S M T C L

CW63 SERIES HORIZONTAL LATHES
CW93 SERIES HORIZONTAL LATHES

INSTRUCTION BOOK

(For Mechanical Unit，CE)

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

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

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

MATTERS NEEDING ATTENTION TO OPERATION

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, only for this doing can make the machine completely run safely.

Before operating the machine, put on all covers, safe guards that were dismounted for transport should be well re-installed; also sealant has to be put on the waterproof locations. Or close the doors according to this Book, otherwise, some troubles may occur to make the machine not be normally started, resulting in the machine's major assembly or other attachments damaged.

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

Although this Instruction Book has been checked carefully, something not to be understood by user is also hard to avoid. If you find there are still a few questionable points, incorrect explanation or omission in it, please make contact with the marketing Department of our factory (for the contact information of our factory, please refer to the back cover).

The model of the products mentioned in the Instruction Book are as follows:

CW63 Series: CW6163B, CW6263B, CW6163C, CW6263C,CW61（62）63D.

CW93 Series: CW6193B, CW6293B, CW6193C, CW6293C

CW63B Series: CW6163B, CW6263B

CW63C Series: CW6163C, CW6263C

CW93B Series: CW6193B, CW6293B

CW93C Series: CW6193C, CW6293C

There are 3 types of CW61（62）63D integrated bed lathes, 750mm, 1500mm, 3000mm, the content in the operation manual except foundation drawing related to CW61（62）63B is also can be used for CW6163D.

While using the machine, the users shall pay attention to distinguishing them one from another.

MATTERS NEEDING ATTENTION TO INSTALLATION

In order to insure the machine running normally, care must be greatly taken to following items during 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 3with the equipments like welding machine or high frequency quencher, etc. which can make noise.

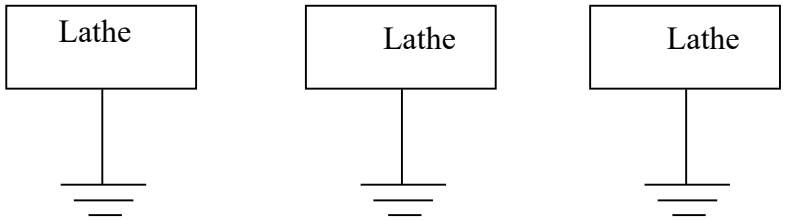
1.3 Power cable should be connected by skilled electrician.

2 Grounding

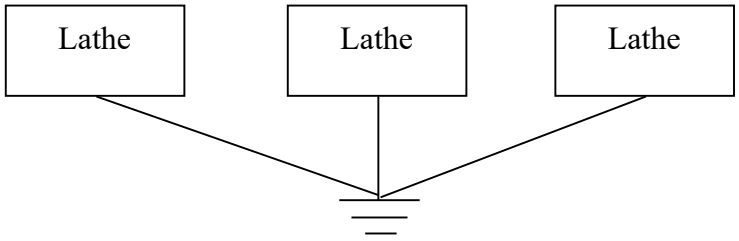
Cross section and grounding resistance as well as matters needing attention to grounding, the grounding wire used for the machine must be in accordance with the standard GB5226.1-2002.

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

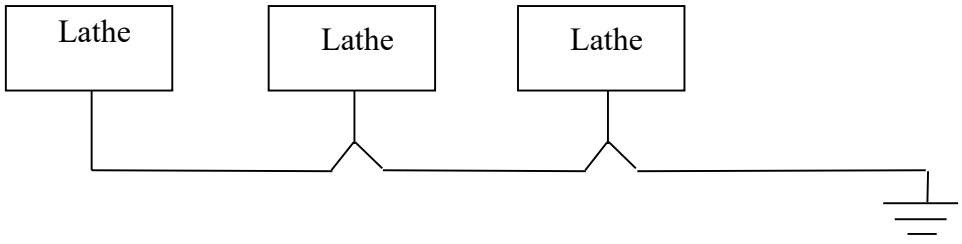
Independent grounding wire:



Common grounding wire



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



NOTICE TO ENVIRONMENTAL PROTECTION

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

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

CONTENTS

1 SAFETY WARN

The machine is provided with some safety devices to prevent operator from injury and the equipment from damage, but the operator should understand and be acquainted with the stipulations given by various safety labels and 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 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 as well as only 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 well 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 workpiece made from cast or aluminum material is to be turned.
- Maintenance shall be performed by qualified maintainer or person specially trained to avoid unexpected accident.

1.2 Requirements of 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

- Before you touch any switch, it is necessary to confirm whether it is the one that you need, never mistaken.

NOTICE

- There must be adequate working space to avoid unexpected accident.
- Separate ground of the machine should be adopted and it is better that its length is as short as possible.
- The operator shall be well acquainted with the location of the E-stop button, so that the button can be pressed without hesitation when it is needed.
- 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-off.
- 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. While it is necessary for you to order a new tablet, please confirm the Part No. of the tablet that you need.
- Do not touch any switch without any meaning.
- Recommended lubricating oil and grease or approved oil possessing equivalent performance should be adopted.
- Check the using condition of the hydraulic oil and lubricating oil, and it is necessary for you to change or add oil periodically.
- While heavy-loading cutting, special attention must be paid to prevent scalding causing by the hot chips.

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 from electrifying switch to main circuit switch fitted for the machine shall be in accordance with the across section specified in the Electric Circuit Diagrams to meet the needs of power requirements.
- Ensure that the protection connecting wire which is not less than the cross section of the phase wire is firmly connected to the PE terminal of the machine.
- Check carefully if the electrical system is correct before connecting power supply and pay attention 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 Lubrication Chart
- 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 a few hours. And each moving parts shall be lubricated with fresh lubricating oil.

- Pay attention to observe whether running direction of the motor is in accordance with specified one.
- Check coolant, and pour 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 safeguard device or protective cover is under good status.
- Check tension of the belts. If they are too loose, replace them with new match-able 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 have adequate brightness for convenience of safety check.
- Tools or other articles around the machine or equipment should be arranged in perfect order and easy to reach, the path is unlocked.
- Tools or other any articles cannot be put on the headstock, the cover of the tool post or other similar positions.
- If the center hole of a heavy cylindrical workpiece is too small, the workpiece may skip out of the center when it is loaded, so pay attention to the size and angle of the center hole.
- The length of workpiece should be limited within the limitation specified range to avoid interference.
- Rust-protecting grease on surface of the machine must be carefully cleaned with kerosene and wash the interior of the headstock with worm kerosene. After all oil wicks are washed and dried, be sure to put them back to their original positions.

Remove the oilpaper and grease on the guide ways; refill the guide way lubricating oil after cleaning. Never use emery 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; there is any loose or imaginary case(s) due to vibration during transportation. After switch-on of the power supply, check whether running direction of the motor is in accordance with the stipulations specified.
- 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 function while the door is opening, limit stop switch, interlock mechanism, etc.
- Before operating the machine, close the protecting cover of chuck, the protecting cover (front chip guard screw) of carriage and the door of belt cover well.
- Any person who is irrelevant with operating the machine should withdraw from around the working area.

1.7 Operation

DANGER

- Do not change the handle for changing spindle speed on the headstock in any case during spindle running; it is forbidden to start the spindle while the machine is set at the neutral step.
- Long hair should be covered with cap when operating the machine.
- Do not operate the switches with gloves to avoid accidental operation or accident of winding or involving in.
- Workpiece and tools must be tightly chucked to avoid being thrown off resulting in personnel injury.
- The chuck jaws must clamp workpiece to avoid being thrown off from their positions when the chuck is running at high speed.
- When the chuck is extended to clamp workpiece, the holding range of the chuck should not exceed the range stipulated by the technical document supplied by chuck factory.

- Workpiece can be unloaded only when the tool and the spindle are under stop status. And never touch the workpiece 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 under only the machine stop status.
- Do not clean chip during machining.
- Clean chips with special hook. Do not clean chips on the cutter by bare hand and to use brush for cleaning it.
- It is only permissible to install or dismount the tools while the machine is under stop status.
- Pulling outwards the hand wheel of the apron make it unengaged. It is necessary to unengaged the hand wheel when rapid speed to avoid the hand wheel injure person.
- While the machine is running, unrelated personnel are forbidden to stay within the working zone.

NOTICE

- The chip-guarding screen should be used for defending when turning workpiece.
- The chuck guarding cover should be used for defending when the spindle running.
- The chuck cover is disposed for the standard chuck of ϕ500.When the faceplate or the chuck of over ϕ500 is used, it is necessary to dismount chuck cover. And because the switch X2-N is used, after the chuck cover is dismounted, the switch shall be pressed by adhesive tape to make the machine run normally, and during the running of the machine, the operator must be pay attention to the safety to avoid accidents.

1.8 Interruption of Machining

NOTICE

- While the machine is stopped, the feed motion shall not be stopped later than the stop of the main motion.
- After completion of turning one pressing, before operator wants to leave from the machine temporally, the operator should turn off the stop button of the main motor and also the switch of the main power supply at the same time.

1.9 After Machining

NOTICE

- After stopping the machine, it is necessary to clean the chips, doors, covers and windows, etc. by means of special hook or other complements, 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 the amount of coolant and lubricating oil. Add them when necessary.
- Clean the oil filter of oil plate.
- Before you leave from the machine, turn off the switch of the general power supply.
- Oil or water can make the floor slipping to cause danger. So, always keep the floor clean and dry to avoid accidents, if necessary, set foot antiskid plate.

1.10 Safety Equipment

- Rear guarding cover
- Front guarding cover
- Guarding cover for chuck
- Belt cover
- Tailstock protection
- E-stop button

1.11 Maintenance

DANGER

- During the period of maintenance, 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

- The interlock mechanism like travel limit device, etc is not permissible to be

dismounted or modified at will.

- Electric elements like cables, etc. used for the machine should be from certificated manufacturers.
- After maintenance is finished the working place should be cleaned and rearranged, the oil, water on every part should be cleared away to get a good working ambience.
- Take the dismounted parts and dirty oil far away from the machine to guarantee 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 unnormal 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.
- It is forbidden for any unauthorized personnel to start, operate and maintain the machine, to open the door of electric cabinet and touch the electric elements are also prohibited.
- Keep hand(s) out of the spindle nose while the spindle is running.

2 GENERAL DESCRIPTION

2.1 Application Scope

The machines described by this INSTRUCTION BOOK belongs to series machines including following sizes:

CW63 Series: CW6163B × 750, 1000, 1500, 2000, 3000, 4000, 5000, 6000, 7000, 8000;

CW6263B × 750, 1000, 1500, 2000, 3000, 4000, 5000, 6000, 7000, 8000;

CW6163C × 750, 1000, 1500, 2000, 3000, 4000, 5000, 6000, 7000, 8000;

CW6263C × 750, 1000, 1500, 2000, 3000, 4000, 5000, 6000, 7000, 8000;

CW61(62)63D×750, 1000, 1500,2000,3000,

CW93 Series: CW6193B × 750, 1000, 1500, 2000, 3000, 4000, 5000, 6000, 7000, 8000;

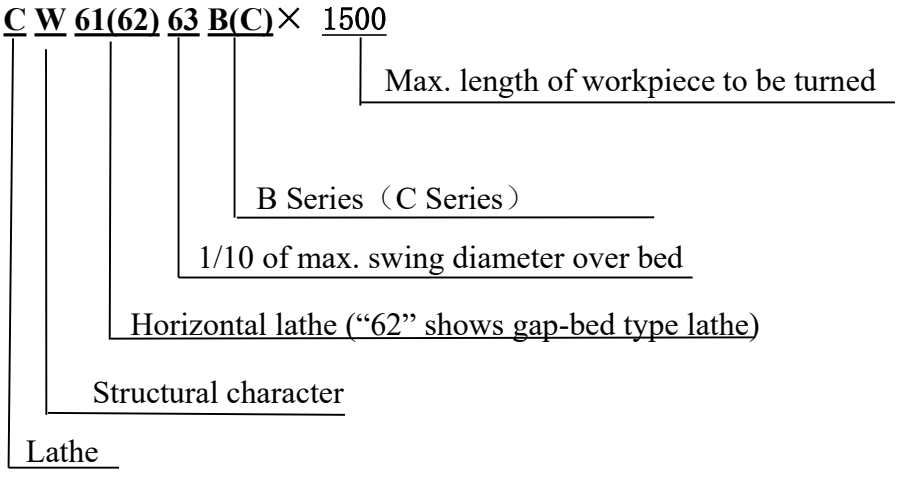
CW6293B × 750, 1000, 1500, 2000, 3000, 4000, 5000, 6000, 7000, 8000;

CW6193C × 750, 1000, 1500, 2000, 3000, 4000, 5000, 6000, 7000, 8000;

CW6293C × 750, 1000, 1500, 2000, 3000, 4000, 5000, 6000, 7000, 8000;

The machines of each size are divided into the machine provided with hand-braking and the machine with foot-pedal braking.

2.2 Identification Marking of Model



2.3 Application and Turning Range of the Machine

2.3.1 Application of the Machine

The machine can perform various turning jobs, such as internal and external cylindrical, cone surfaces and other surfaces, cutting of various metric, Whitworth, module and diametral threads, as well as facing also drilling, reaming and broaching oil grooves, etc.

The machine is available to turn workpieces made from steel, casting ferrous metal material, etc.

The workpiece produced on the machine can achieve the working accuracy of Grade IT6-IT7 and lower value of surface roughness. The gap-bed lathe is also capable of turning flat and grotesque workpieces besides the turning jobs mentioned above.

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

2.3.2 Turning Range of the Machine

Turning range of the machine should be determined according to size and technical data of the machine. Strictly forbid the operation of the machine under over-performance and over-local, otherwise, resulting in damage of the machine and personal injury or death caused by an accident.

2.4 Accuracy of the Machine

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

2.5 Noise of the Machine

Sound pressure level of idle running noise of the machine is ≤ 80dB(A).through measurement according to the standard EN11202.

2.6 Illumination of the Machine

In order to meet the needs of illuminating intensity in working zone of the machine in normal shining case, the machine is fully considered about illuminating problem in the design. The specifications of which are as follows:

Type of illuminating light:	JC 38B
Voltage:	24V
Power:	40W

The local illuminating light 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: Range of 5°C -40°C. not more than 35°C of even temperature for 24 hours.
- Relative humidity: Range of 30% - 95% and the principle of humidity changing can result in condensation.
- 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 heart 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, also no discharge of harmful gas or liquid.

3 HANDLING, INSTALLATION AND TRIAL-RUN OF THE MACHINE

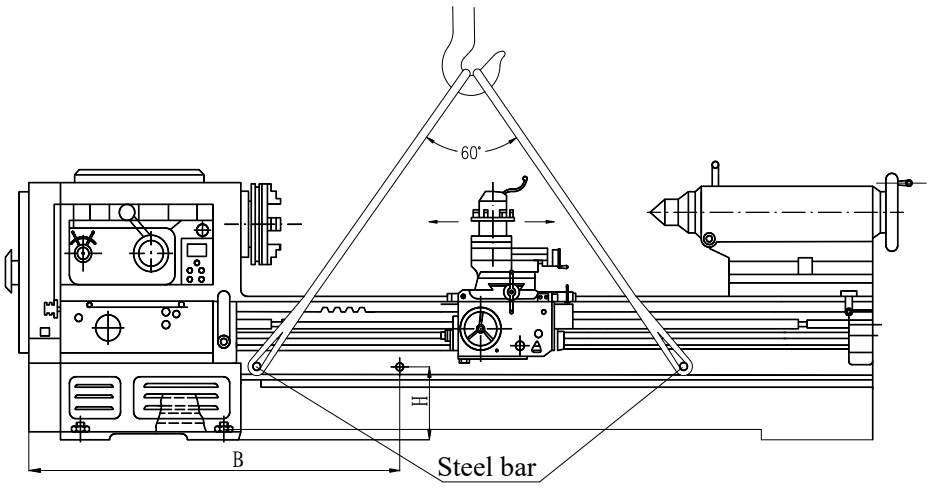
3.1 Transport of the Machine

We have taken some measure 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°~55°C and also transport and storage in short time within 24 hours under status of temperature of 70°C.

Material of the packing case is wood that will not 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°, the diameter of the rolls used must not be over 70 mm. Never place the case on a prismatic body or upside down. When the machine is unpacked, first, inspect its exterior condition and check attachments according to the "PACKING LIST". When lifting the unpacked machine with a crane, use strong steel bars with ϕ50 mm, 1000 mm long, and made them insert into the in front and rear hanging holes of bed leg (see the Fig.1). And the wooden blocks should be padded between the strong steel wire ropes and the position touched with the wire ropes of the machine or the steel wire ropes slipped with rubber pipe to prevent the machine from being damaged. While lifting, it is available to move the carriage to make the machine balance and the tailstock shall be fixed on the machine bed. Before lifting, remove the chip guard and while lifting.



B: Horizontal location of the center gravity H: Vertical location of the center gravity

Fig. 1 Handling plan of the machine

3.3 Overall Dimensions, Center gravity and Weight of the Machine

Refer to Table 1.

Table 1 Overall dimensions, center gravity and weight of the machine

Type of Product			CW63 Series	CW93 Series
Profile Dimensions	L×W×H (mm)	750	2890×1380×1450	2890×1440×1835
		1000	3160×1380×1450	3160×1440×1835
		1500	3660×1380×1450	3660×1440×1835
		2000	4160×1380×1450	4160×1440×1835
		3000	5155×1380×1450	5155×1440×1835
		4000	6210×1380×1450	6210×1440×1835
		5000	7390×1380×1450	7390×1440×1835
		6000	8300×1380×1450	8300×1440×1835
		7000	9300×1380×1450	9300×1440×1835
		8000	10300×1380×1450	10300×1440×1835
Center of Gravity	Horizontal location B (mm)	750	1225	1225
		1000	1395	1395
		1500	1605	1605
		2000	1815	1815
		3000	2345	2345
		4000	2815	2815
		5000	3380	3380
		6000	3760	3760
		7000	4305	4305
		8000	4850	4850
	Vertical length H (mm)		525	580
Weight of the machine kg		750	3500	3900
		1000	3600	4000
		1500	3700	4100
		2000	4100	4500
		3000	4700	5100
		4000	5800	6900
		5000	6800	7800
		6000	8500	9500
		7000	8900	9900
		8000	9470	10470

NOTE

- In order to keep balancing of the machine being lifted up in both horizontal and vertical directions, it is just away from ground (very beginning) that the machine is lifted up should be kept balancing.
- Angle of the steel wire rope under lifting up or down shall be not more than 60°.
- Whenever handling the machine, it is necessary to give signal with each other for coordinated working provided the handling work is not carried out by one person.

3.4 Installation of the Machine

3.4.1 Preparation Work before Installation

3.4.1.1 Environmental Requirements

Installation of the machine should be in accordance with the stipulations given in the Chapter 2.7. Except those, also pay attention to 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.

3.4.1.2 Power Interface

Connection of power supply:

For the machine with hand-braking: Connect the wire of power supply to the wiring terminal of the terminal block XT0 in the electric cabinet of the machine.

For the machine with foot-pedal braking: Connect the wire of power supply to the wiring terminal in the wiring box XT0 outside the machine leg, and the wire is connected with the foot-pedal brake via the through-hole at the front side of the machine bed.

3.4.1.3 General Power Supply

The voltage of power supply and the frequency available for this machine will be determined according to concerned contract. Refer to following Table 4.

Table 2

Frequency	Rated Voltage					
50Hz	~220V	~380V	~415V	~420V	~440V	~600V
60Hz						

Allowed fluctuation range of the voltage and the frequency:

Voltage: Stabilizing voltage value is as much as 0.9 ~1.1 times of rated voltage.

Frequency: Stabilizing frequency value is as much as 0.99 ~ 1.01 times of rated frequency (continuous working); Stabilizing frequency value is as much as 0.98 ~ 1.02 times of rated frequency (short-time working).

3.4.2 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, but the original accuracy cannot be obtained due to the reason of bad installation of the machine. And most troubles of the machine are caused by this reason.

It is necessary to dispose wedge irons or adjustable pad irons near the foundation bolts before installation of the machine, and the wedge irons shall be supplied by the user (for the parts, please refer to Fig. 2), and the adjustable pad irons are disposed for special order.

NOTE

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

3.4.2.1 Foundation of the Machine

For the machine installation, a plane installation place should be first found, then, determine the installing space and prepare the foundation according to the Foundation plan (refer to Fig. 3~10) and specified ambient requirements.

For floor space of the machine not only consider the space required by operating machine but also the space required for maintenance (the distance of pulling the water tank plus distance for maintenance). The foundation plan has specified the space required by the machine itself. The space required by maintenance is the space extended by 1200~1500mm from each side of the space required by the machine itself.

3.4.2.2 Installation Steps

- The machine and the foundation bolt shall be supported by the same number of iron wedges which shall be placed near the foundation bolt in pairs. When placing each pair of cement mortar, for convenient adjustment, for the top wedge, the large

end shall be facing outward, and that of the bottom wedge facing inward. Refer to Fig. 2, please.

- Roughly adjust installing accuracy of the machine. The accuracy of installation is tested by means of a spirit level that is placed respectively at two ends of the bed ways. The readings of the level should all not be over 0.02/1000 in both longitudinal and traverse directions. If not so, first make rough adjustment by means of wedges.
- After rough adjustment of the machine, pour cement into the foundation boltholes, and carry out the fine adjustment after the dry out of the cement.
- Adjust the installing accuracy of the machine precisely. On the one hand, adjust the pad wedges; on the other hand, adjust the foundation bolts, until the installing accuracy is up to the requirements.
- All foundation bolts should be evenly tightened, and no bad effects to the accuracy of installation.
- After the accuracy catches up the requirements, fill cement into the space between foundation and lathe legs and trim the surface around the base leg to prevent ingress of lubricating oil.

3.4.2.3 Connection of Inner Devices of the Machine

After the leveling, before switching on the machine, following preparation should be done:

- Re-check whether every connector is firmly connected.
- Check and be sure that the input power supply is in correct phase, otherwise, running direction of the motor will not be the same as one specified.

3.4.2.4 Trial-running

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

- Re-install those protection covers dismounted for convenient transport on their original positions.
- Clearing:
- Sliding surface and some metal parts has been painted with antirust. during the transportation, dust, sand powder, and other dirty things may enter into the coating for anti-rust, so it is necessary to clean them out, otherwise, the machine cannot be allowed to be started.
- During the clearance, it is necessary to use kerosene to clean the anti-rust coating, heated kerosene for cleaning inside of the headstock. After all oil wicks (knitting wool) have been washed and dried, be sure to put them back to their original positions. Leadscrew, feed rod, guideways, etc., should be carefully wiped dry and

covered with a film of oil against rusting. Before using the machine, lubrication shall be done in accordance with the stipulations specified by the lubricating system.

Check

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

- Trial-run

- After completion of installing and the preparation work before trial-run mentioned above, it is necessary to do trial-run very carefully. Time for trial-run is about one hour. Larger load is not allowed to be used during the period of trial-run.
- Before the machine is connected to the shop mains, check whether the electrical system is in proper order, and specially respect to moisture of the motor, then connect the mains and also check whether the motor runs in correct direction. The operator should read the instruction for the machine structure, operation and lubrication carefully before operating the machine. Operate the machine manually at first, to make sure that all the parts are working in good conditions, and then start the machine for idle running. The machine should be well lubricated and run smoothly and the brake of the machine should be effective, and when all these work well, the machine may be put into normal operation.
- While checking the rotating direction of the rapid motor, it's necessary to make the feed rod disengaged from the feed box to prevent possible damage to the machine parts.
- When checking normal moving direction of apron (it's not rapid travel), feed rod must rotate upwards; otherwise normal working feed is not carried out.

3.4.2.5 Part Drawing for Wedge Irons

Refer to Fig. 2, please.

