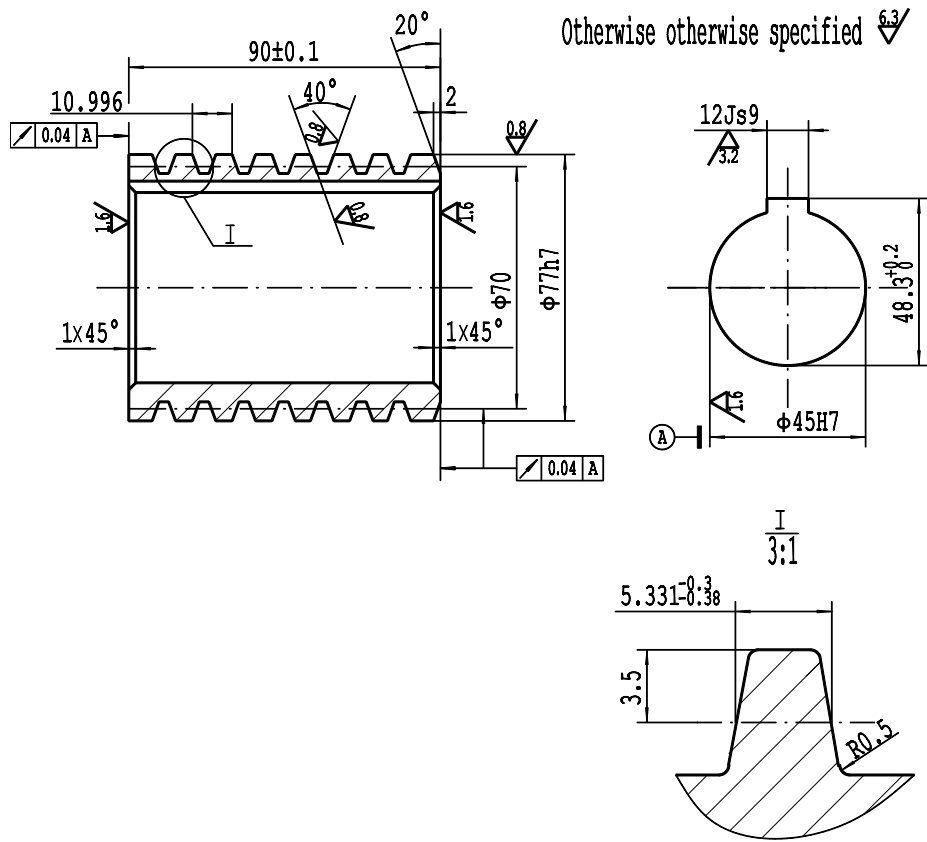


Fig. 33 Worm (10B06132)

No. of axial module	3.5
No. of thread	4
Accuracy	80Dc
Helix angle	11°18'36"
Helix direction	Right hand
Lead	43.984
Axial nominal thickness of thread	5.498
Accumulative deviation of axial teeth distance	±0.025
Accumulative error of axial teeth distance	±0.05
Radial run-out of thread	0.035
Radial run-out of outer diameter	0.025
Wormwheel teeth	40

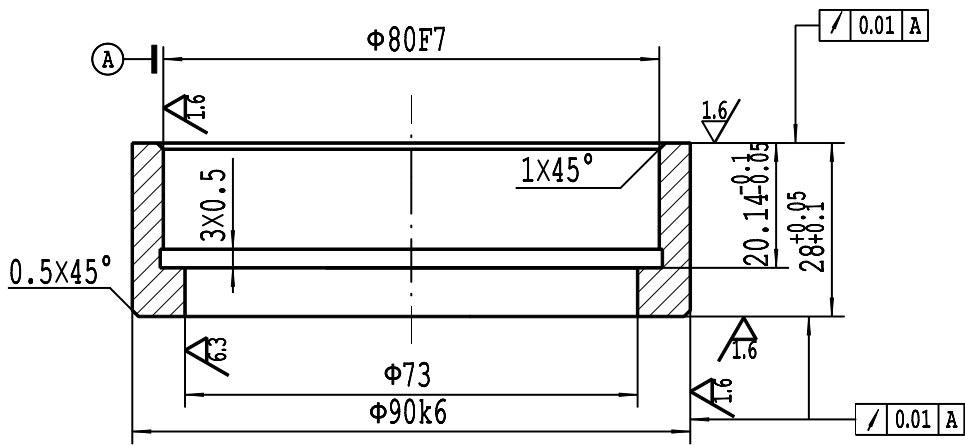


Fig. 34 Bearing rest (10B11344)