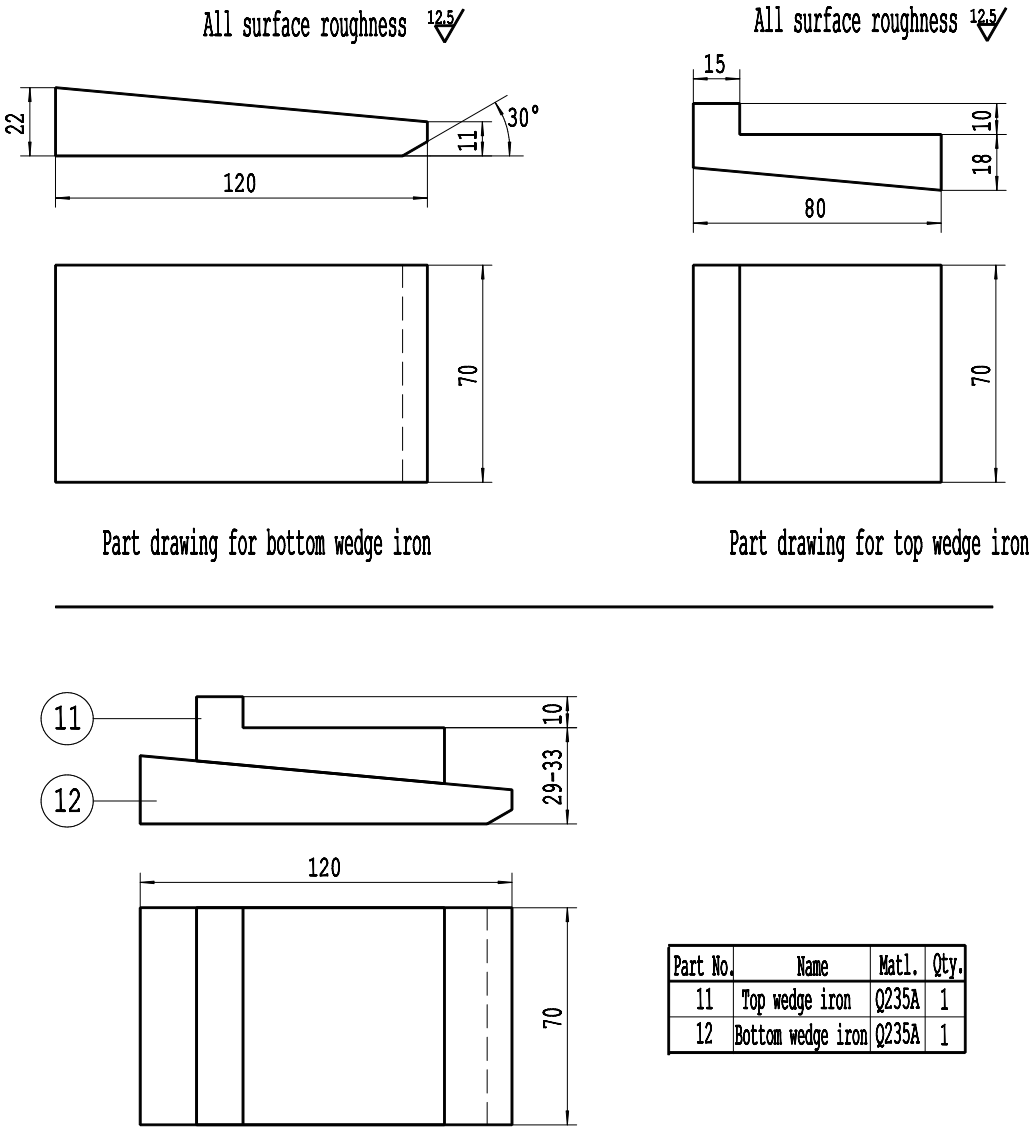
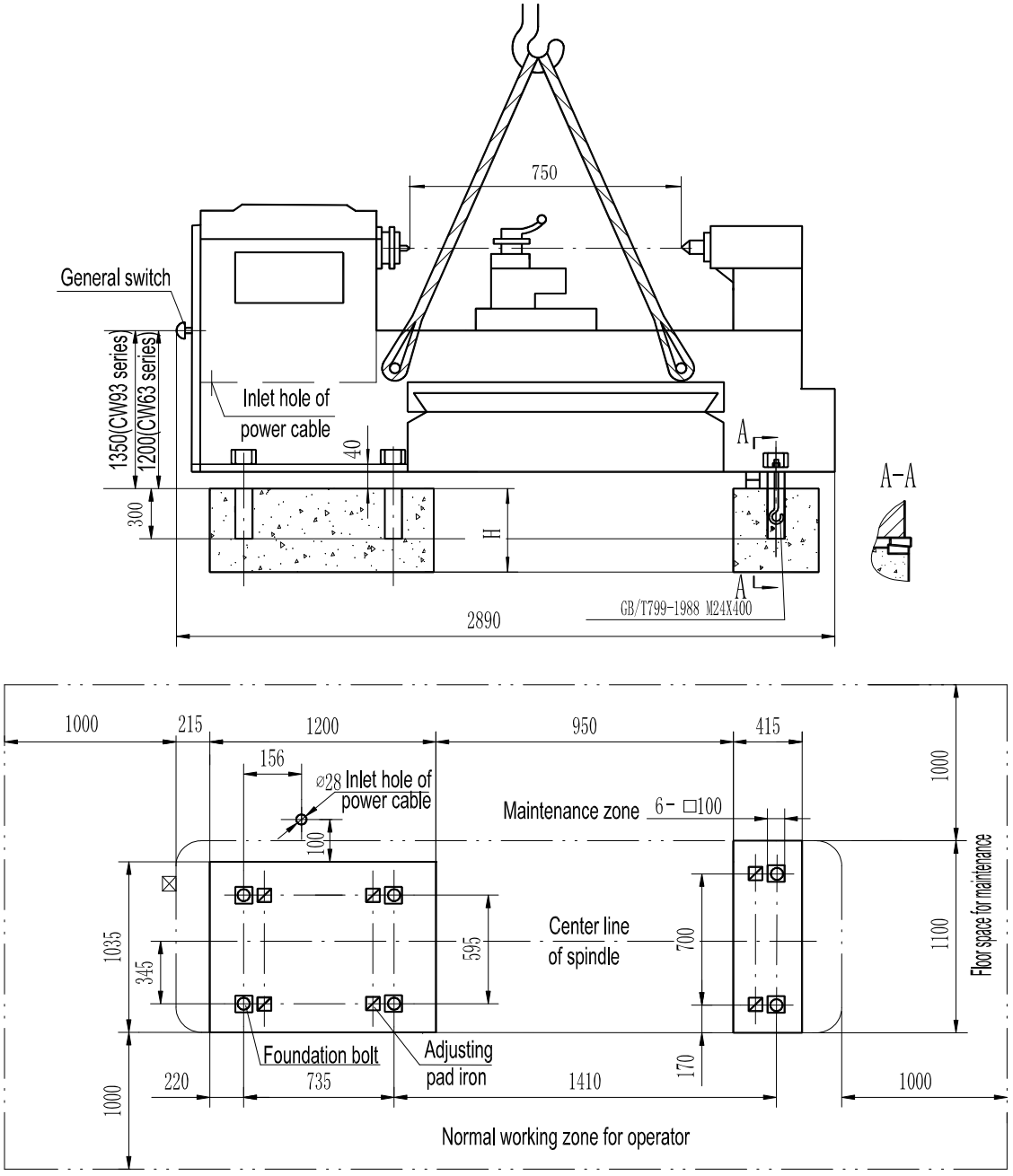


Fig. 2 Part drawing for wedge irons

3.4.3 Foundation Plan for the Machine

3.4.3.1 Foundation Plan for the Machine of 750 mm

Refer to Fig. 3.



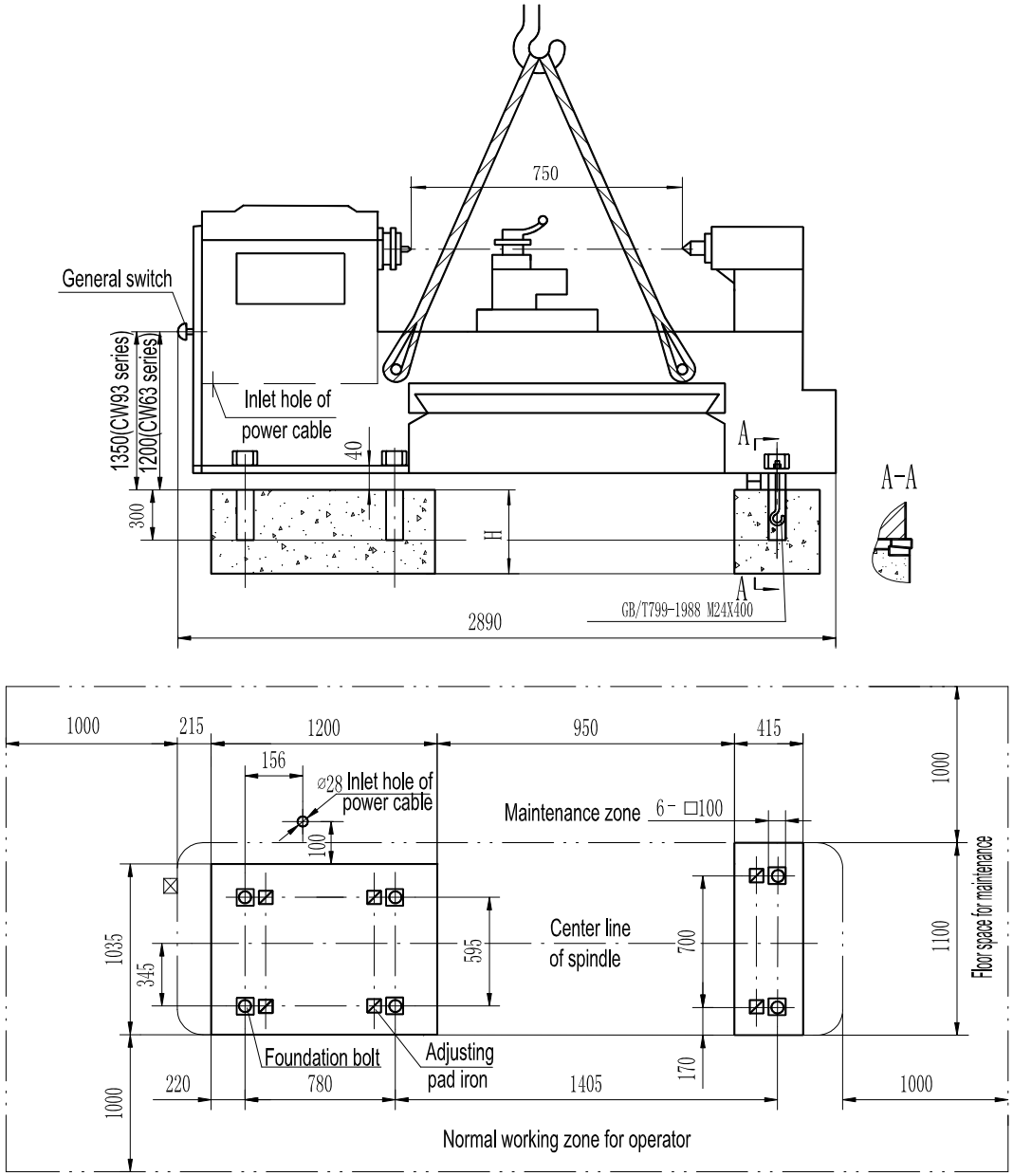
Note: 1. H: decided according to property of the local soil.

2. Mark ⊠ shows the position of wedge.

Fig.3 Foundation plan for the machine of 750 mm

3.4.3.2 Foundation Plan for the Machine of CW61(62)63D,750mm

Refer to Fig. 3.1



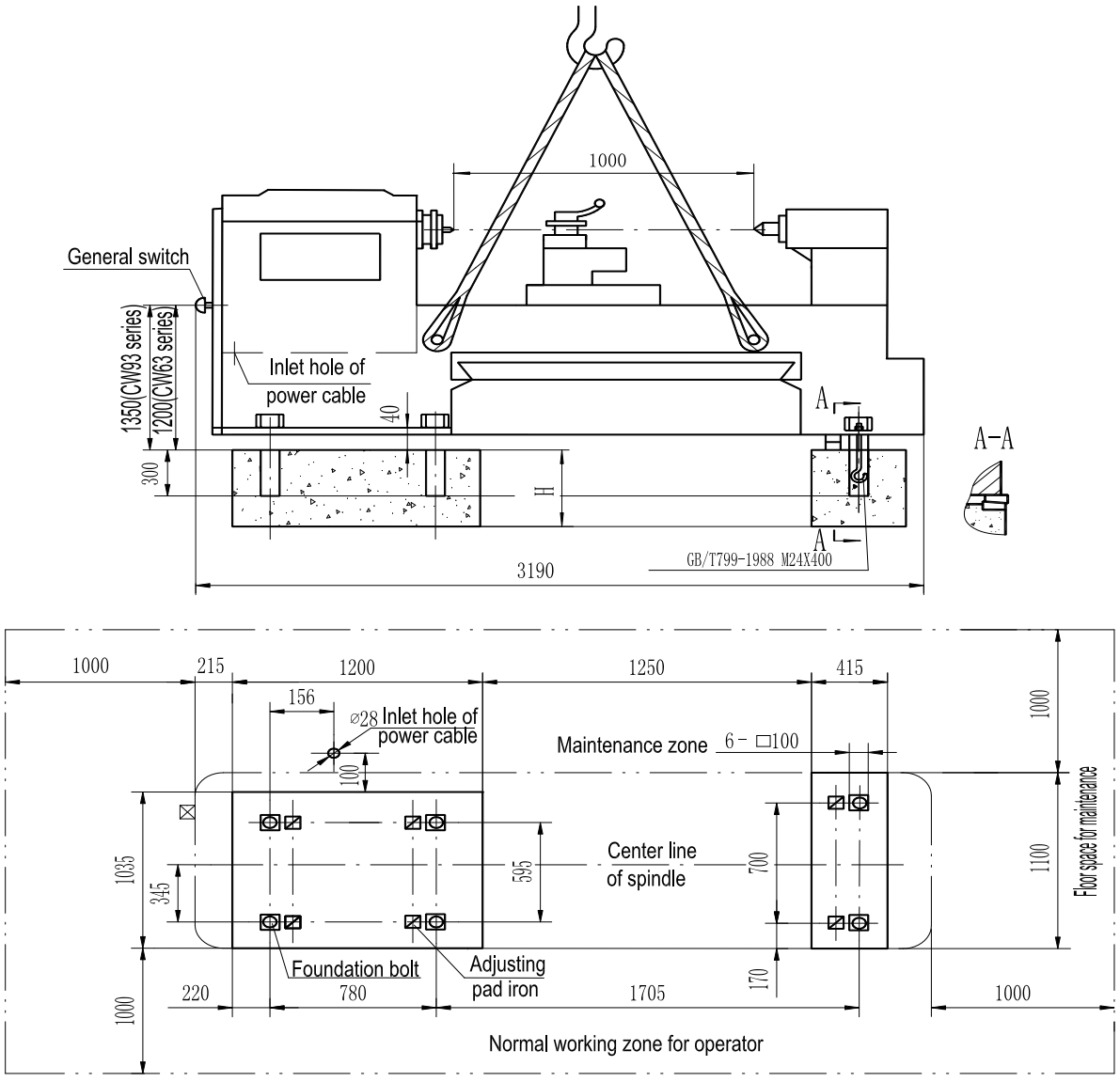
Note: 1. H: decided according to property of the local soil.

2. Mark ⊠ shows the position of wedge.

Fig. 3.1 Foundation plan for the machine of cw61(62)63D,750mm

3.4.3.3 Foundation Plan for the Machine of 1000 mm

Refer to Fig.4



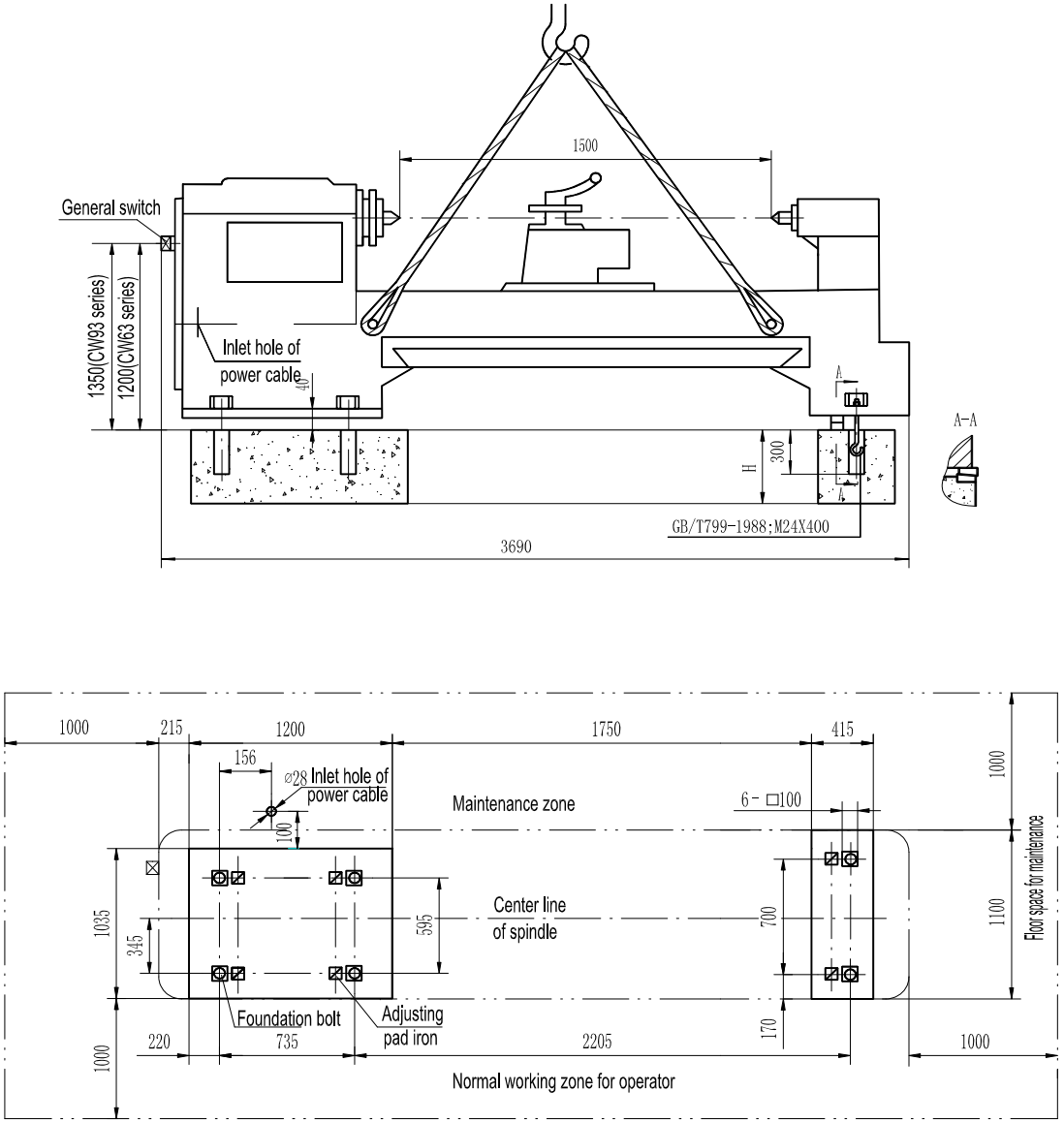
Note: 1. H: decided according to property of the local soil.

2. Mark ⊠ shows the position of wedge.

Fig. 4 Foundation plan for the machine of cw6163B,1000mm

3.4.3.4 Foundation Plan for the Machine of 1500 mm

Refer to Fig.5



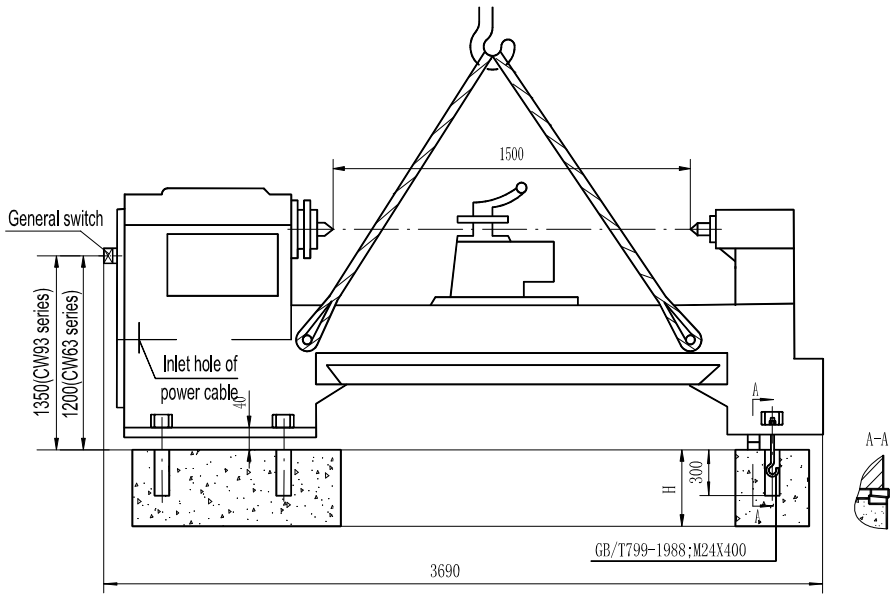
Note: 1. H: decided according to property of the local soil.

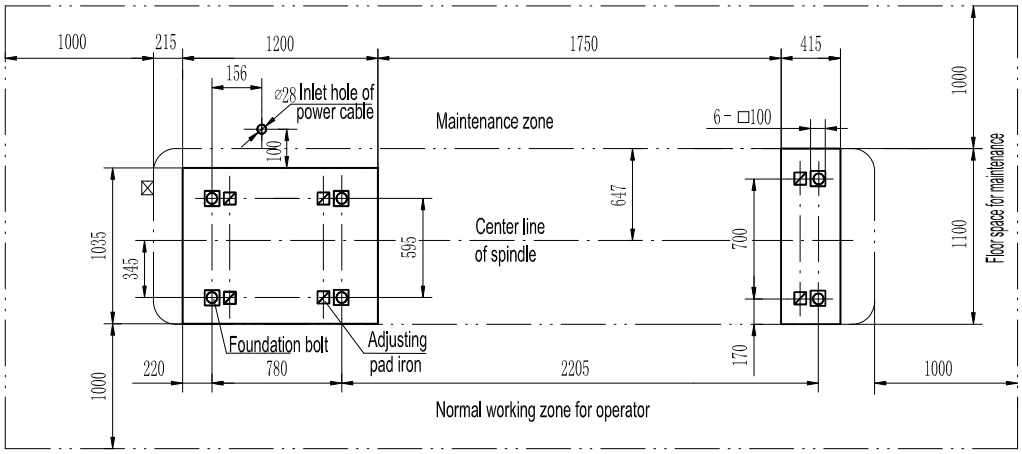
2. Mark ⊠ shows the position of wedge.

Fig. 5 Foundation plan for the machine of 1500 mm

3.4.3.5 Foundation Plan for the Machine of CW61(62)63D,1500mm

Refer to Fig. 5.1





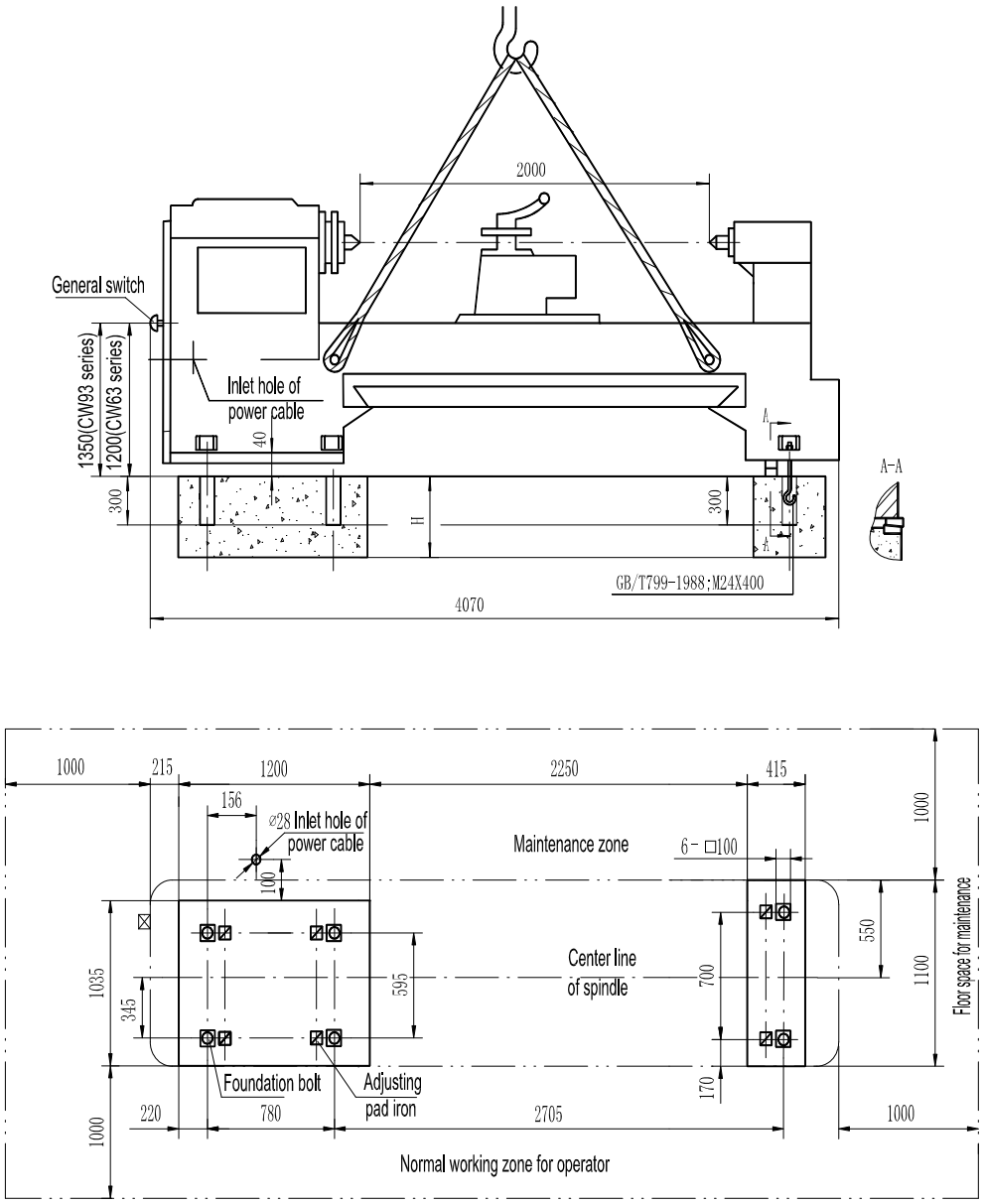
Note: 1. H: decided according to property of the local soil.

2. Mark ⊠ shows the position of wedge.

Fig.5.1 Foundation plan for the machine of CW61(62)63D,1500 mm

3.4.3.6 Foundation Plan for the Machine of CW61(62)63B,2000mm

Refer to Fig. 5.2.



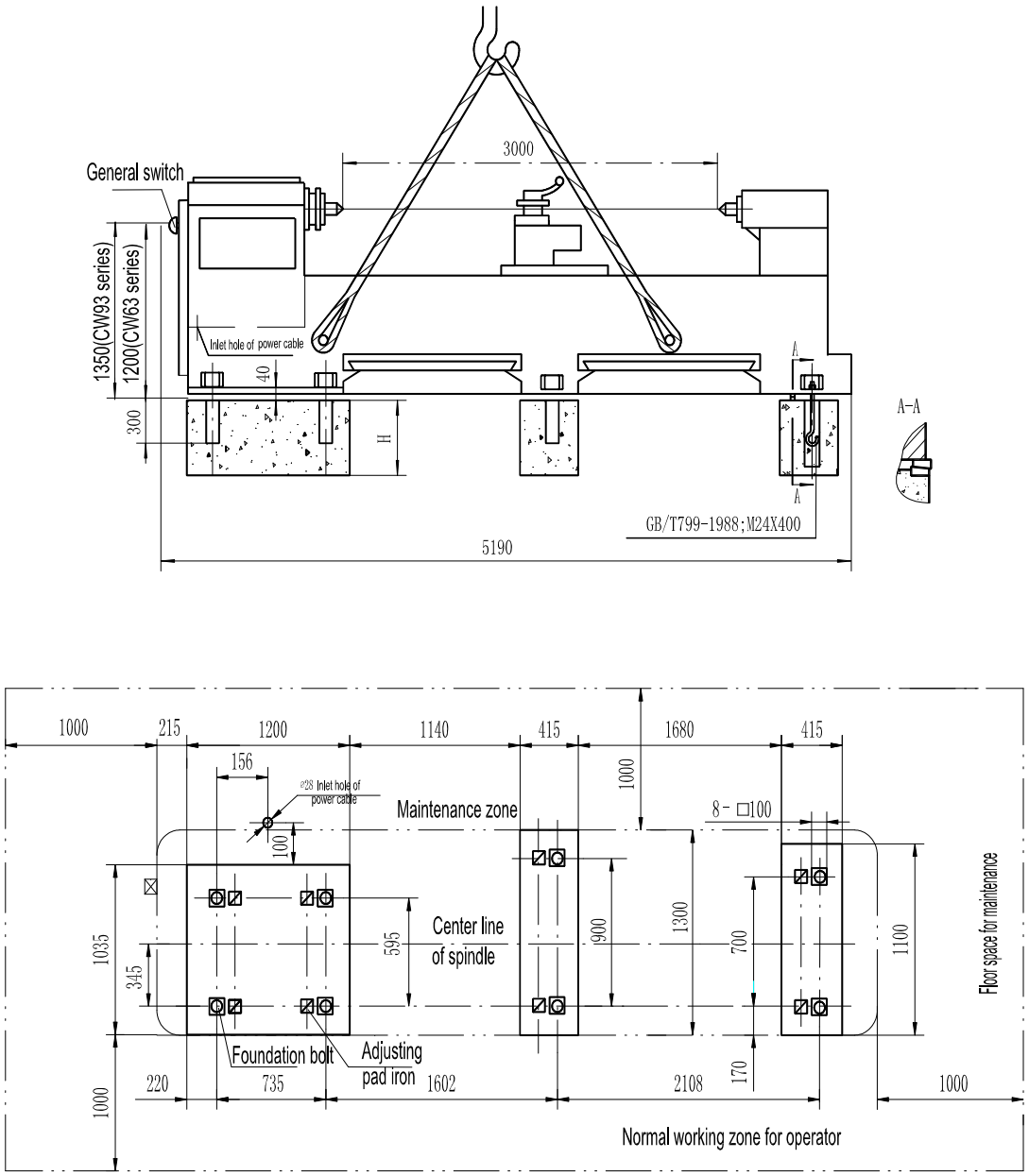
Note: 1. H: decided according to property of the local soil.

2. Mark ⊠ shows the position of wedge.

Fig.5.2 Foundation plan for the machine of CW61(62)63B,2000 mm

3.4.3.7 Foundation Plan for the Machine of 3000mm

Refer to Fig. 6, please.



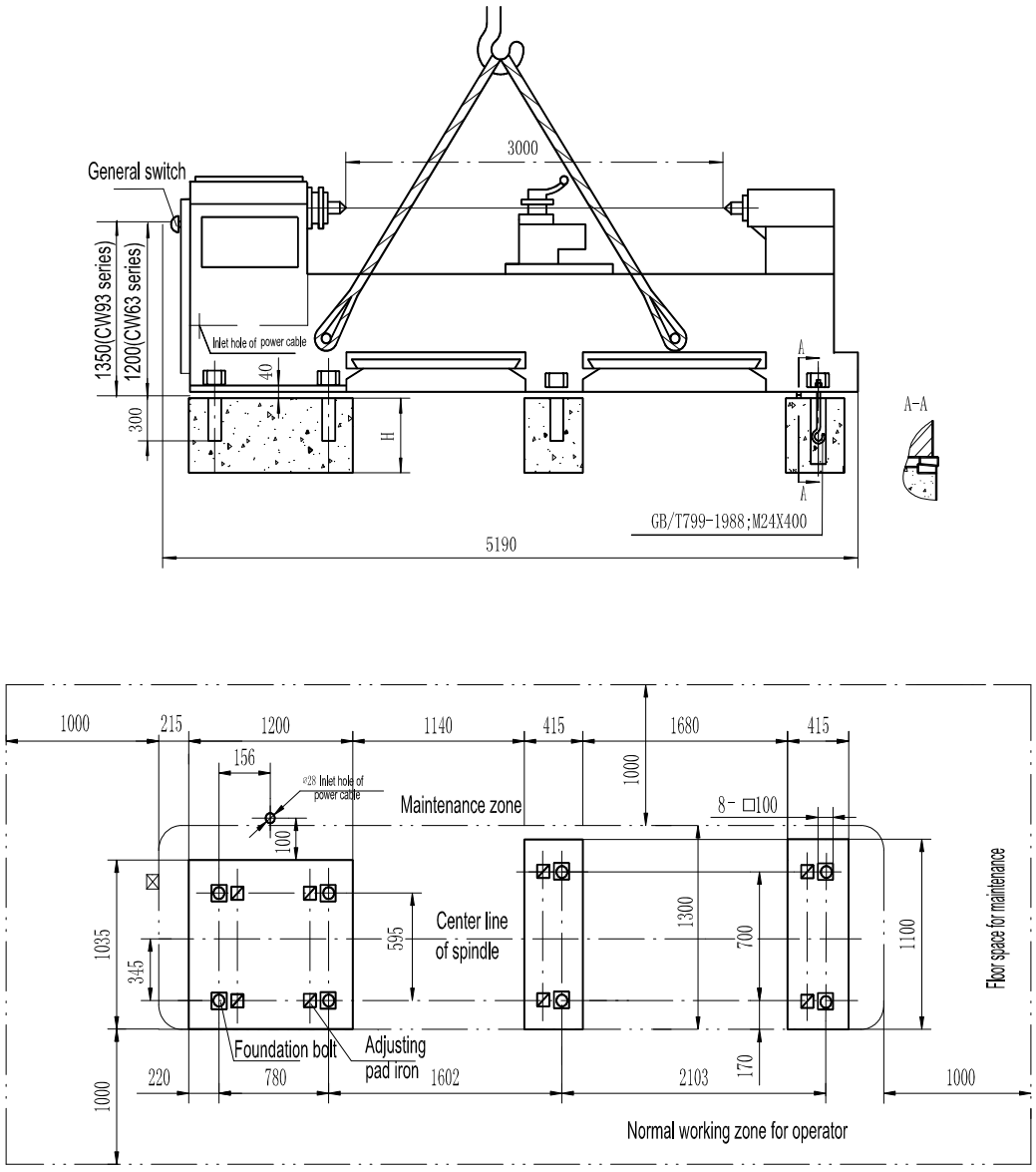
Note: 1. H: decided according to property of the local soil.

2. Mark ⊠ shows the position of wedge.

Fig. 6 Foundation plan for machine of 3000 mm

3.4.3.8 Foundation Plan for the Machine of CW61(62)63D,3000mm

Refer to Fig. 6.1.



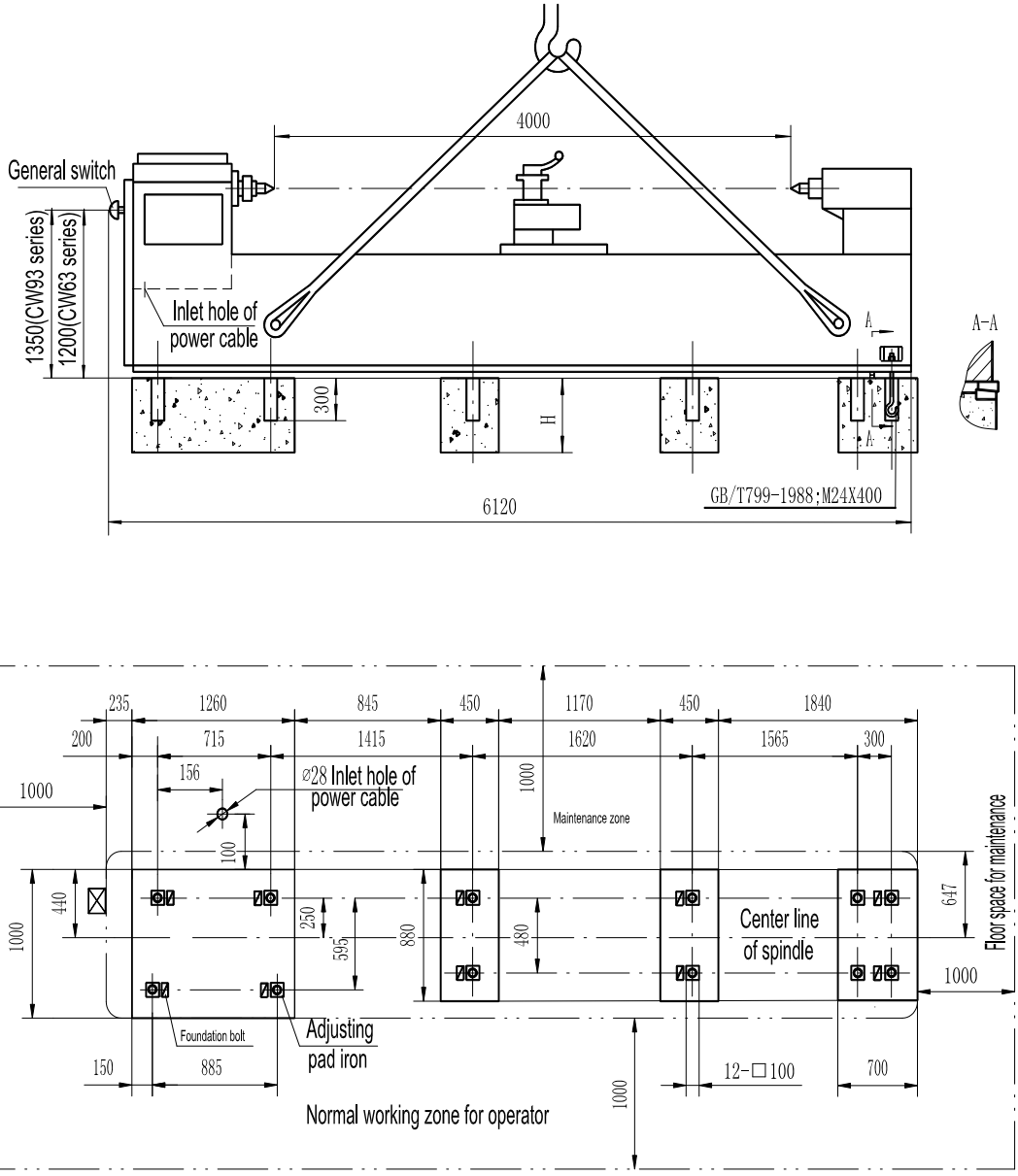
Note: 1. H: decided according to property of the local soil.

2. Mark ⊠ shows the position of wedge.

Fig. 6.1 Foundation plan for the machine of CW61(62)63D 3000 mm

3.4.3.9 Foundation Plan for the Machine of 4000mm

Refer to Fig. 7, please.



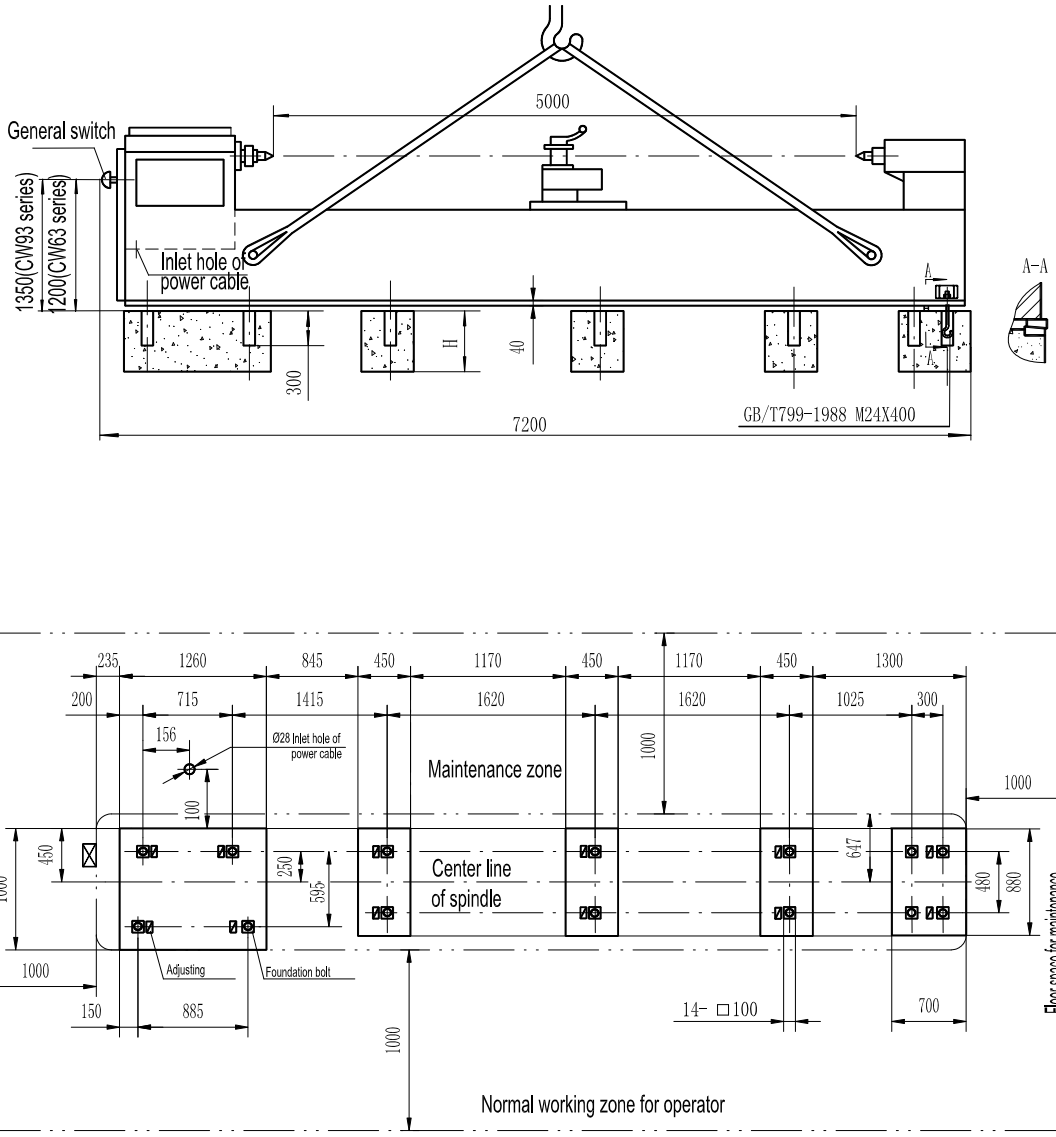
Note: 1. H: decided according to property of the local soil.

2. Mark ⊠ shows the position of wedge.

Fig. 7 Foundation plan for the machine of 4000 mm

3.4.3.10 Foundation Plan for the Machine of 5000mm

Refer to Fig. 8, please.



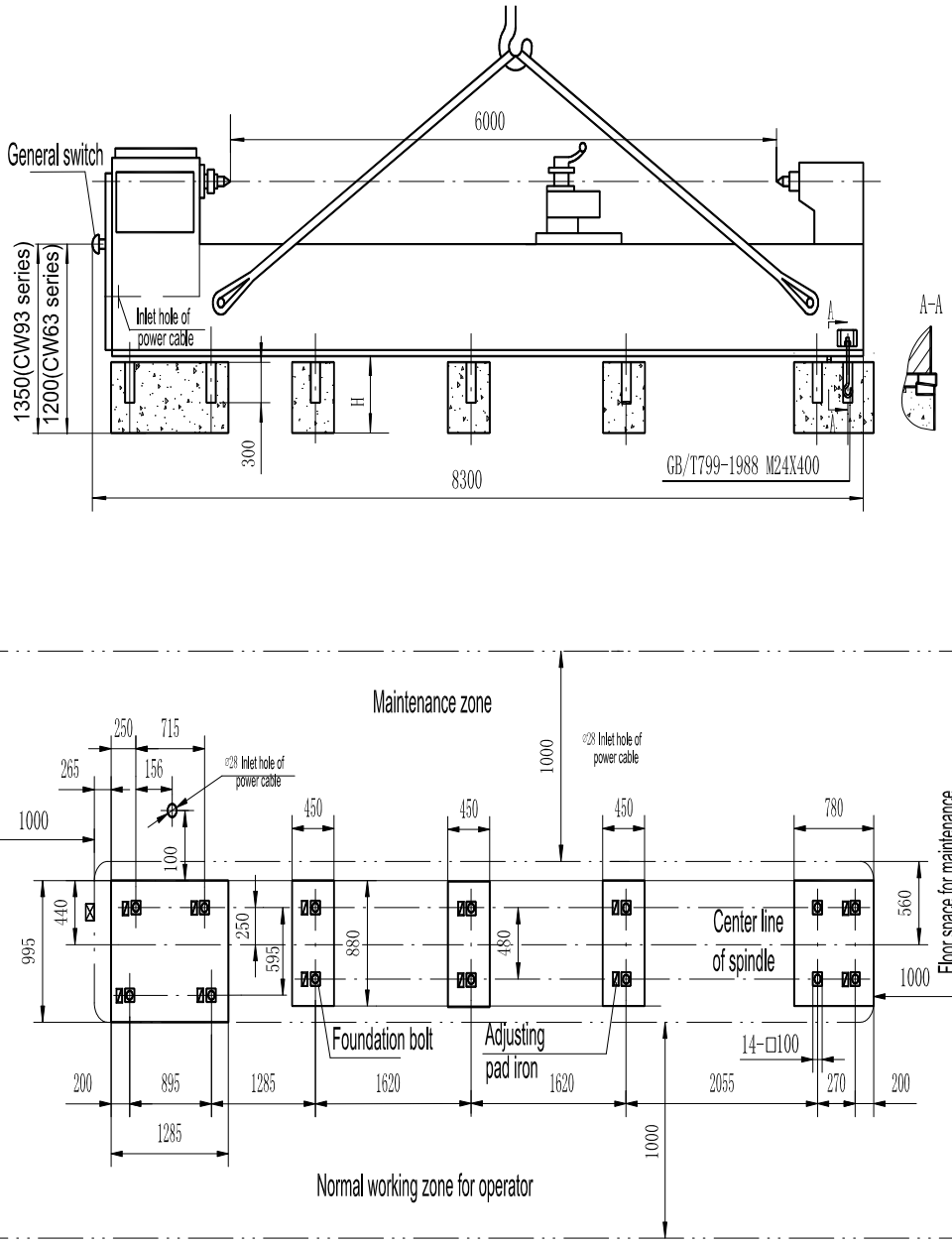
Note: 1. H: decided according to property of the local soil.

2. Mark ⊠ shows the position of wedge.

Fig. 8 Foundation plan for the machine of 5000 mm

3.4.3.11 Foundation Plan for the Machine of 6000mm

Refer to Fig. 8.1, please.



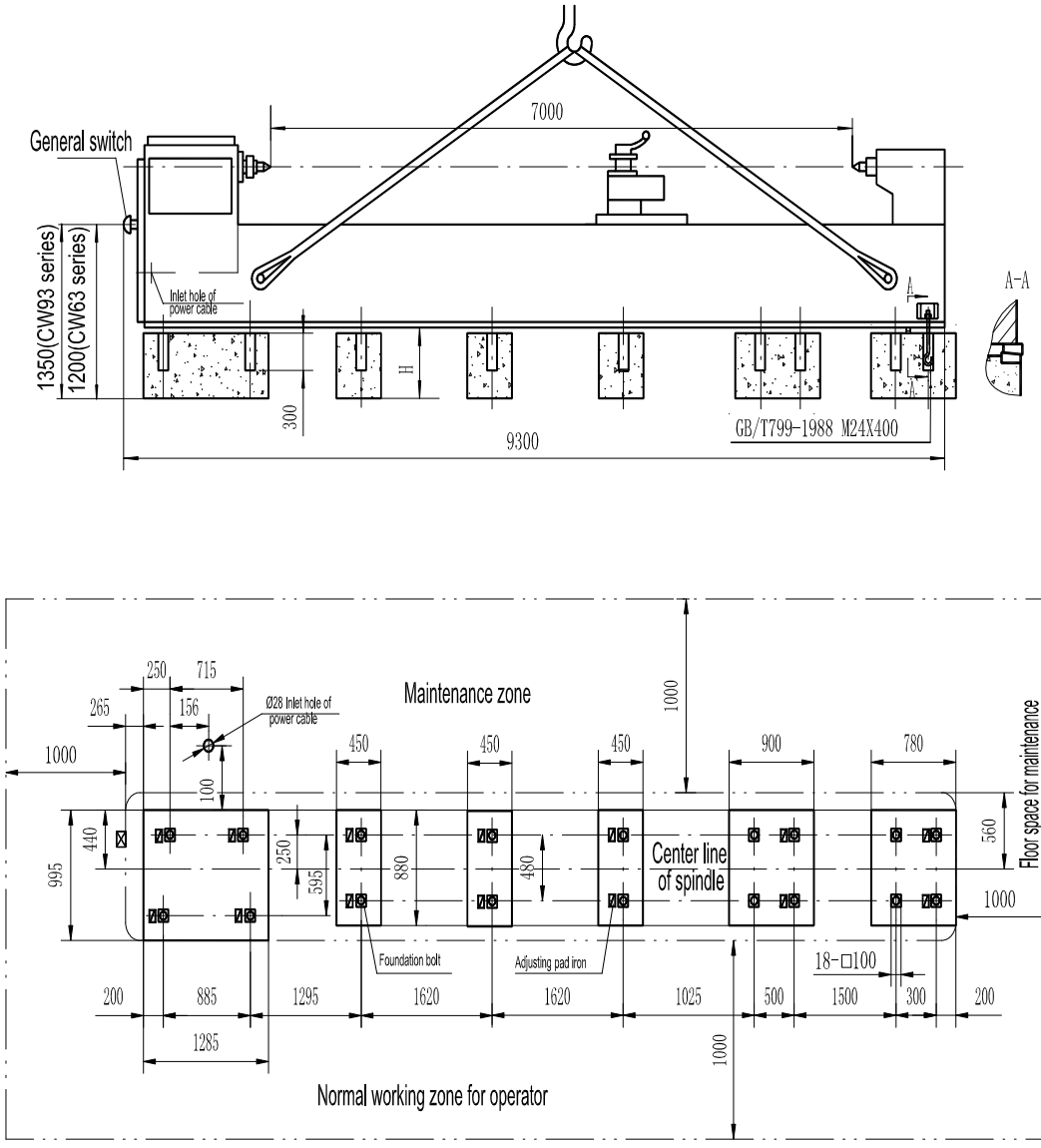
Note: 1. H: decided according to property of the local soil.