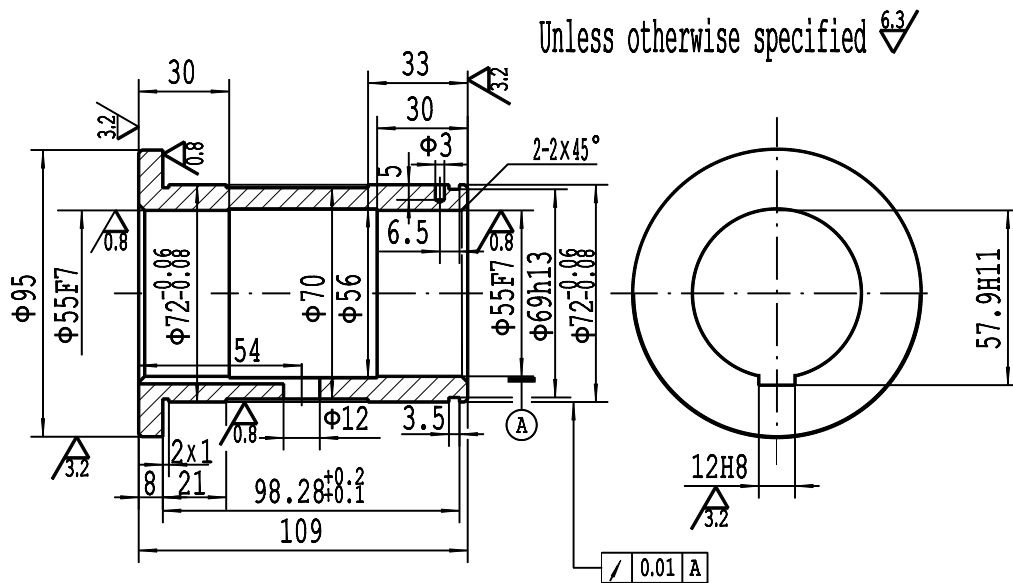


Fig. 35 Bearing bush (10B11338)

Unless otherwise specified  $\sqrt[6.3]{}$

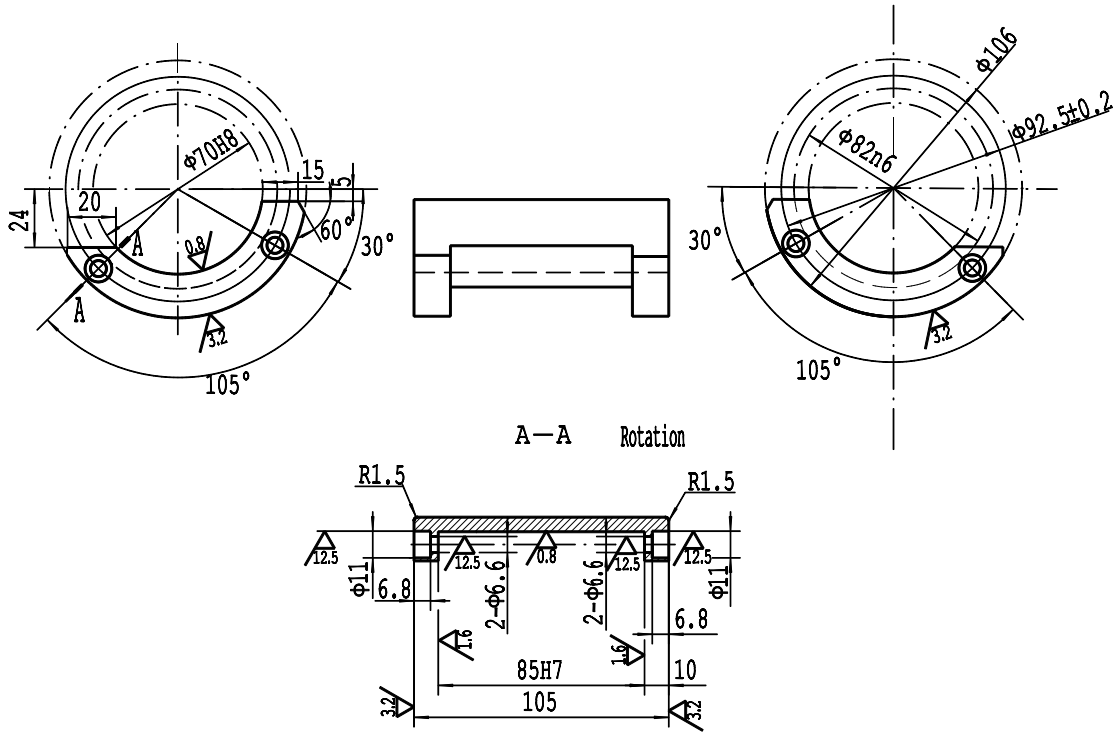


Fig. 36 Bearing bush