2. Mark ⊠ shows the position of wedge.

Fig.8.1 Foundation plan for the machine of 6000 mm

3.4.3.12 Foundation Plan for the Machine of 7000mm

Refer to Fig. 9, pleas



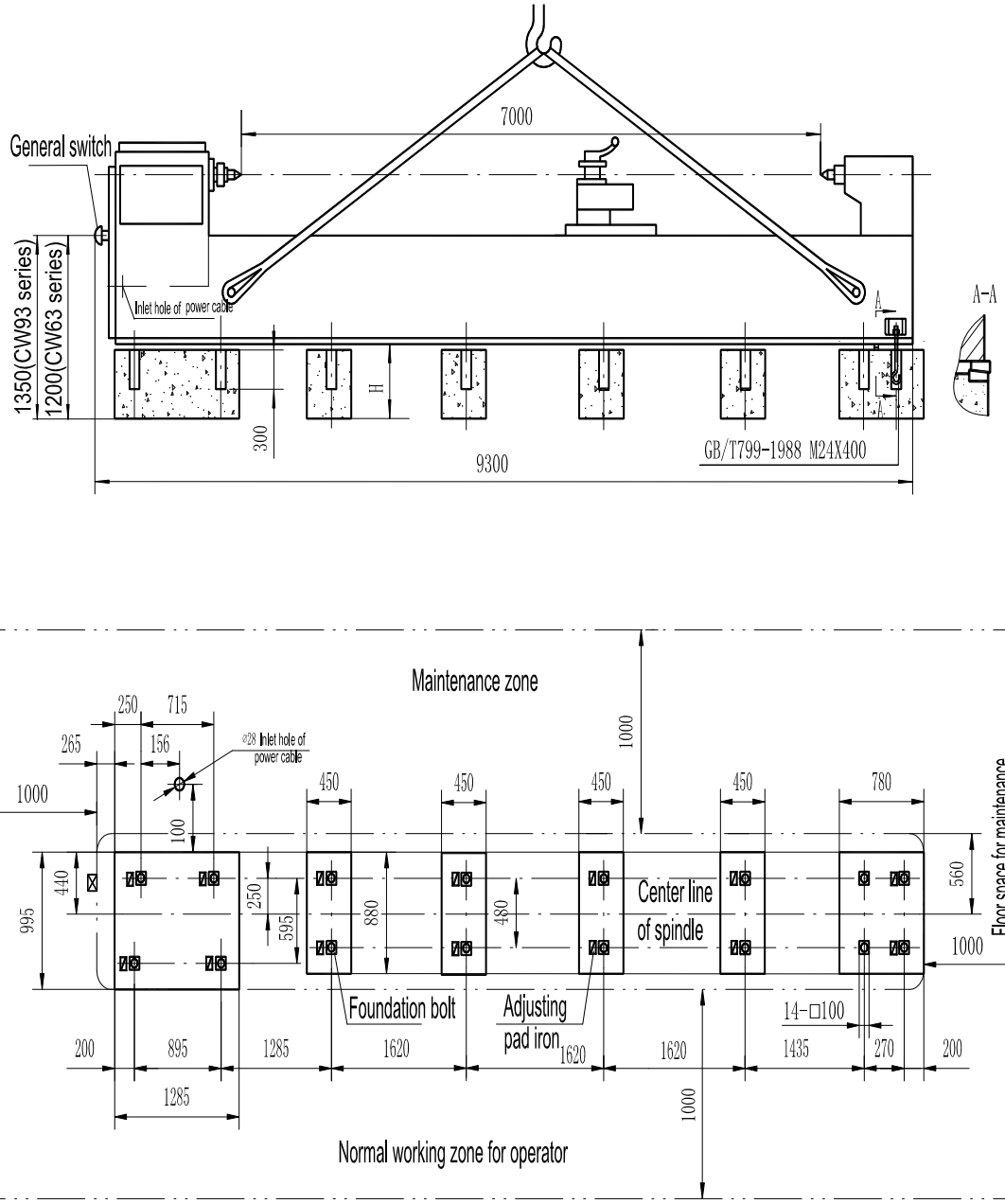
Note: 1. H: decided according to property of the local soil.

2. Mark ⊠ shows the position of wedge.

Fig.9 Foundation plan for the machine of 7000 mm

3.4.3.13 Foundation Plan for the integrated bed lathe of 7000mm

Refer to Fig. 9.1, please



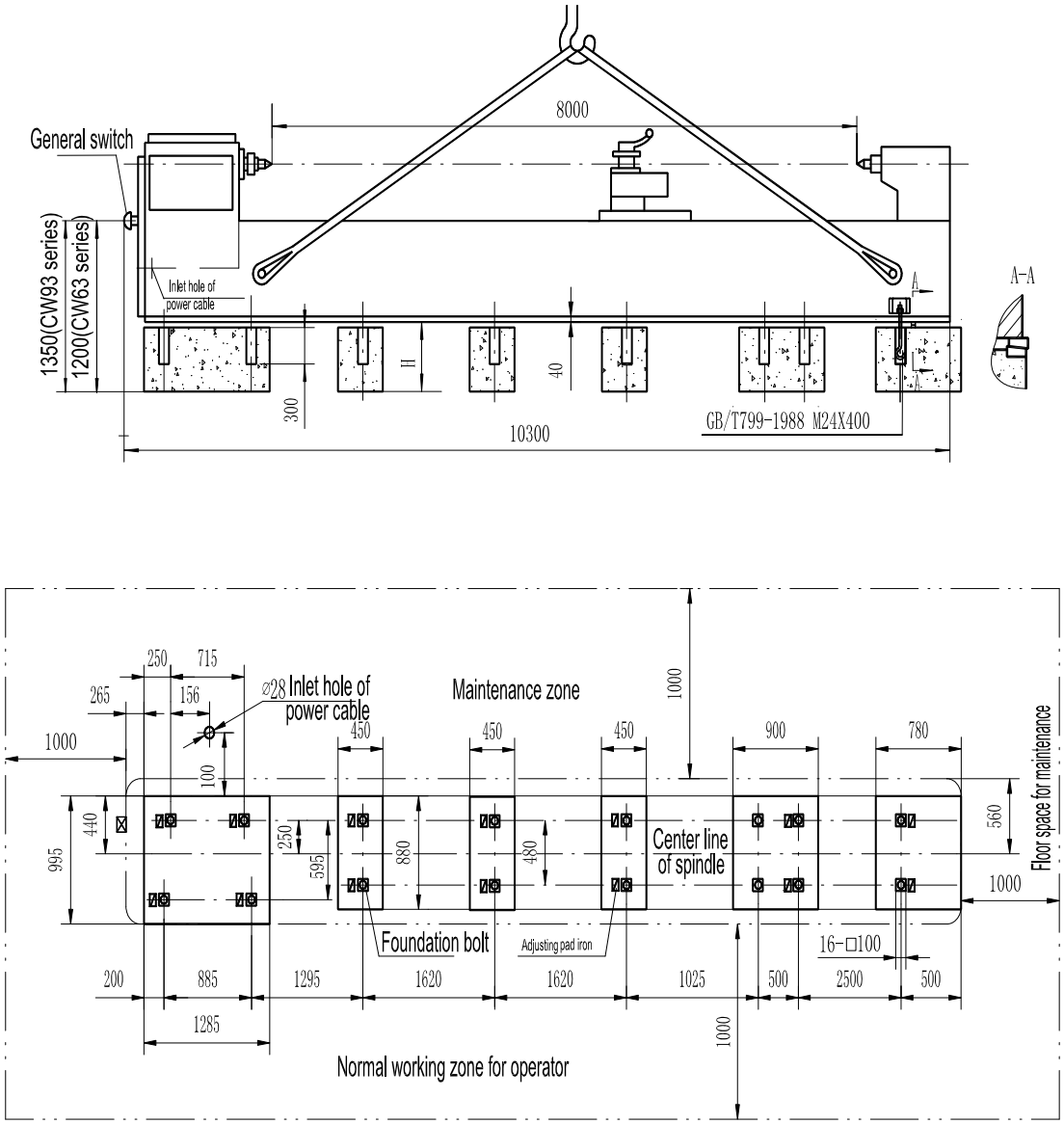
Note: 1. H: decided according to property of the local soil.

2. Mark ⊠ shows the position of wedge.

Fig.9.1 Foundation plan for the integrated bed lathe of 7000mm

3.4.3.14 Foundation Plan of the Machine of 8000mm

Refer to Fig. 10, please



Note: 1. H: decided according to property of the local soil.

2. Mark ⊠ shows the position of wedge.

Fig. 10 Foundation plan for the machine of 8000 mm

3.5 Appearance View of the Machine

Appearance view of the machine with hand-braking device, refer to Fig. 11, please. Appearance view of the machine with foot-pedal braking device, refer to Fig. 12, please.

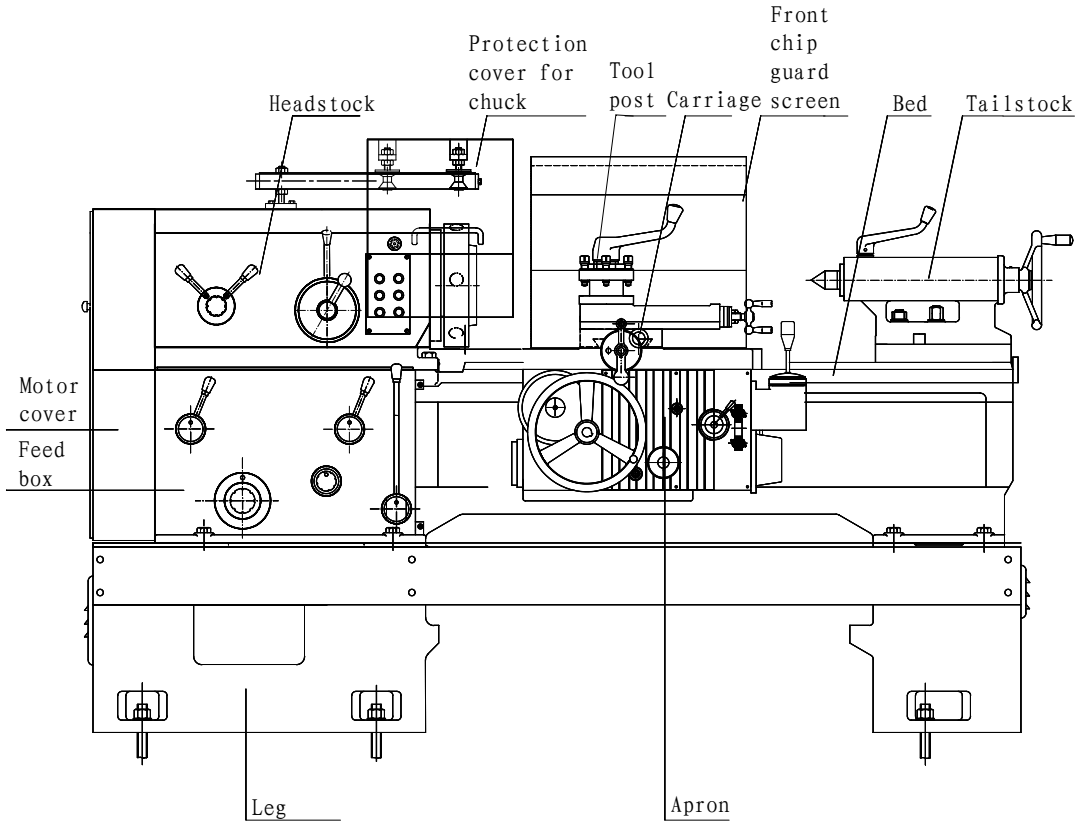


Fig. 11 Appearance view of the machine with hand-brake

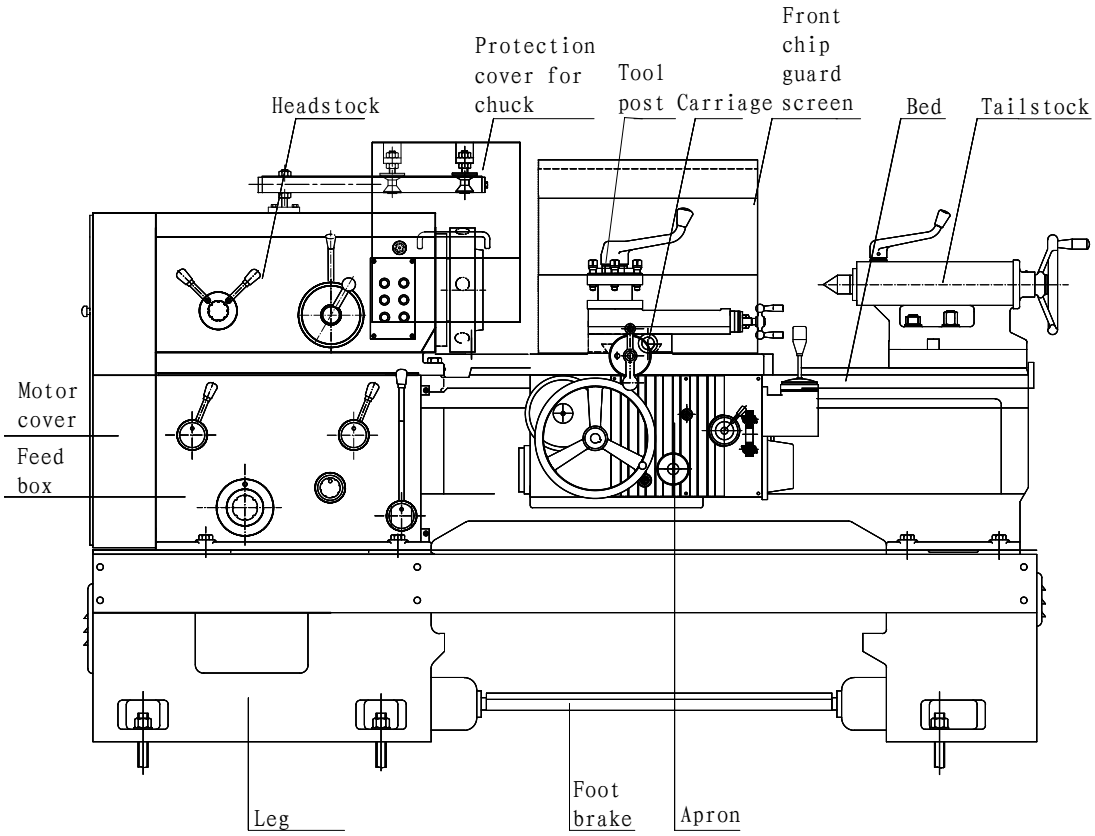


Fig. 12 Appearance view of the machine with foot-pedal braking

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 description.

4.2 Specifications of the Machines

Table 3

Item	Type of the machine							
	CW6163B	CW6163C	CW6263B	CW6263C	CW6193B	CW6193C	CW6293B	CW6293C
Max. swing dia. over bed mm	630				930			
Max. swing dia. over gap mm			800				1100	
Valid length within the gap mm			300				300	
Max. length of workpiece to be turned mm	750、1000、1500、2000、3000、4000、5000、6000、7000、8000							
Max. turning length mm	Common machine bed: 550、850、1350、1850、 2850、3850、 4850、5850、6850、7850							
	Gap machine bed: 250、550、1050、2550、3550、4550、5550、6550							
Max. swing dia. over carriage mm	350				650			
Diameter of spindle bore mm	104	130	104	130	104	130	104	130

Spindle	Taper of front bore of spindle	Metric 120	Metric 140	Metric 120	Metric 140	Metric 120	Metric 140	Metric 120	Metric 140
	Taper of center	Morse No. 5							
	Steps; range	B series:18, 7.5—1000 r/min C series 18, 8.5—800 r/min		18, 6—800 r/min					

Item		Type of the machine	
		CW63 series	CW93 series
Feed system	Number of longitudinal and transverse feeds:	64 for each	
	Range of longitudinal feeds for driving gear ratio of 1：1	0.1—1.52mm/r	
	Range of longitudinal feeds for driving gear ratio of 16：1	1.6—24.3mm/r	
	Range of longitudinal fine feeds:	0.05—0.912mm/r（with change gears）	

Item		Type of the machine	
		CW63 series	CW93 series
Feed system	Rapid speed of carriage movement	4000 mm/min	
	Transverse feed is equal to:	1/2 time of longitudinal feed	
	Leadscrew pitch	12mm	
	Number of valid metric threads	50	
	Range of valid metric threads:	1—240mm	
	Number of valid inch threads:	26	
	Range of valid inch threads:	14—1 t.p.i	
	Number of valid module threads:	53	
	Range of valid module threads:	0.5-120mm	
	Number of valid diametral pitch threads:	24	
	Range of valid diametral pitch threads:	28-1t.p.i	
Carriage	Vertical distance from center line of spindle to bottom of tool	33mm	
	Size of tool shank's section	32×32mm	
	Swing degree of compound slide rest	±90° (The swing degree must be adjusted by precise measuring equipment)	
	Max. travel of cross slide:	315mm	500mm
	Max. travel of compound rest:	200mm	
	Max. permissible cutting force PZ:	19600N	
	Max. permissible feed force PX:	7840N	

Tailstock	Diameter of center sleeve:	100mm	
	Travel of center sleeve:	250mm	
	Taper of tailstock center:	Morse No. 5	
	Max. cross movement of tailstock	± 15 mm	
Power system	Type of main drive motor	Y160M—4—B3	
	Power of main drive motor	11kW	
	Speed of main drive motor	1460 r/min	
	Type of rapid motor	NJ12—4 (middle-flanged-type)	
	Power of rapid motor	1.1kW	
	Speed of rapid motor	1450 r/min	
Item		Type of the machine	
		CW63 series	CW93 series
Cooling system	Type of cooling motor:	YSB-II-20	
	Power of cooling motor:	120W	
	Flow volume of cooling pump	20 L/min	
Control and lubricating system	Type of gear pump	(Counter-clockwise rotating)CB—B6	
	Capacity of gear pump:	6 ml/r	
	Pressure of gear pump:	2.5MPa	
	Speed of gear pump:	1450 r/min	
	Working pressure of cylinder:	1—1.5MPa	

4.3 Accessories for the Machine

4.3.1 Accessories for the Machines of CW63 Series

3-jaw chuck	ϕ315 mm (Type: K11 315C/D11)
	ϕ380 mm (Type: K11 380/D11)
	ϕ500 mm (Type: K11 500A/D11)
	ϕ400 mm (Type: K72 400/D11)
	ϕ500 mm (Type: K72 500/D11)
	ϕ630 mm (Type: K72 630/D11)
4-jaw chuck	ϕ400 mm (Type: K72 400/D11)
	ϕ500 mm (Type: K72 500/D11)
	ϕ630 mm (Type: K72 630/D11)
Face plate	ϕ650 mm (for CW6263B and CW6263C)
Steady rest	ϕ20 mm~ ϕ130 mm
	ϕ160 mm~ ϕ350 mm
Follow rest	ϕ30 mm~ ϕ180 mm
Taper attachment	
Max. turning length of taper attachment	500 mm
Max. turning taper of taper attachment	Inner cone 10°
	Outer cone 15°

4.3.2 Accessories for the Machines of CW93 Series

3-jaw chuck	ϕ315 mm (Type: K11 315C/D11)
	ϕ380 mm (Type: K11 380/D11)
	ϕ500 mm (Type: K11 500A/D11)
4-jaw chuck	ϕ400 mm (Type: K72 400/D11)
	ϕ500 mm (Type: K72 500/D11)
	ϕ630 mm (Type: K72 630/D11)

	ϕ 800 mm (Type: K72 800/D11)
Face plate	ϕ 930 mm (for CW6293B and CW6293C)
Steady rest	ϕ 30 mm~ ϕ 420 mm
Follow rest	ϕ 30 mm~ ϕ 180 mm
Safety guard	
Chip guard screen	
Thread cutting dial	16C63B02
Max. turning length of taper attachment	500 mm
Max. turning taper of taper attachment	Inner cone 10°
	Outer cone 15°

5 HYDRAULIC SYSTEM OF THE MACHINE

The hydraulic system of this machine is used for controlling forward, reverse and braking of the spindle. It's also used to lubricate the headstock and feed box. It consists of the following elements:

5.1 Gear Pump

Type:	CB-B6 reverse rotation pump
Pressure:	2.5 Mpa
Delivery capacity:	6 ml/r
Speed:	1450 r/min

5.2 Rotary Valve for Special-purpose:

350Y-8B (used for machine with center distances of less than 3000.)

It's controlled by the lever in the front of the bed, which controls separately forward rotation, reverse rotation and braking of the spindle. The valve is provided with a pressure valve and a pressure meter switch. Readings is read out from the pressure meter.

Its pressure is regulated up to 1-1.5Mpa. Overflow oil from the pressure valve is used for lubricating the headstock and the feed box.

5.3 Solenoid Valve

Solenoid valve: SWH-G02-C4-D24-20 (Northman of Taiwan)

SWH-G02-B2S-D24-20 (Northman of Taiwan) or D5-02-3C4-D2 (Janus of Taiwan), D5-02-2B2 converse-D2 (Janus of Taiwan), which are available for the machine with distance between the two centers of 4000-5000 and the machine with distance between the two centers of 400-5000 and provided with foot-pedal brake. The voltage of the solenoid valve is DC24V.

Forward: YV2 electromagnet for SWH-G02-C4-D24-20 (Northman of Taiwan) or D5-02-3C4-D2 (Janus of Taiwan) is energized.

Reverse: YV3 electromagnet for SWH-G02-C4-D24-20 (Northman of Taiwan) or D5-02-3C4-D2 (Janus of Taiwan) is energized.

Braking: YV1 electromagnet for SWH-G02-B25-D24-20 D5-02-2B2 converse-D2 (Janus of Taiwan) is energized.

Pressure valve Y-10B is regulated up to 1-1.5Mpa, overflow oil is used for lubricating the headstock and the feed box.

5.4 Oil Filter

It consists of a special oil filter and net oil fitter WU-63×100-J.

5.5 Oil Reservoir

It contains about 35L hydraulic oil of HL32 and lies inside the bed leg. The first cleaning and changing oil should be carried out in one month after using.

CB-B6 gear pump is only allowed reverse rotation, viewing from end of shaft.

While the spindle is running, and it is necessary to change direction or change steps for the spindle, it is necessary to make the spindle retard to lower than 500r/min, to avoid damage to the machine or the influence to the service life.

5.6 Hydraulic Principle Diagram

For Hydraulic Principle Diagram of the machine of 3m or less than 3m, please refer to Fig. 13. For Hydraulic Principle Diagram of the machine of 4m or more than 3m, please refer to Fig. 14.

5.6.1 Hydraulic Principle for the Machine of 3m or Less than 3m

Refer to Fig. 13, please

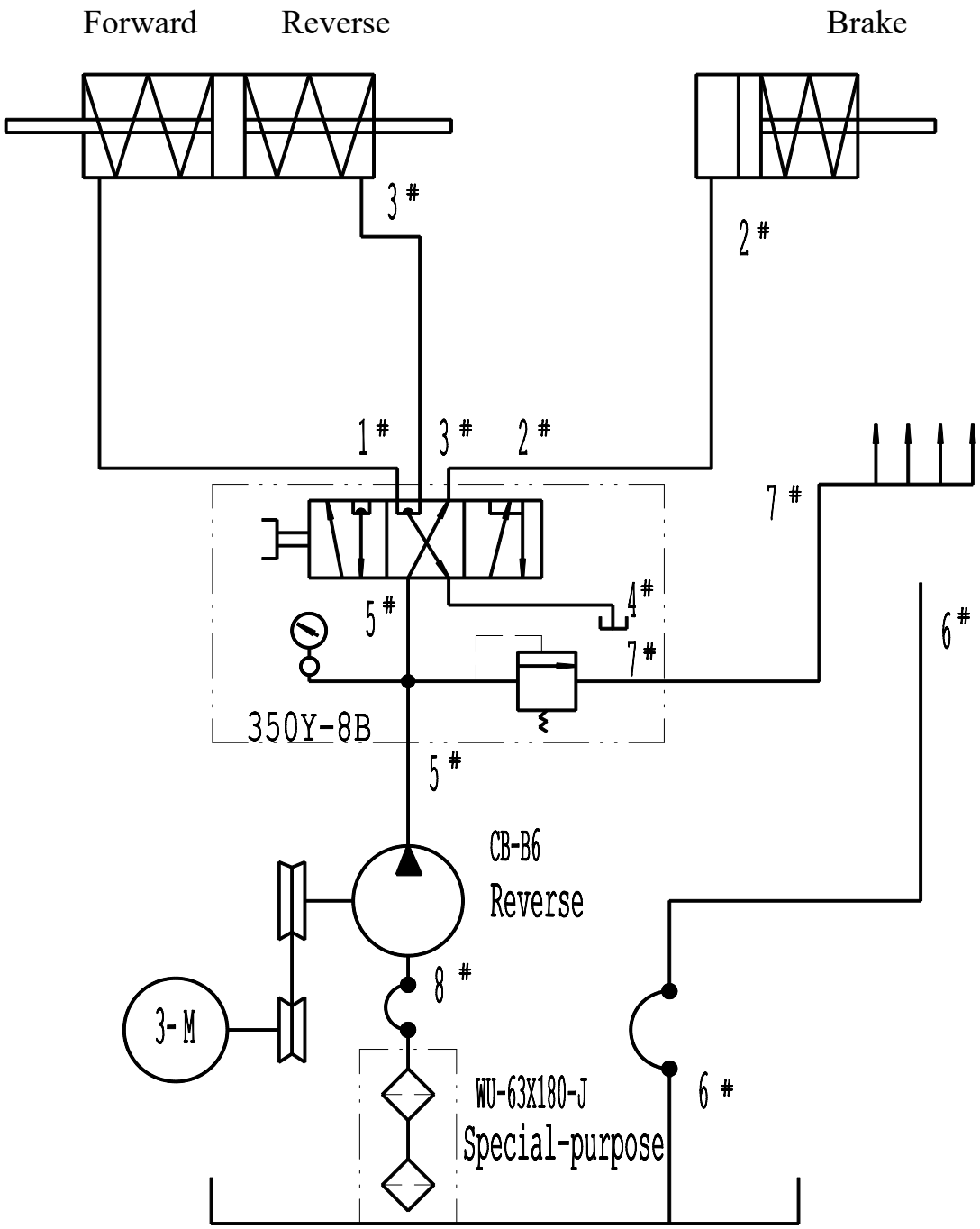


Fig.13 Hydraulic principle diagram for the machine of 3m or less than 3m

5.6.2 Hydraulic Principle Diagram for the Machine of 4m or More than 4m

Refer to Fig. 14, please.

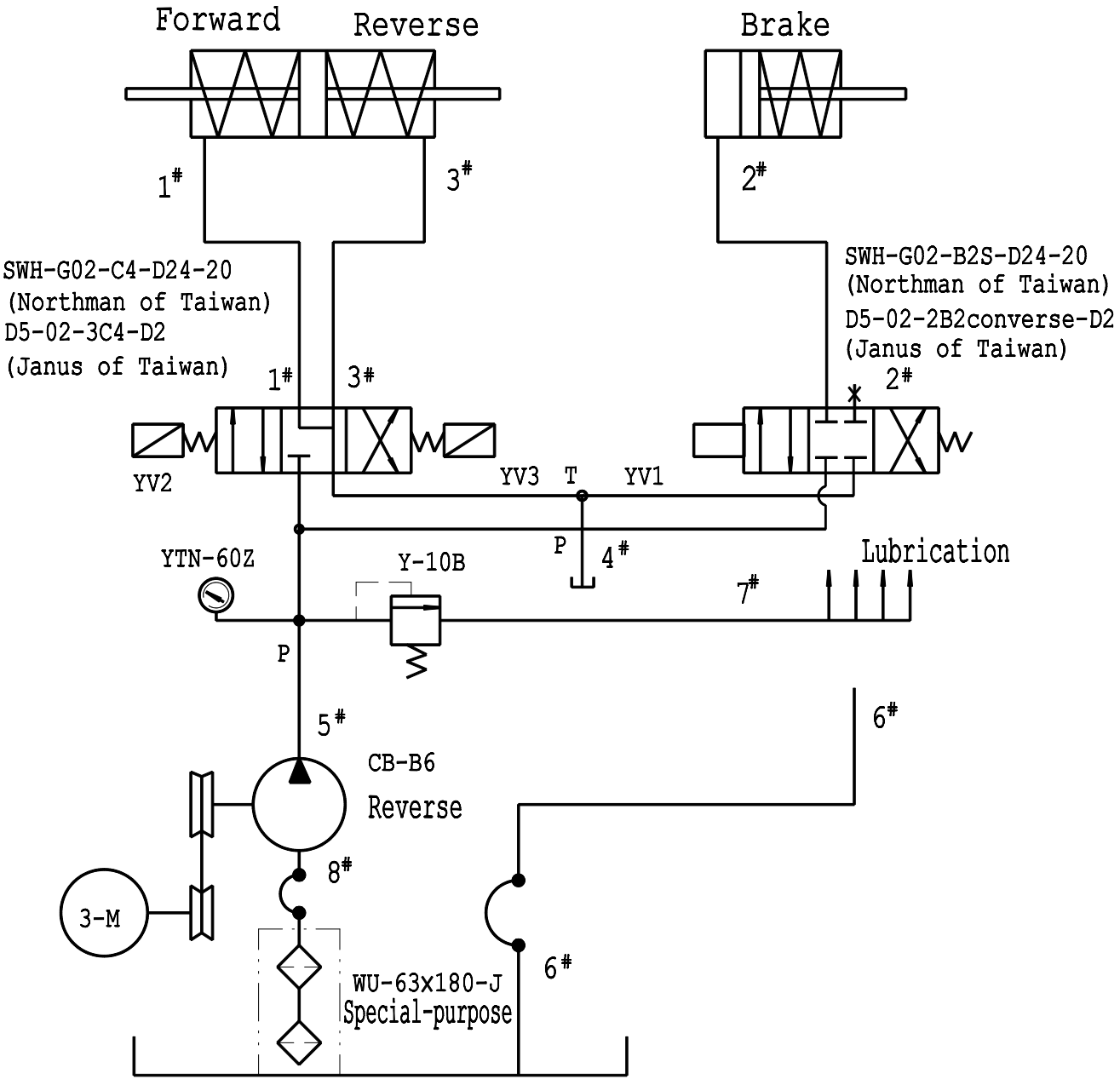


Fig. 14 Hydraulic principle diagram for the machine of 4m or more than 4m

6 DRIVING SYSTEM AND ARRAMGEMENT OF BEARING SIZES

6.1 Driving System Diagram for CW63B and CW93B

Refer to Fig. 15, please.

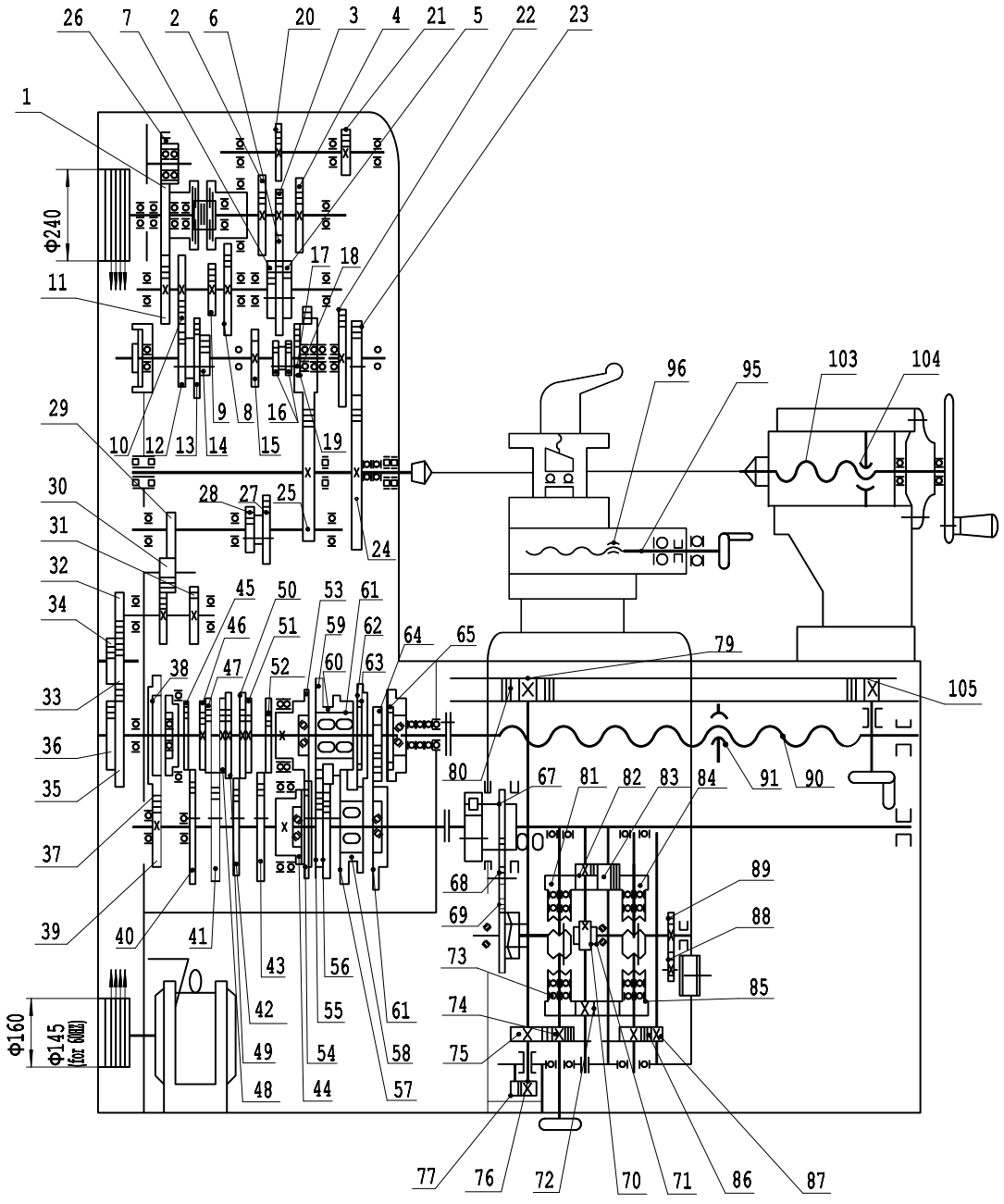


Fig. 15 Driving system diagram for CW63B series and CW93B series

6.2 Distributing Diagram of Speed for CW63B

Refer to Fig. 16, please.

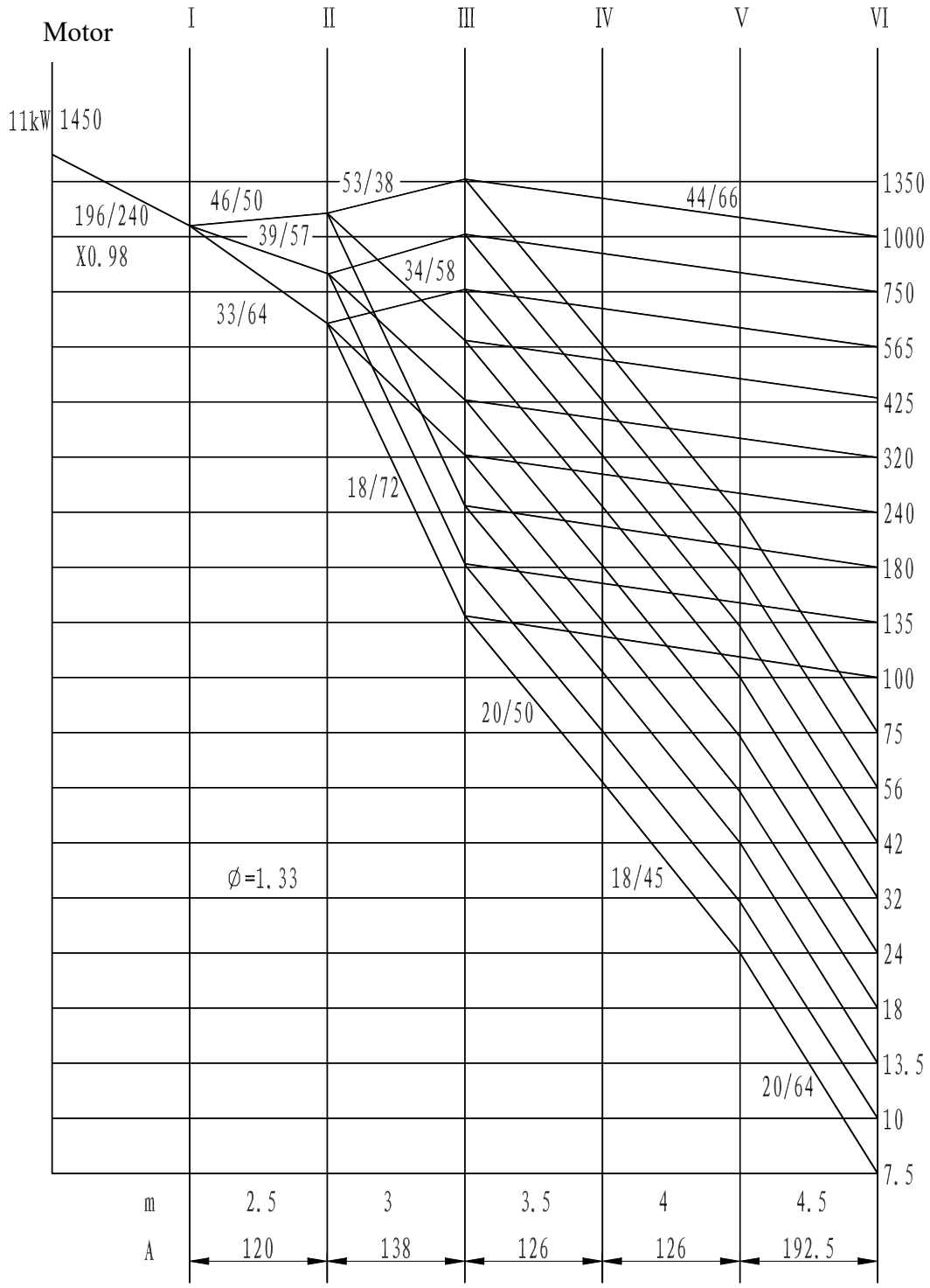


Fig. 16 Distributing diagram of speed for CW63B

6.3 Distributing Diagram of Speed for CW93B

Refer to Fig. 17, please.

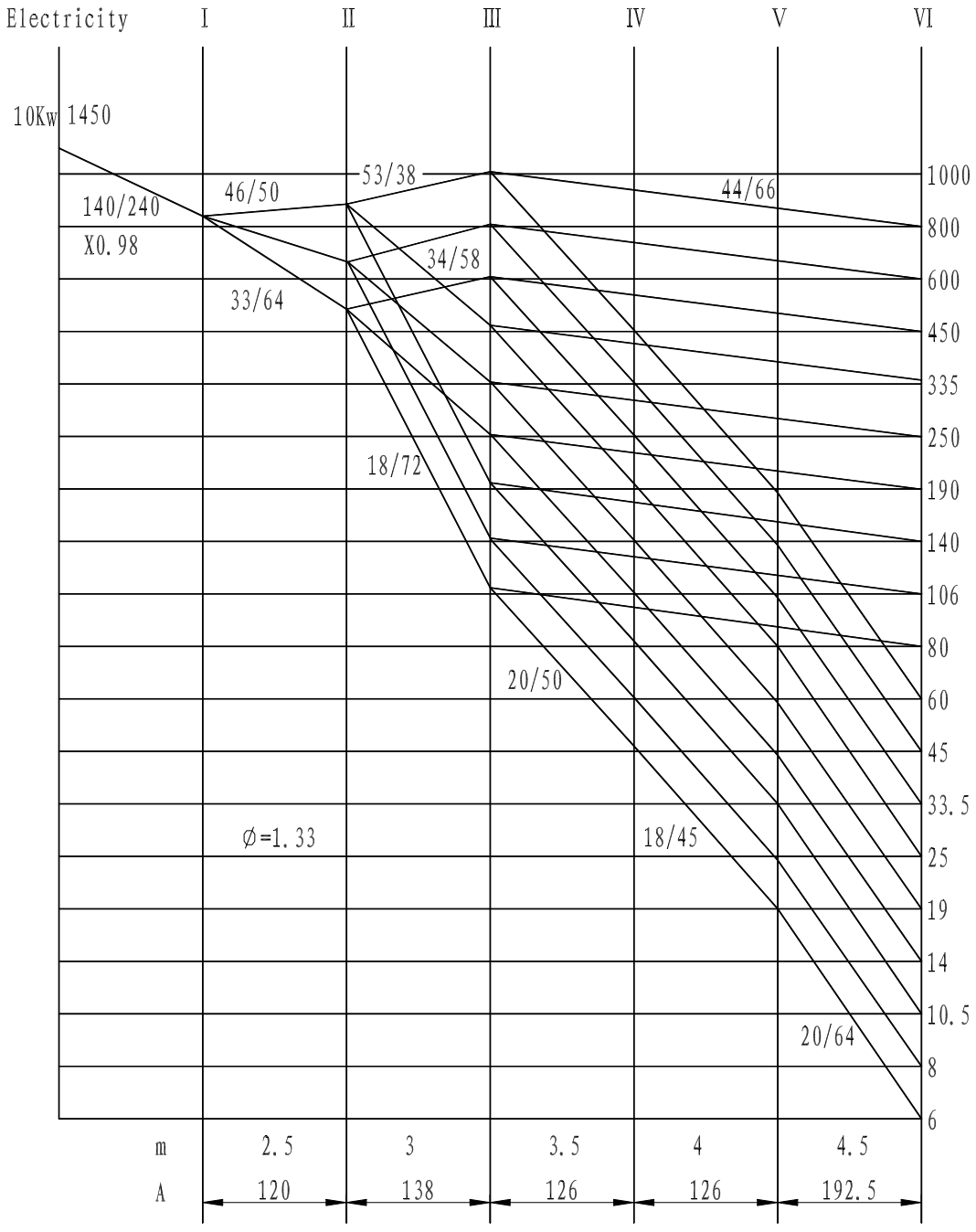


Fig. 17 Distributing diagram of speed for CW93B

6.4 List of Gears, Wormwheels, Leadscrews and Nuts for CW63B and CW93B

For CW63B and CW93B, please refer to Table 4.

Table 4

Components	Headstock								
No. in Fig.	1	2	3	4	5	6	7	8	9
No. of Teeth/Threads	46	46	33	39	57	64	50	53	18
Module/Pitch mm	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	3
Correction Coefficient and Helix Angle						ξ =0.47			ξ =0.7
No. in Fig.	10	11	12	13	14	15	16		17
No. of Teeth/Threads	34	49	58	72	38	44	20	28	28
Module/Pitch mm	3	2.5	3	3	3	3	3.5	2.5	2.5
Correction Coefficient and Helix Angle	ξ =0. 3	ξ =0. 3	ξ =0. 3	ξ =0. 38	ξ =0. 52		ξ =0. 7		
No. in Fig.	18	19	20	21	22	23	24	25	26
No. of Teeth/Threads	40	44	50	18	45	20	64	66	72
Module/Pitch mm	3	3.5	3.5	4	4	4.5	4.5	3.5	2.5
Correction Coefficient and Helix Angle			ξ =0.4			ξ =0.57 right 6°	Left 6°		
No. in Fig.	27	28	29	30	31				
No. of Teeth/Threads	48	44	28	24	35				
Module/Pitch mm	3	3	2.5	2.5	2.5				
Correction Coefficient and Helix Angle									
Components	Change gear box								
No. in Fig.	32	33	34	35	36				
No. of Teeth/Threads	42	66	57	42	32				
Module/Pitch mm	2.25	2.25	2.25	2.25	2.25				
Correction Coefficient and Helix Angle									

Components	Feed box								
No. in Fig.	37	38	39	40	41	42	43	44	45
No. of Teeth/Threads	40	36	27	24	36	36	48	32	28
Module/Pitch mm	2.25	2	2.5	3	2.25	2.5	2	3	3
Correction Coefficient and Helix Angle			ξ =0.7	ξ =1.17	ξ =0.2	ξ =0.3	ξ =0.1		ξ =1.3

Components	Feed box								
No. in Fig.	46	47	48	49	50	51	52	53	
No. of Teeth/Threads	30	39	36	30	33	36	32	40	
Module/Pitch mm	3	2.25	2.25	2.5	2.5	2	2	2	
Correction Coefficient and Helix Angle	ξ =-0.05	ξ =0.36	ξ =1.3	ξ =0.94	ξ =-0.5	ξ =-1	ξ =1.33		
No. in Fig.	55	56	57	58	59	60	61	62	63
No. of Teeth/Threads	28	42	56	28	56	42	28	38	56
Module/Pitch mm	2	2	2	2	2	2	2	2	2
Correction Coefficient and Helix Angle	ξ =0.3		ξ =0.3	ξ =0.3	ξ =0.3		ξ =0.3	ξ =0.3	ξ =-0.3
No. in Fig.	64	65	66						
No. of Teeth/Threads	27	27	57						
Module/Pitch mm	2	2	2						
Correction Coefficient and Helix Angle	ξ =0.3	ξ =0.3	ξ =-0.3						
Components	Apron								
No. in Fig.	67	68	69	70	71	72	73	74	75
No. of Teeth/Threads	25	22	30	3	30	36	34	15	62
Module/Pitch mm	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Correction Coefficient and Helix Angle				Right 8° 32′	Right 8° 32′			ξ =0.745	ξ =0.045
No. in Fig.	76	77	78	79	80		82	83	84
No. of Teeth/Threads	20	49		12	Rack		36	35	30

Module/Pitch mm	1.5	1.5		3	3		2.5	2.5	2.5
Correction Coefficient and Helix Angle				ξ =0.5					
No. in Fig.	85	86	87	88	89	90	91		
No. of Teeth/Threads	30	42	60	20	22	1	1		
Module/Pitch mm	2.5	2.5	2.5	2	2	12	12		
Correction Coefficient and Helix Angle									
Components	Carriage				Tailstock				
No. in Fig.	92	93	94	95	96				
No. of Teeth/Threads	16	1	1	1	1				
Module/Pitch mm	2.5	5	5	5	5				
Correction Coefficient and Helix Angle		Left	Left						
Components	Tailstock								
No. in Fig.			103	104	105				
No. of Teeth/Threads			1	1	12				
Module/Pitch mm			6	6	3				
Correction Coefficient and Helix Angle					ξ =0.294				

6.5 Arrangement of Roller Bearings of CW63B and CW93B

Refer to Fig. 18, please.

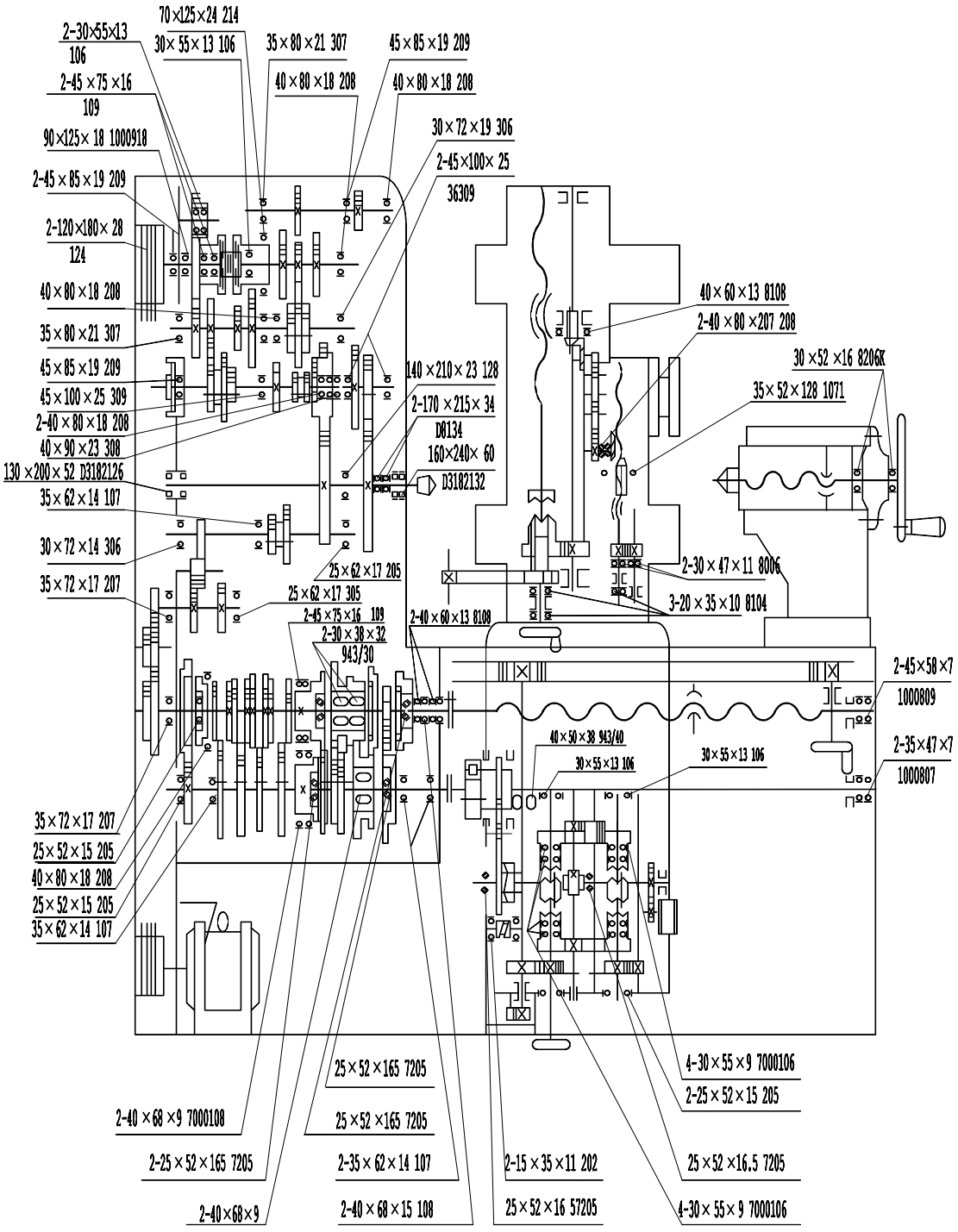


Fig. 18 Arrangement of rolling bearings for CW63B and CW93B

6.6 Driving System Diagram for CW63C, CW93C

Refer to Fig. 19, please.

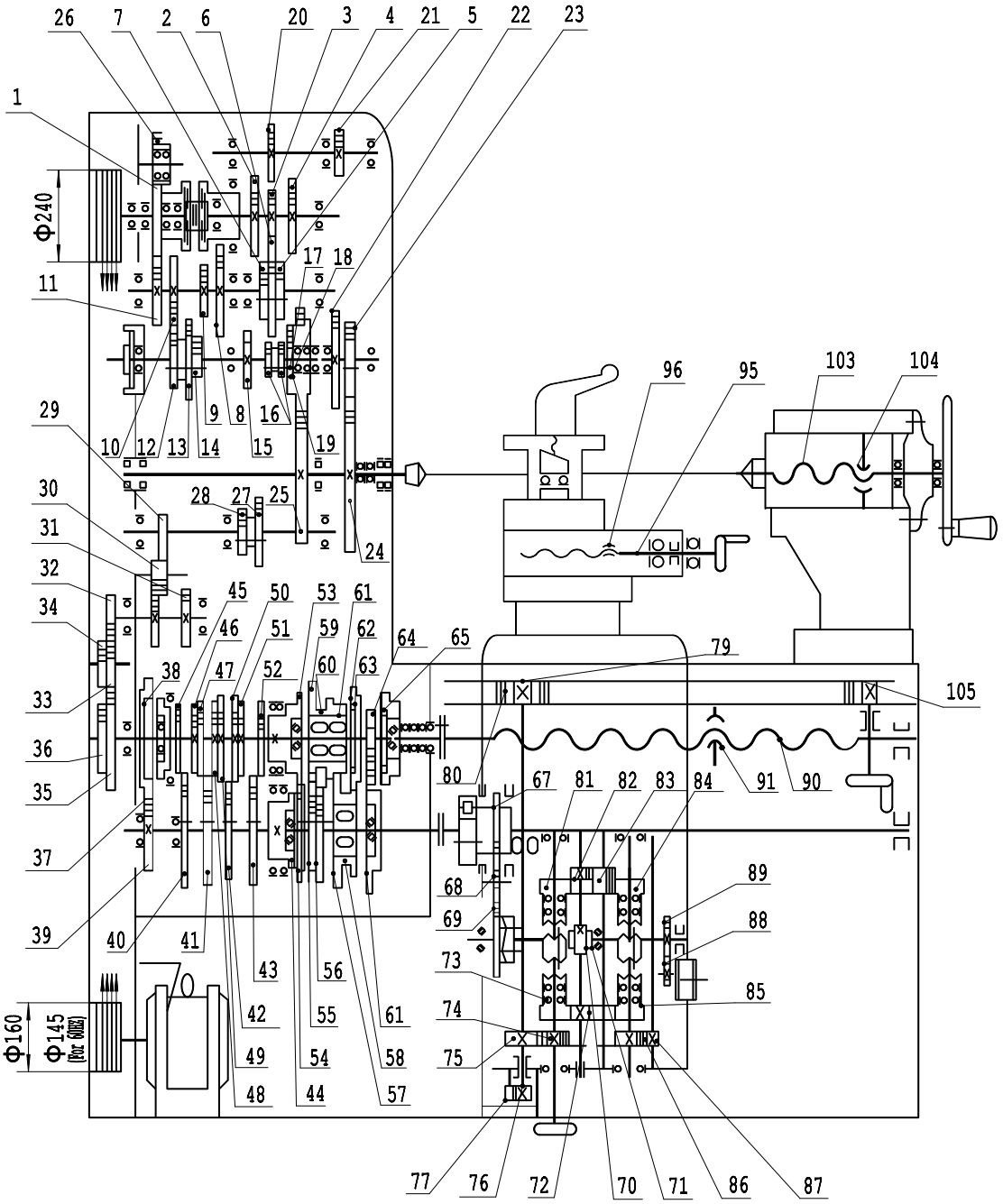


Fig. 19 Arrangement of rolling bearings for CW63C, CW93C

6.7 Distributing Diagram of Speed for CW63C

Refer to Fig. 20, please.

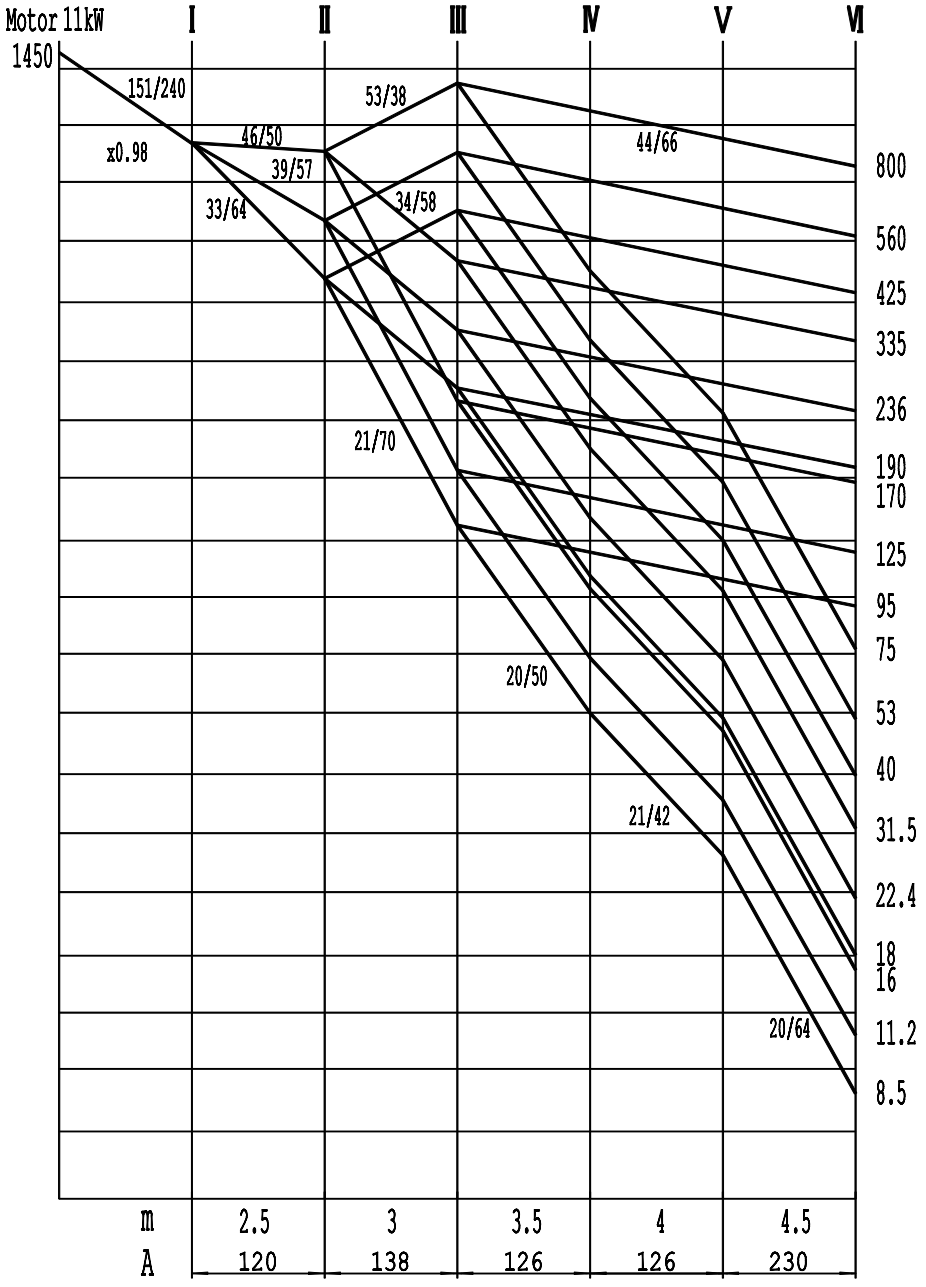


Fig. 20 Distributing Diagram of Speed for CW63C

6.8 Distributing Diagram of Speed for CW93C

Refer to Fig. 21, please.

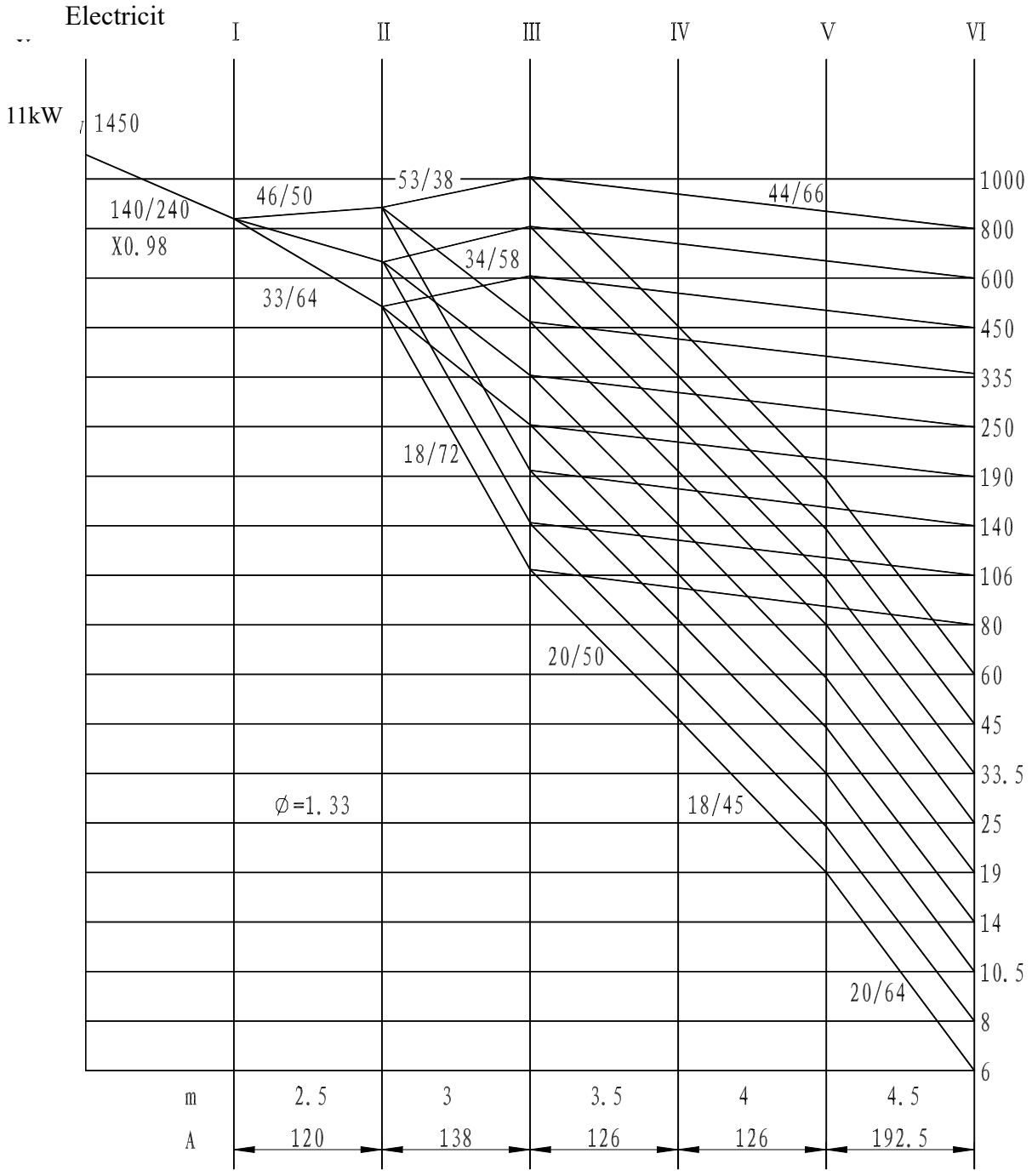


Fig. 21 Distributing Diagram of Speed for CW93C

6.9 List of Gears, Wormwheels, Leadscrews and Nuts for CW63C and CW93C

For CW63C and CW93C, please refer to Table 5.

Table 5

Components	Headstock								
No. in Fig.	1	2	3	4	5	6	7	8	9
No. of Teeth/Threads	46	47	33	39	57	64	49	53	21
Module/Pitch mm	2.5	2.5	2.5	2.5	2.5	2.5	2.5	3	3
Correction Coefficient and Helix Angle						ξ =0.47			ξ =0.7
No. in Fig.	10	11	12	13	14	15	16		17
No. of Teeth/Threads	34	49	58	70	38	65	20	28	28
Module/Pitch mm	3	2.5	3	3	3	2.25	3.5	2.5	2.5
Correction Coefficient and Helix Angle	ξ =0.3	ξ =0.3	ξ =0.3	ξ =0.38	ξ =0.52		ξ =0.7		
No. in Fig.	18	19	20	21	22	23	24	25	26
No. of Teeth/Threads	40	44	50	21	42	20	64	66	32
Module/Pitch mm	3	3.5	3.5	4	4	4.5	4.5	3.5	2.5
Correction Coefficient and Helix Angle			ξ =0.4		ξ =0.57 Right 6 °	Left 6 °			
No. in Fig.		28	29	30	31				
No. of Teeth/Threads		52	28	24	35				
Module/Pitch mm		2.25	2.5	2.5	2.5				
Correction Coefficient and Helix Angle									
Components	Change gear box								
No. in Fig.	32	33	34	35	36				
No. of Teeth/Threads	42	66	57	42	32				
Module/Pitch mm	2.25	2.25	2.25	2.25	2.25				

Correction Coefficient and Helix Angle									
Components	Feed box								
No. in Fig.	37	38	39	40	41	42	43	44	45
No. of Teeth/Threads	40	36	27	24	36	36	48	32	28
Module/Pitch mm	2.25	2	2.5	3	2.25	2.5	2	3	3
Correction Coefficient and Helix Angle			ξ =0.7	ξ =1.17	ξ =0.2	ξ =0.3	ξ =0.1		ξ =1.3
Components	Feed box								
No. in Fig.	46	47	48	49	50	51	52	53	
No. of Teeth/Threads	30	39	36	30	33	36	32	40	
Module/Pitch mm	3	2.25	2.25	2.5	2.5	2	2	2	
Correction Coefficient and Helix Angle	ξ =-0.05	ξ =0.36	ξ =1.3	ξ =0.94	ξ =-0.5	ξ =-1	ξ =1.33		
No. in Fig.	55	56	57	58	59	60	61	62	63
No. of Teeth/Threads	28	42	56	28	56	42	28	38	56
Module/Pitch mm	2	2	2	2	2	2	2	2	2
Correction Coefficient and Helix Angle	ξ =0.3		ξ =0.3	ξ =0.3	ξ =0.3		ξ =0.3	ξ =0.3	ξ =-0.3
No. in Fig.	64	65	66						
No. of Teeth/Threads	27	27	57						
Module/Pitch mm	2	2	2						
Correction Coefficient and Helix Angle	ξ =0.3	ξ =0.3	ξ =-0.3						
Components	Apron								
No. in Fig.	67	68	69	70	71	72	73	74	75
No. of Teeth/Threads	25	22	30	3	30	36	34	15	62
Module/Pitch mm	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Correction Coefficient and Helix Angle				Right 8°32 ´	Right 8°32 ´			ξ =0.745	ξ =0.045
No. in Fig.	76	77	78	79	80		82	83	84
No. of Teeth/Threads	20	49		12	Rack		36	35	30

Module/Pitch mm	1.5	1.5		3	3		2.5	2.5	2.5
Correction Coefficient and Helix Angle				ξ =0.5					
No. in Fig.	85	86	87	88	89	90	91		
No. of Teeth/Threads	30	42	60	20	22	1	1		
Module/Pitch mm	2.5	2.5	2.5	2	2	12	12		
Correction Coefficient and Helix Angle									
Components	Carriage				Tailstock				
No. in Fig.	92	93	94	95	96				
No. of Teeth/Threads	16	1	1	1	1				
Module/Pitch mm	2.5	5	5	5	5				
Correction Coefficient and Helix Angle		Left	Left						
Components	Tailstock								
No. in Fig.			103	104	105				
No. of Teeth/Threads			1	1	12				
Module/Pitch mm			6	6	3				
Correction Coefficient and Helix Angle					ξ =0.294				

6.10 Arrangement of Roller Bearings of CW63C and CW93C

Refer to Fig. 22, please.

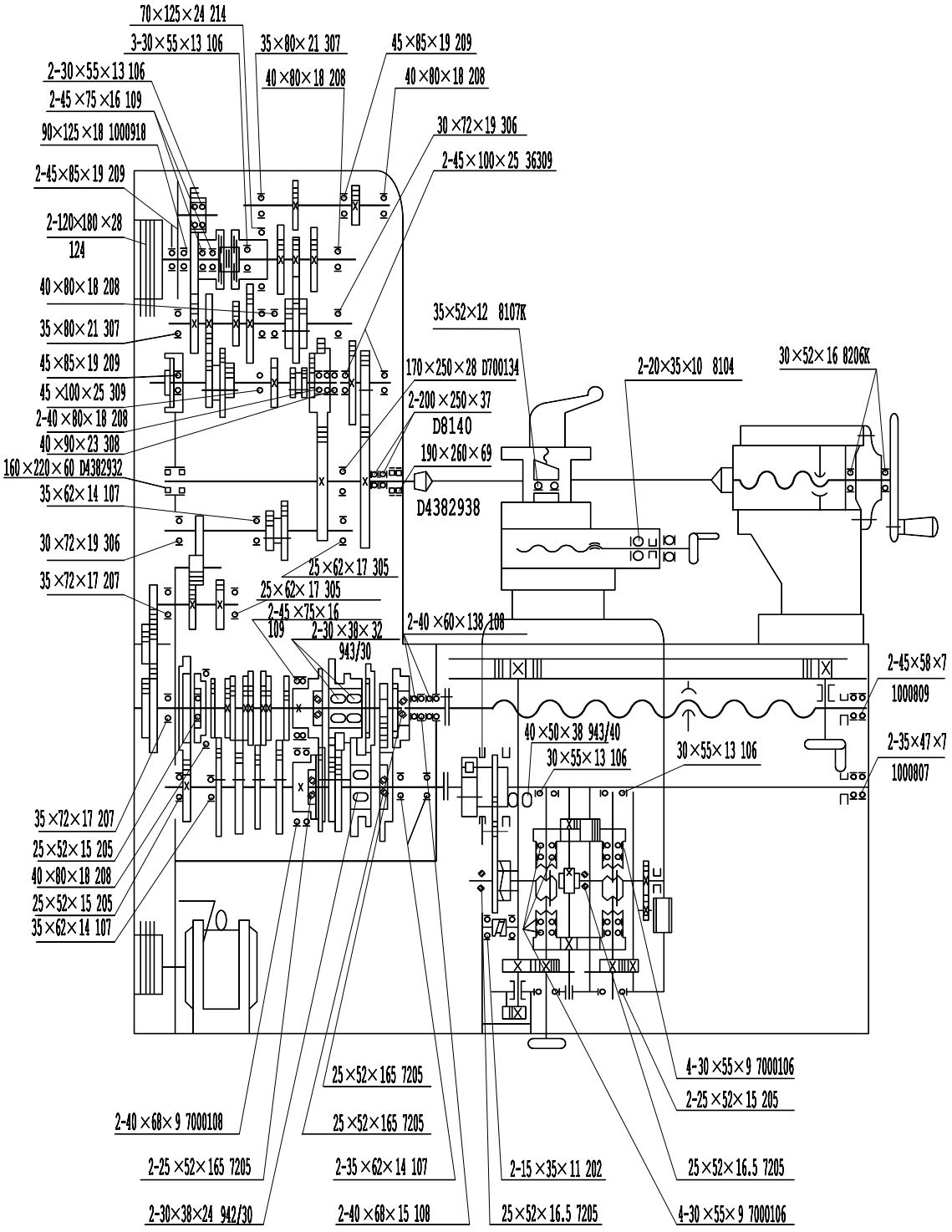


Fig. 22 Arrangement of Roller Bearings of CW63C and CW93C

7 CONTROL SYSTEM OF THE MACHINE

It is necessary for you to be acquainted with use of every handle/lever of it before starting the machine to avoid the machine to be damaged. It can be normally used only after completion of trial-run of the machine.

For the control system of the machine with hand-braking, refer to Fig. 23 and Table 6.

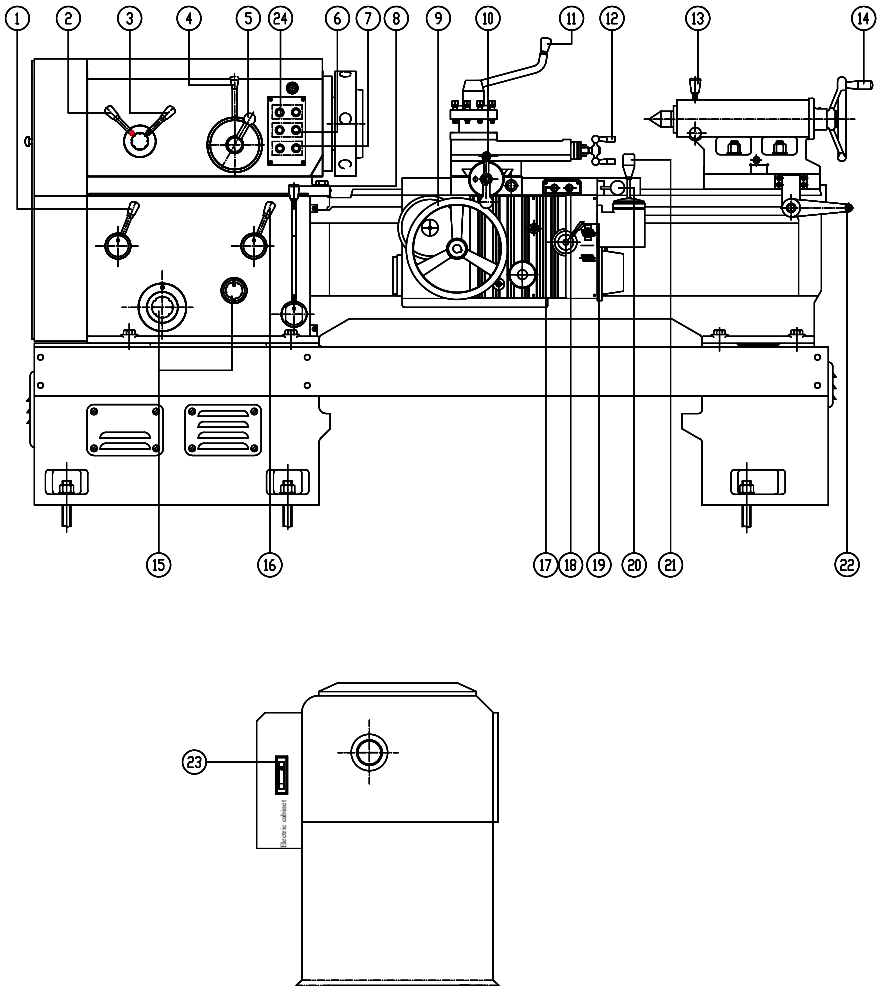


Fig. 23 Control levers of the machine with hand-braking

For the control system of the machine with foot-pedal braking, refer to Fig. 24 and Table 7.

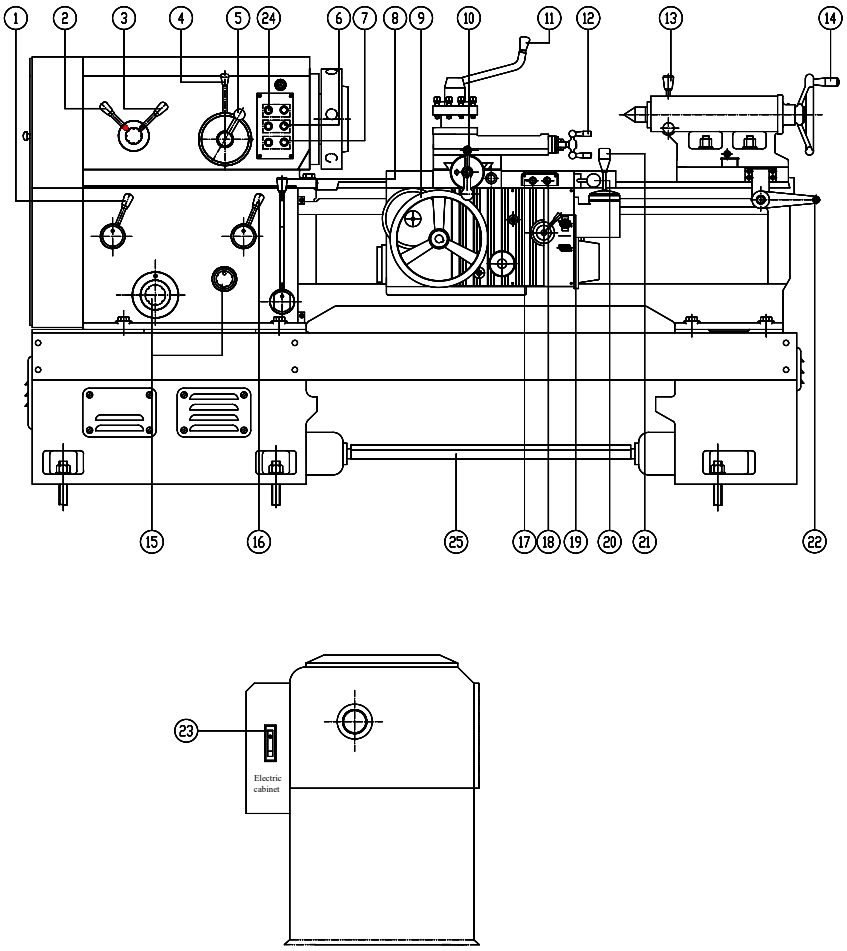


Fig. 24 Control levers of the machine with foot-pedal braking

Name of Control handles/Levels/Handwheels for the Machine with hand-braking.

Table 6

No. in Fig	Name and Use
1	Changing levers for changing speed of threads of Metric and Inch system
2、3	Changing lever for coarse pitch and L.&R. thread cutting
4、5	Changing lever for rapid speed/low speed of spindle
6	Start/Stop buttons for cooling system
7	Start push button for main drive motor and emergency stop button

8、20	Start/Stop buttons of spindle
9	Handwheel for longitudinal travel of carriage
10	Handle for traversing of cross slide
11	Indexing and fixing lever of square tool post
12	Handle for traveling of compound rest slide
13	Lever for fixing tailstock center sleeve
14	Lever for traveling of tailstock quill
15	Adjusting Handwheel for adjusting pitch and feed
16	Changing lever for leadscrew and feed rod
17	Emergency stop button
18	Start button of spindle
19	Control lever for split nut
21	Joystick lever with a push button for power longitudinal or cross feed and four-way traverse
22	Lever for tailstock movement
23	General Switch for power supply
24	Button for illuminating light and buzzer

Names of Control Handles/ Levers/ Buttons/ Handwheel for the Machine with Foot-pedal Braking

Table 7

No. in Fig	Name and Use
1	Changing levers for changing speed of threads of Metric and Inch system
2、3	Changing lever for coarse pitch and L.&R. thread cutting
4、5	Changing lever for rapid speed/low speed of spindle
6	Start/Stop buttons for cooling system

7	Start push button for main drive motor and emergency stop button
8、20	Start/Stop buttons of spindle
9	Handwheel for longitudinal travel of carriage
10	Handle for traversing of cross slide
11	Indexing and fixing lever of square tool post
12	Handle for traveling of compound rest slide
13	Lever for fixing tailstock center sleeve
14	Lever for traveling of tailstock quill
15	Adjusting Handwheel for adjusting pitch and feed
16	Changing lever for leadscrew and feed rod
17	Emergency stop button
18	Start button of spindle
19	Control lever for split nut
21	Joystick lever with a push button for power longitudinal or cross feed and four-way traverse
22	Lever for tailstock movement
23	General Switch for power supply
24	Button for illuminating light and buzzer
25	Foot-step plate

Note:

The tables 6 and 7 mentioned above are available for the machine of sizes of less than 3000mm and for the machines of sizes of more than 3000 mm, there are two control buttons instead of the control levers (8, 20) used for control of start and stop of spindle, used for control forward and reverse of the spindle, which are separately provided with on the spindle box and carriage. In general, the green button is start button and the red one stop button.

7.1 Definition of Operating Directions of Handles and Handwheel of the Machine

The relationship between the operating directions of the handwheel (9) for moving the carriage in longitudinal direction, the handwheel (10) for moving the cross slide in cross direction and the handle (12) 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 (see Fig. 24), the cross slide and the compound rest make straight movement far from operator (see Fig. 25)

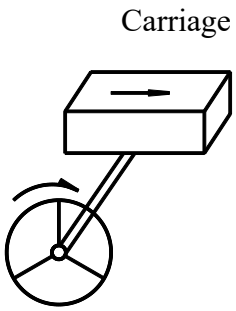


Fig. 25 Handwheel and moving directions of the carriage

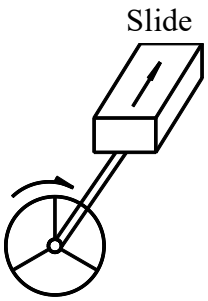


Fig. 26 Handwheels and moving directions of slides

For relationship between the operating directions of the handle (8, 20) for forward and reverse of spindle of the machine and running direction of the spindle, see Fig.26. The handle is lifted up, the spindle makes counter-clockwise rotating movement.

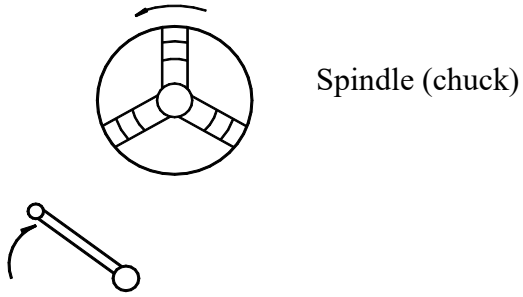


Fig. 27 Operating handle for forward and reverse of spindle and rotating direction of spindle

7.2 Operating Procedures of the Machine

7.2.1 Preparing Procedures

- Turn right the rotary switch (23) of general power supply to the position ON. Switch on the switch for illuminating light.
- Open the chuck cover before loading workpiece.
- Load the workpiece and clamp it firmly in chuck in a way in accordance with requirements of workpiece to be clamped.
- Select the tool, the material and parameters of which can be in accordance with requirements of the material of workpiece to be turned.
- Close the chuck cover and the protection cover of tool post before starting the machine.
- Using the handle (4, 5) 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 the handles (1, 15) on the changing box according to the Table of Threads and Feed can obtain proper feed.
- Using the automatically feed handle and the rapid traveling button (9, 10) for longitudinal/traverse feed of the slide makes it moving to position near the workpiece.

NOTE

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

7.2.2 Requirements of Loading and Clamping Workpiece

Different loading and clamping methods should be used owing to that shape, size and quality of workpiece to be machined are different.

- 3-jaw chuck is available to load/unload regular workpieces that belong to small and middle type size of large batch production. When you want to turn shaft workpiece, especially, more heavy 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.
- Workpiece with un-regular shape of larger size should be chucked in 4-jaw chuck or faceplate, and it is necessary to balance the workpiece, such as eccentric bush and crank shaft.
- Longer workpiece or workpiece which is completed for turning through many time leadings should be clamped between two centers, for example, turing long shaft

and long leadscrew or workpiece which needs processes and milling ands grounding after turning.

- Thin and longer shat workpiece (L/d≥25) should be turned in case of follow rest or steady rest used to increase rigidity of the workpiece.

WARN

- Workpiece to be turned and turning tool to be used must be firmly clamped to prevent it from throwing out to avoid personal injury.
- When positive jaws of 3-jaw chuck will be intended to clamp workpiece, the diameter of it should not be too large. In general case, the jaw's extending length out from the chuck circle should not exceed 1/3 of the jaw length, otherwise, the chuck's plane thread plate is easy to be broken off when the jaws are stressed. Workpiece with larger diameter should use counter-jaws to chuck it as far as possible.
- If long stick is installed to be turned, it shall not be extended exceeding the edge of the pulley cover.
- If a loaded workpiece with special shape possesses displaced bar center, it may be under unbalancing status when rotating. In this case, you first consider selecting balancing weight method to make it balancing. If difficult, you should take the measures like reducing speed, etc. to be sure safety.

7.2.3 Requirements from the Machine for Tool

Tool size: Tool size should suit the installation of tool post of the machine. turning tools to be used on the tool post should be 32 mm × 32 mm. And the tool tip of turning tool installed must be equal height with spindle center line.

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 larger impact performance, also often used as finishing turning tool, such larger feed turning tool with wide edge, finishing thread tool, forming turning tool, etc.

Geometric parameter of tool should suit the turning requirements.

7.2.4 Manual Feed

- Press the start buttons (7, 18) for main motor and shift the lever (8, 20) for changing forward/reverse of spindle to the forward, with the spindle staring.
- Shift the joystick lever (21) for longitudinal or cross feed of slide to the neutral

position in the cross-way groove manual controlling handwheel (9) for longitudinal travel of carriage and the handwheel (10) for traversing of cross slide and then, turning the handwheel (9) right and left and the handwheel (10) forwards and backwards, thus, longitudinal/traverse feed of slide can be realized.

- Manually control the handwheel (12) for controlling the movement of the compound rest slide, and according to the different angle shifted, obtaining longitudinal/transverse/diagonal feed is possible.
- 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 manual controlling the handwheel (14) for traveling of tailstock quill can manually perform drilling, augmenting (board) hole, reaming, tapping threads, etc.

7.2.5 Automatic Feed

Press the start button (7, 18) for main motor, then, shift the changing forward/reverse levers (8, 20) for spindle to forward, with spindle running.

- Manual controlling the handwheel (9) for longitudinal travel of carriage and the handle (10) for traveling of cross slide can modify the distance between the tool and the workpiece to select suitable feed depth.
- 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 (21) 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 immediately to shift the lever for automatic feed of the carriage in longitudinal/traverse direction to the neutral position and then press the emergency stop button (17) and turn the rotary switch (23) to the position OFF to switch off the general power supply.

7.2.6 Threads Cutting

There are two kinds of methods for cutting threads.

7.2.6.1 No Opening the Split Nut

Shift the control lever (19) for split nut to the position engaging with leadscrew, to cutting 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.

7.2.6.2 Opening Split Nut

After shifting the control lever (19) 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 (19) 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 lever (2, 3) on the headstock to select L&R threads or coarse pitch threads and then, select suitable spindle speed by the levers (4, 5).
- Shift the lever (1) and the lever (15) 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 gear box.
- Move the carriage to the position of threads to be cut by the lever (10), then, shift the lever (21) to the neutral position in the cross-way groove.
- Press the start button (18) for main motor, then, shift the lever (20) 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 (9) and the handle (10), then make the tool moving for a certain distance away in longitudinal direction to select suitable feed depth.
- After the lever (19) for split nut is shifted to the position engaging with the leadscrew, turning can be carried out in any way given by “5.2.7 and 5.2.8”.

NOTE

When the machine with hand-braking is used to cut threads, the control lever is not allowed to shift it directly from forward to reverse, it is necessary to shift it to the neutral braking position and make it stay for about two seconds, then, to the reverse position. This operating method is benefit for increasing service life of the machine.

7.2.7 Operation of Spindle Stop

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 hand-braking: the lever for forward/reverse of spindle is shifted to the stop position, the spindle stops running.

For the machine with foot-pedal braking: step the foot-pedal brake, the spindle stops running. If needing to restart the spindle, it is necessary to return the lever for forward/ reverse of spindle to the stop position, re-shift it forward or reversely, the spindle can be re-started.

NOTE

After stepping the foot-pedal brake, in order to work conveniently, return the lever for forward/reverse of spindle to the stop position.

7.2.8 Operation of Machine Stop

- Move the carriage to position near the end of tailstock by means of the automatic lever for longitudinal/traverse feed and traversely to the position close to the end of the lever (10).
- Shift the lever for forward/reverse of spindle to the neutral position.
- Press the stop button (17) to stop the main motor.
- If coolant is used, switch off the switch (6) for cooling pump.
- Switch off the switch for illuminating light.
- Turn the general switch (23) to the position “OFF”.

7.3 Re-start after Power-off and Emergency Stop of the Machine

7.3.1 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, then, shift the lever (8, 20) for forward/reverse of spindle to the middle position. When power-on, turn the switch of the general power supply right to the Position ON, following, push the start button (19) of the main motor, then, shift the lever (8, 20) to forward position or reverse position to start the spindle.

7.3.2 Re-start after Emergency Stop

When there is trouble with the machine or the machine is under critical status, push the E-stop button (17 or 7). If you want to re-start the machine, first of all, reset the E.-stop button, following, shift the lever (8, 20) for forward/reverse of the spindle to the middle position, then, push the start button (18) for the main motor , shift the lever (8, 20) to forward position or reverse position to start the spindle.

7.4 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.

7.5 Cleaning of Chips

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

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

8 SETTING UP OF THE MACHINE

According to the construction of feed system, the machine can be divided into two kinds: Metric Lathe and Inch Lathes.

8.1 Characteristic Table for Power Vs Torque of Spindle

8.1.1 Characteristic Table for Power Vs Torque of Spindle for CW63B Series

Table 8

<table>
<tr><th colspan="7">Setting up of the Machine</th></tr>
<tr><td colspan="2">Spindle Speed（r/min）</td><td rowspan="2">Driving Efficiency</td><td colspan="2">Working Ability of Spindle</td><td rowspan="2">Weakest part</td><td rowspan="2">Coarse pitch</td></tr>
<tr><td>Forward</td><td>Reverse</td><td>Output Power（kW）</td><td>Max. Torque（N • m）</td></tr>
<tr><td>1000</td><td rowspan="3">1020</td><td rowspan="6">0.83</td><td rowspan="15">9.1</td><td>96</td><td rowspan="15">Friction clutch</td><td rowspan="12">Without</td></tr>
<tr><td>700</td><td>127</td></tr>
<tr><td>565</td><td>170</td></tr>
<tr><td>425</td><td rowspan="3">433</td><td>228</td></tr>
<tr><td>320</td><td>304</td></tr>
<tr><td>240</td><td>402</td></tr>
<tr><td>180</td><td rowspan="3">183</td><td rowspan="3"></td><td>529</td></tr>
<tr><td>135</td><td>706</td></tr>
<tr><td>100</td><td>956</td></tr>
<tr><td>75</td><td rowspan="3">76</td><td rowspan="9">0.78</td><td rowspan="5">8.5</td><td>1245</td><td rowspan="4">16 times</td></tr>
<tr><td>56</td><td>1666</td></tr>
<tr><td>42</td><td>2234</td></tr>
<tr><td>32</td><td rowspan="3">32</td><td rowspan="6">2979</td><td rowspan="6"></td></tr>
<tr><td>24</td><td>6</td></tr>
<tr><td>18</td><td>4.5</td></tr>
<tr><td>13.5</td><td rowspan="3">14</td><td>3.4</td></tr>
<tr><td>10</td><td>2.5</td></tr>
<tr><td>7.5</td><td>1.9</td></tr>
</table>

8.1.2 Characteristic Table for Power Vs Torque of Spindle for CW93C Series Series

Table 9

Setting up of the Machine						
Spindle Speed（r/min）		Driving Efficiency	Working Ability of Spindle		Weakest part	Coarse pitch
Forward	Reverse		Output Power（kW）	Max. Torque（N・m）		
800	812	0.83	9.13	111	Friction clutch	Without
600				148		
450				198		
335	342			265		
250				356		
190				468		
140	145			635		
106				839		
80				1112		
60	61	0.78	8.58	1939		16 times
45				1857		
33.5				2459		
25	26			3320		
19			8.4			
14			6.1			
10.5	11		4.6			
8			3.5			
6			2.6			

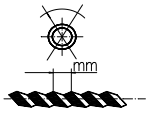
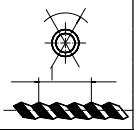
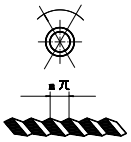
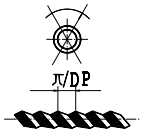
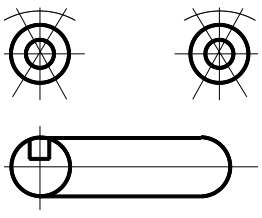
8.1.3 Characteristic Table for Power Vs Torque of Spindle for CW63C Series

Table 10

Setting up of the Machine						
Spindle Speed（r/min）		Driving Efficiency	Working Ability of Spindle		Weakest part	Coarse pitch
Forward	Reverse		Output Power（kW）	Max. Torque（N • m）		
800	816	0.83	9.1	110	Friction clutch	Without
560				155		
425				205		
335	346			262		
236				370		
190				463		
170	146.4			517		
125				704		
95				926		
75	60.8	0.78	8.5	1110		16 times
53				1575		
40				2089		
31.5	25.5		6	2795		
22.4						
18			4.5			
16	11.2		3.4			
11.2			2.5			
8.5			1.9			

8.2 Table of Feed Amount and Threads for CW63 Series and CW93 Series Series Machines of Metric System

Table 11

Thread or feed rate			I	II	III	IV	I	II	III	IV
Metric thread mm		1	1	2	4	8	16	32	64	128
		2			4.5	9	18	36	72	144
		3	1.25	2.5	5	10	20	40	80	160
		4			5.5	11	22	44	88	176
		5	1.5	3	6	12	24	48	96	192
		6								
		7	1.75	3.5	7	14	28	56	112	224
		8			7.5	15	30	60	120	240
Inch thread t.p.i		1	8	4	2	1				
		2	9	4 1/2	2 1/4	1 1/8				
		3	10	5	2 1/2	1 1/4				
		4	11	5 1/2	2 3/4	1 3/8				
		5	12	6	3	1 1/2				
		6			3 1/4	1 5/8				
		7	14	7	3 1/2	1 3/4				
Module thread m		1	0.5	1	2	4	8	16	32	64
		2			2.25	4.5	9	18	36	72
		3		1.25	2.5	5	10	20	40	80
		4			2.75	5.5	11	22	44	88
		5		1.5	3	6	12	24	48	
		6			3.25	6.5	13	26	52	104
		7		1.75	3.5	7	14	28	56	112
		8			3.75	7.5	15	30	60	120
Diametral pitch thread DP		1	16	8	4	2	1			
		2	18	9	4 1/2	2 1/4				
		3	20	10	5	2 1/2	1 1/4			
		4								
		5	24	12	6	3	1 1/2			
		6								
		7	28	14	7	3 1/2	1 3/4			
Longitu -dinal feed rate mm/r		1	0.1	0.2	0.4	0.8	1.6	3.20	6.40	12.8
		2	0.11	0.22	0.45	0.9	1.8	3.60	7.20	14.4
		3	0.13	0.26	0.52	1.04	2.08	4.16	8.30	16.6
		4	0.14	0.28	0.58	1.12	2.24	4.48	9.00	18.0
		5	0.15	0.30	0.60	1.20	2.40	4.80	9.60	19.2
		6	0.17	0.34	0.68	1.36	2.72	5.44	10.9	21.8
		7	0.18	0.36	0.72	1.44	2.88	5.76	11.5	23.0
		8	0.19	0.38	0.76	1.52	3.04	6.08	12.16	24.32

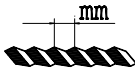
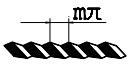
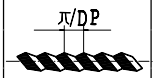
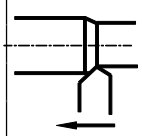
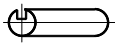
Note: 1.Cross feed of the cross slide is equal to 1/2 of feed rate of carriage and feed rate of the compound slide rest is equal to 1/4 of feed rate of carriage.

2. 0.5 times fine feed rate can be obtained with change gears.

3. Inch thread of 19 t.p.i can be obtained with change gears.

8.3 Table of Feed Amount and Threads for CW63 Series and CW93 Series Series Machines of Inch System

Table 12

Thread or feed rate				1:1				16:1			
				I	II	III	IV	I	II	III	IV
Metric threads mm			1	1	2	4	8	16	32	64	128
			2			4.5	9	18	36	72	144
			3	1.25	2.5	5	10	20	40	80	160
			4			5.5	11	22	44	88	176
			5	1.5	3	6	12	24	48	96	192
			6								
			7	1.75	3.5	7	14	28	56	112	224
			8			7.5	15	30	60	120	240
Inch threads t.p.i			1	8	4	2	1				
			2	9	4 1/2	2 1/4	1 1/8				
			3	10	5	2 1/2	1 1/4				
			4	11	5 1/2	2 3/4	1 3/8				
			5	12	6	3	1 1/2				
			6			3 1/4	1 5/8				
			7	14	7	3 1/2	1 3/4				
			8								
Module threads mm			1	0.5	1	2	4	8	16	32	64
			2			2.25	4.5	9	18	36	72
			3		1.25	2.5	5	10	20	40	80
			4			2.75	5.5	11	22	44	88
			5		1.5	3	6	12	24	48	96
			6			3.25	6.5	13	26	52	104
			7		1.75	3.5	7	14	28	56	112
			8			3.75	7.5	15	30	60	120
Dia -metral threads DP			1	16	8	4	2	1			
			2	18	9	4 1/2	2 1/4				
			3	20	10	5	2 1/2	1 1/4			
			4								
			5	24	12	6	3	1 1/2			
			6								
			7	28	14	7	3 1/2	1 3/4			
			8								
Longi -tudinal feed rate 1 " /r			1	0.00375	0.0075	0.015	0.03	0.06	0.12	0.24	0.48
			2	0.00425	0.0085	0.017	0.034	0.068	0.136	0.272	0.544
			3	0.00475	0.0095	0.019	0.038	0.076	0.152	0.304	0.608
			4	0.00525	0.0105	0.021	0.042	0.084	0.168	0.336	0.672
			5	0.00575	0.0115	0.023	0.046	0.092	0.184	0.368	0.736
			6	0.00625	0.0125	0.025	0.05	0.1	0.2	0.4	0.8
			7	0.00675	0.0135	0.027	0.054	0.108	0.216	0.432	0.864
			8	0.00725	0.0145	0.029	0.058	0.116	0.232	0.464	0.928

Note: 1. Cross feed of the cross slide is equal to 1/2 of feed rate of carriage.

2. 0.5 times fine feed rate can be obtained with change gears.

3. Inch thread of 19 t.p.i can be obtained with change gears.

8.4 Setting Up of Feed System for the Machines of CW63 Series

8.4.1 Setting Up of Feed System for the Metric Machines of CW63 Series

8.4.1.1 Ordering of Change Gears

By arrangement of levers on the headstock and feed box, various feed and threads listed in the table can be cut directly, as shown by Fig. 28. Only module threads and diametral pitch threads need change gear for ordering. For the form of the threads after ordering by change gears, please refer to Fig. 29.

For cutting metric and inch threads

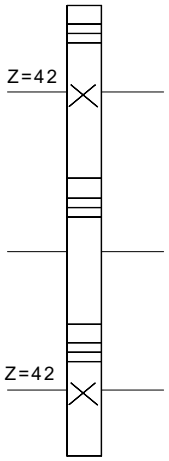


Fig. 28

For cutting module and diametral pitch threads

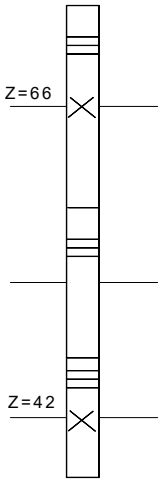


Fig. 29

8.4.1.2 Normal Setting Formulas for Various Threads

For cutting various threads, they can be calculated according to the following formulas:

For cutting Metric threads: $j=\frac{Z\times t}{I\times T}$

For cutting Module threads: $j=\frac{I\times T}{Z\times m}$

For cutting Inch threads: $j=\frac{Z\times 25.4}{I\times T\times N}$

Where :
J:change gear ratio
I: feed box gear ratio
T: pitch of leadscrew（12mm）
t: pitch of workpiece mm
Z: number of threads to be cut
m: Module mm
N: t.p.i of workpiece
P: diametral pitch of workpiece

For cutting Diametral threads: $j=\dfrac{Z\times 25.4}{I\times T\times P}$

8.4.1.3 For Cutting Special Threads by Means of Change Gears

For cutting special pitch and higher precision threads, it is necessary to use change gears to cut them by shifting the lever or the handwheel to the position “pitch 12 mm” thus the gear ratio of feed box is i=1.

Change gear ratio is calculated by the following formula: $J=\dfrac{Z\times T}{12}$

8.4.1.4 For Cutting Inch Threads of 19 t.p.i

Turn the control lever and handwheel on feed box to the position “14 t.p.i” and set change gear as shown in Fig. 29 to turn threads of 19 t.p.i.

8.4.1.5 Realization of Fine Feeds

If required feed rates are finer than that listed on the feed chart, it is necessary to set the change gear as shown by following figures, and fine feed obtained is equal to 0.5 time of the standard feed (Fig.31).

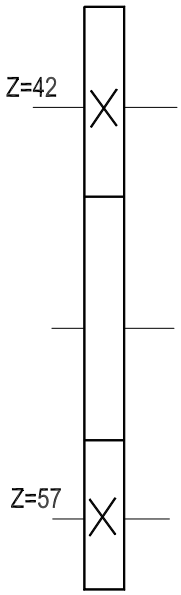


Fig.30

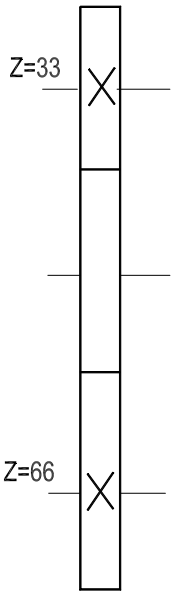


Fig.31

8.4.1.6 For Broaching Oil Groove or Keyways with Carriage

By shifting the spindle speed change lever to the neutral position to make the spindle stop and the coarse pitch lever is shifted to the position “16:1”, the reciprocal movement of carriage can be obtained.

8.4.2 Setting Up of Feed System for the Inch Machines of CW63 Series

8.4.2.1 Ordering of Change Gears

By arrangement of levers on the headstock and feed box, various feed and threads

listed in the table can be cut directly, as shown by Fig.32. Only module threads and diametral pitch threads need change gear for ordering. For the form of the threads after ordering by change gears, please refer to Fig.33.

For cutting metric and inch threads

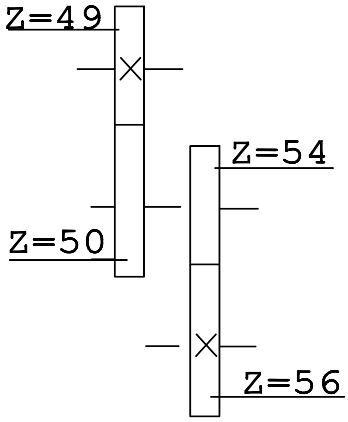


Fig. 32

For cutting module and diametral pitch threads

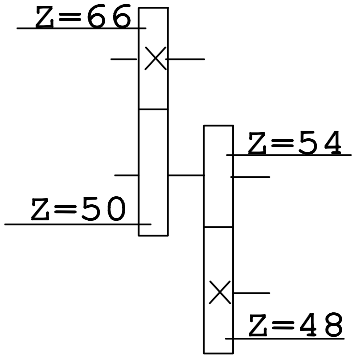


Fig. 33

8.4.2.2 For Cutting Inch Threads of 11.5 t.p.i

Turn the control lever and handwheel on feed box to the position “11.5 t.p.i” and set change gear as shown in Fig. 34 to turn threads of 11.5 t.p.i..

8.4.2.3 For Cutting Inch Threads of 19 t.p.i

Turn the control lever and handwheel on feed box to the position “14 t.p.i” and set change gear as shown in Fig. 35 to turn threads of 19 t.p.i.

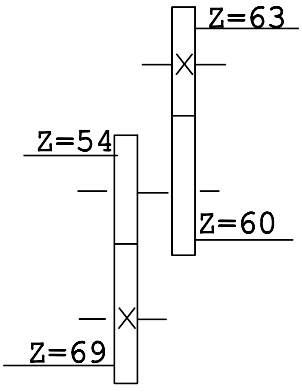


Fig. 34

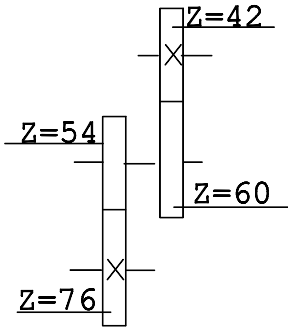


Fig. 35

8.4.2.4 For Cutting Inch Threads of 27 t.p.i

Turn the control lever and handwheel on feed box to the position “27 t.p.i” and set change gear as shown in Fig. 36, to turn threads of 27 t.p.i.

8.4.2.5 Realization of Fine Feed

As shown by following figures, fine feed obtained is equal to 0.5 time of the standard feed (Fig.37). Turn the control lever and handwheel on feed box to the position “8 t.p.i, 9 t.p.i., 10 t.p.i., 11 t.p.i., 12 t.p.i., 13 t.p.i., 14 t.p.i., ” and set change gear as shown in Fig. 36 to turn threads of “16 t.p.i, 18 t.p.i., 20 t.p.i., 22 t.p.i., 24 t.p.i., 26 t.p.i., 28 t.p.i. ”

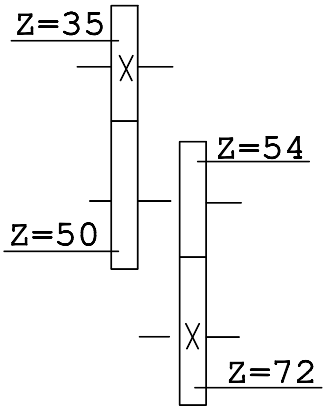


Fig. 36

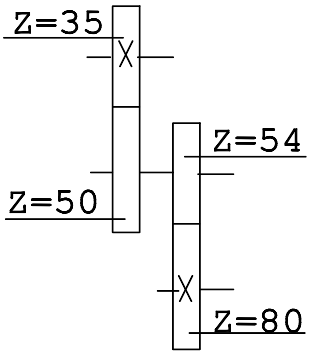


Fig.37

8.5 Setting Up of Feed System for the Machines of CW93 Series

8.5.1 Setting Up of Feed System for the Metric Machines of CW93 Series

8.5.1.1 Ordering of Change Gears

By arrangement of levers on the headstock and feed box, various feed and threads listed in the table can be cut directly, as shown by Fig.38. Only module threads and diametral pitch threads need a change gear for ordering, and please refer to Fig.39.

For cutting metric and inch threads

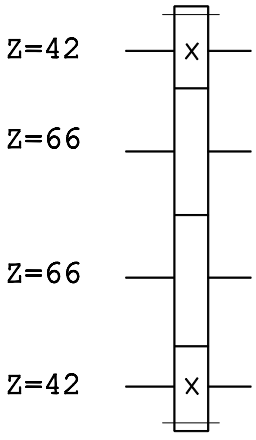


Fig. 38

For cutting module and diametral pitch threads

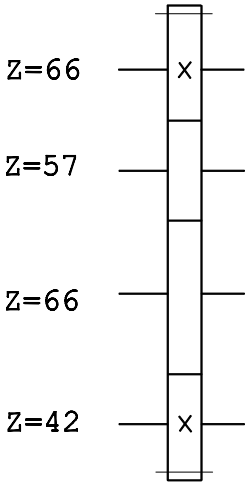


Fig. 39

8.5.1.2 Normal Setting Formulas for Various Threads

For cutting various threads, they can be calculated according to the following formulas:

For cutting Metric threads: $j=\frac{Z\times t}{I\times T}$

For cutting Module threads: $j=\frac{Z\times m\times \pi}{I\times T}$

For cutting Inch threads: $j=\frac{Z\times 25.4}{I\times T\times N}$

For cutting Diametral threads: $j=\frac{I\times T\times P}{Z\times 25.4\times \pi}$

Where :
J:change gear ratio
I: feed box gear ratio
T: pitch of leadscrew（12mm）
t: pitch of workpiece mm
Z: number of threads to be cut
m: Module mm
N: t.p.i of workpiece
P: diametral pitch of workpiece

8.5.1.3 For Cutting Special Threads by Means of Change Gears

For cutting special pitch and higher precision threads, it is necessary to use change gears to cut them by shifting the lever or the handwheel to the position “pitch 12 mm” thus the gear ratio of feed box is i=1.

Change gear ratio is calculated by the following formula: $J=\frac{Z\times T}{12}$

8.5.1.4 For Cutting Inch Threads of 19 t.p.i

Turn the control lever and handwheel on feed box to the position “14 t.p.i” and set change gear as shown in Fig. 39.

8.5.1.5 Realization of Fine Feeds

If required feed rates are finer than that listed on the feed chart, it is necessary to set the change gear as shown by following figures, and fine feed obtained is equal to 0.5 time of the standard feed (Fig.41).

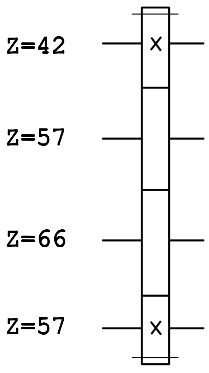


Fig. 40

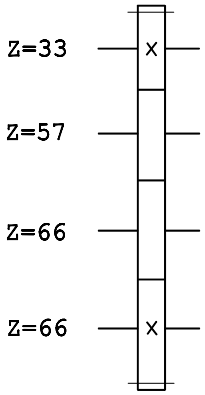


Fig. 41

8.5.1.6 For Broaching Oil Groove or Keyways with Carriage

By shifting the spindle speed change lever to the neutral position to make the spindle stop and the coarse pitch lever is shifted to the position “16:1”, the reciprocal movement of carriage can be obtained.

9 ADJUSTMENT OF THE MACHINE

9.1 Adjustment of the Spindle Bearings

The spindle structure for the machines of CW63 Series and CW93 Series adopts rolling-bearing construction.

The nut 1 is used to adjuste the axial clearance between the two thrust bearings, nut 2 to adjust the radial cleanrance of the double-row cylinder bearings and nut 3 to adjust clarance of double-row cylinder bearings at the rear supporting point and the axial clearance of the spindle. Please refer to Fig. 44.

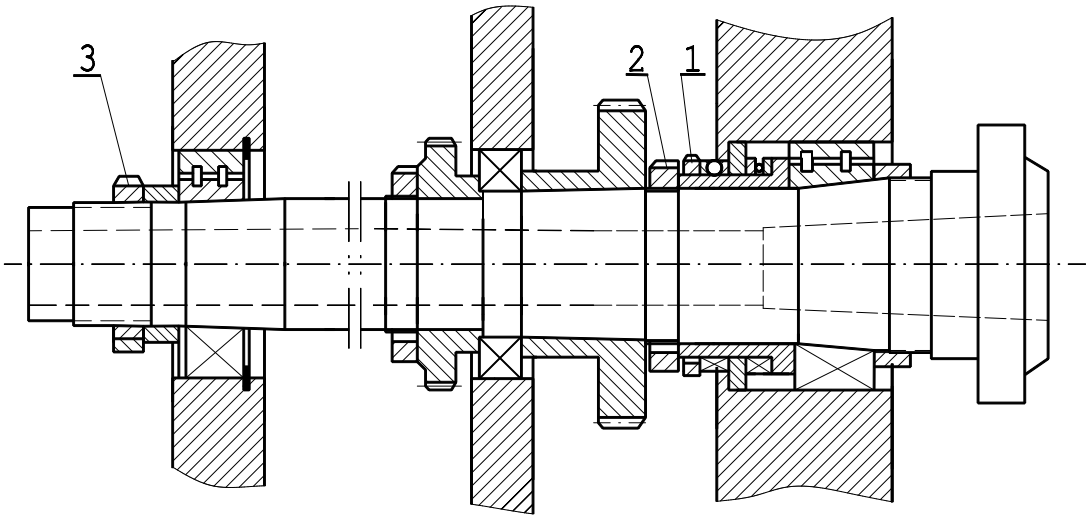


Fig. 44 Spindle structure

9.2 Adjustment of Safety Device in the Apron.

The single direction over-run clutch that consists of gear 6, start-shape part 7 and roller 8 located at the left of the apron is provided to prevent simultaneous engagement of the feed motion and the rapid traverse motion as well as rotating at high speed of the feed rod during rapid traverse(see section E-E in figure below). A safe device of preventing from over-load, which is mounted on the worm shaft 5 which consists of spiral double claw type end face clutch (2, 3)and sausage spring group (4). In normal working condition, the motion from feed rod is transmitted to the worm shaft (5) through the clutch. In the case of overload of the feed system, the clutch is unengaged, the motion of the apron is under longitudinal slippage.

The tension of the spring had been well adjusted in our shop before dispatch, so it is unnecessary for you to adjust it, otherwise, safety of the spring may be failed. If you find that the torque driven by the clutch is really not enough to drive the worm during working, the tension can be adjusted by nut 1, as shown by Fig. 45.

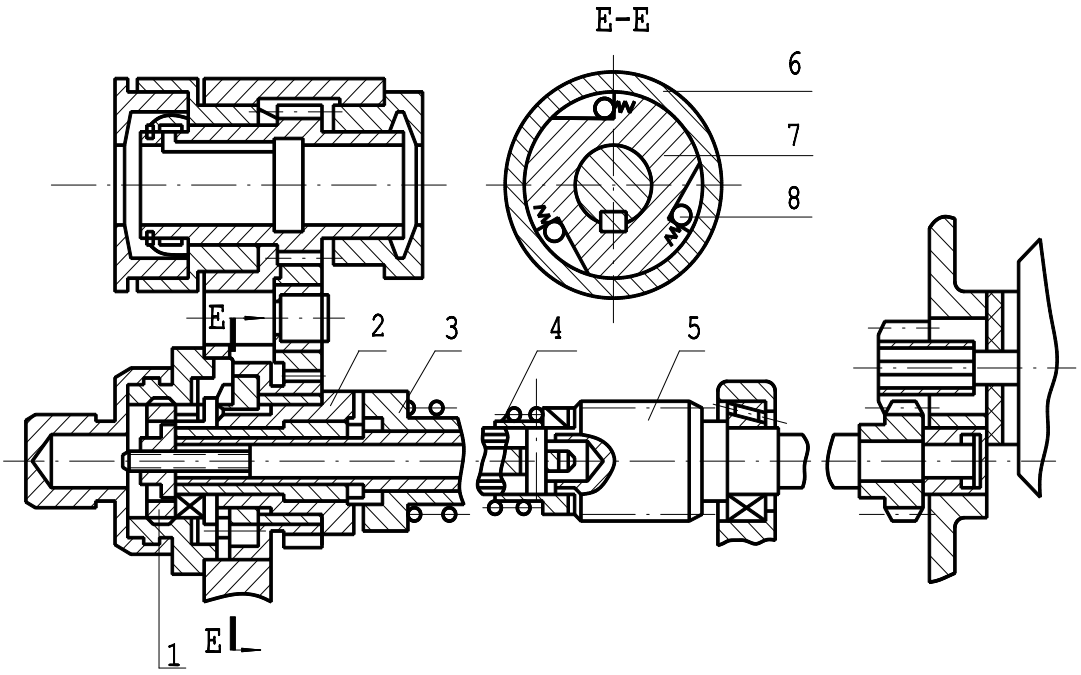


Fig. 45 Safety device in the apron

No. in Fig. 44	Name	No. in Fig. 44	Name
1	Nut	5	Worm shaft
2	Coupling	6	Gear
3	Coupling	7	Star-shape part
4	Spring	8	Roller

9.3 Adjustment of the Backlash between the Cross Slide Leadscrew and Nut

The nut of the cross slide is open type. When the leadscrew and the nut are possible to slipping due to wearout, tighten the adjusting nut of screw to make the nut get elastic deformation to obtain proper play. Refer to Fig. 46, please.

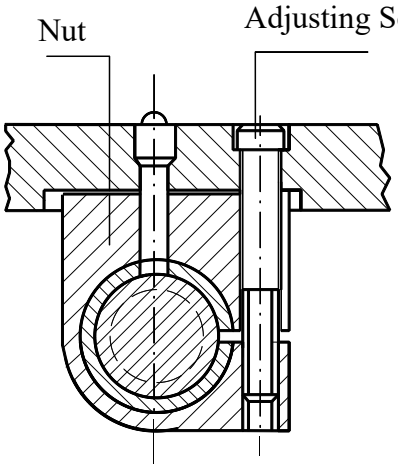


Fig. 46 Adjustment of Leadscrew for Carriage

9.4 Adjustment for Taper Attachment

In case the sliding members of the taper attachment is loose, adjusting the adjustable screws 1 and 2 to properly tighten the gibs to prevent the play between sliding members. In the case of looseness of cross fed screw, properly tighten the nut 3 mounted on the screw to eliminate play between the screw and cross slide 4, as shown by Fig. 47.

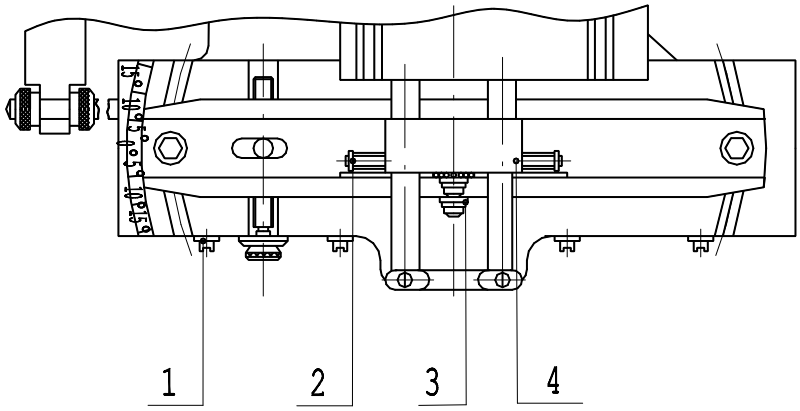


Fig. 47 Adjustment of taper attachment

10 MAINTENANCE AND LUBRICATING OF THE MACHINE

10.1 Maintenance of the Machine

When using this machine it is necessary to pay attention to following requirements:

- The oil level in all oil tanks shall always be maintained on the center of oil leveler, otherwise the machine may be damaged due to ineffective lubrication or overheating.
- All oiling points shall be filled with pure oil on time.
- Frequently inspect the oil flow through sight grass ensuring proper lubrication of the headstock and feedbox.
- Check and adjust the tension of V-belts of the motor at regular intervals.
- That start the spindle at once is not allowed after start the main motor every time. It is necessary for you to wait for the time only when the lubricating pump works normally and there is oil-flow through the oil window, thus, you are allowed to start the spindle to let the machine work.
- With the spindle running at high speed, the changing speed handle is not absolutely allowed to be shifted 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 1 for lubricating guide way every shift for ensuring adequate lubricating when the carriage moving. For practical lubricating method, refer to “ Lubrication of the Machine”.
- If you want to stop the machine while the spindle is running, shift the handle to the stop position and stop the spindle by means of braking device.

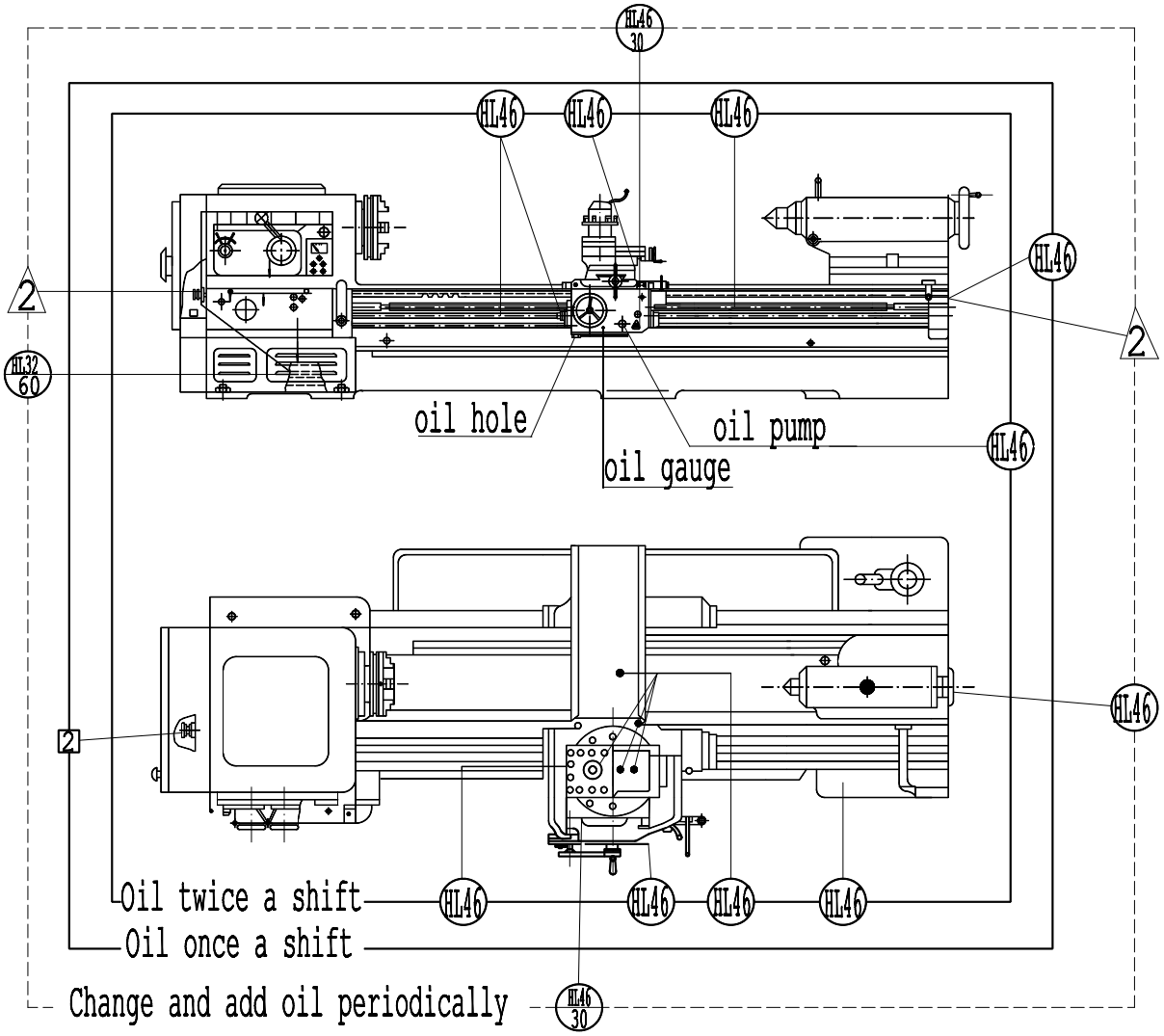
It is absolutely forbidden to use controlling reverse running of the spindle to break the machine. If needing reverse running of the spindle, first, stop the spindle, then, start reverse running of the spindle.

10.2 Lubrication of the Machine

All friction surfaces 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. The operator should know the distribution of all lubricating points, the trade mark of lubricants, the lubricating cycle, the lubricating manner, etc.

For the distribution of lubricating points, brand of lubricating grease and lubricating period, refer to Fig. 48. The corresponding lubricating points are marked on the machine.

10.3 Lubrication of the Machine



HL46	HL46	2	Calcium grease No.2, turn it once every shift	——	Oilling location by operator
2	Comon lithium grease No. 2, renewed once every three years			- - -	Oilling location by lubricator
HL32 60	Hydraulic oil HL32/lubricating intervals(days)for work in two-shift.				

Fig. 48 Lubrication chart of the machine

11 USE AND CLEANING OF CUTTING FLUID

11.1 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 clean and firm.

11.2 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.

NOTE

Pouring cutting fluid over the coolant pump is absolutely forbidden to prevent the motor from being burnt.

11.3 Usage of Cutting Fluid

11.3.1 Application of Cutting Fluid

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

11.3.2 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.

11.3.3 Selection and Technical Specifications 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 13 and Table 14.

Specifications of Castrol Cutting Fluid Table 13

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

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

Table of Specifications of Compound Cutting Fluid Table14

Item		Specifications				Test Method
		Ⅰ (Common Type)	Ⅱ (Antirust Type）	Ⅲ(Extreme pressure Type)	Ⅳ (Multiefficiency Type）	
Appearance of enriched products		Liquid state：No layer or precipitation, showing even liquid status. Past state: No foreign matter separated out and showing even past status. Solid state：Even powder which has no indurate block and easy to dissolve in water.				
Dilute Liquid	Penetrability	Vitreous or semi-vitreous				GB/T6144 -1985
	PH value	8~10				
	Foam performance mL/10min	<2				
	Corrosion test	Cast iron：No rust, shine is like mew. Red copper, aluminum：No rust, no colour changing				

Item	Specifications				Test Method
	Ⅰ (Common Type)	Ⅱ (Antirust Type）	Ⅲ(Extreme pressure Type)	Ⅳ (Multiefficiency Type）	
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 of ferrous metals, copper, aluminum, etc.	

Flammable or baneful cutting fluid is forbidden to be used.

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

11.4.1 Adding of Cutting Fluid

If following cases occur, you should change or add cutting fluid in time during the period of cutting fluid being used.

11.4.2 Changing of Cutting Fluid

During the period of cutting fluid being used, operator can judge whether the cutting fluid exceeds the time limit of quality guarantee through observing whether the cutting fluid has layer(s), peculiar sell, etc. and if the phenomenon mentioned above occur, it is necessary to change cutting fluids in time. General the quality guarantee period is 2~3 months, for details, please refer to the Technical Materials of Cutting Fluids.

11.4.3 Changing Cycle of Cutting Fluid

The quantity of cutting fluid poured every time can be used for two months according to calculation of work for eight hours every day. 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.

11.4.4 Changing Methods of Cutting Fluid

NOTE

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

Changing methods of cutting fluid are as follows:

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

11.5 Cleaning Method and Matters Needing Attention to Cooling System

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

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

- Push back the coolant tank to the specified position in the rear guard.
- Connect the aero-plug of the coolant tank with the power supply line.

NOTE

(1) When dismount the aero-plug of power supply of the coolant pump, do not exert too strong force to prevent the aero-plug from being damaged.

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

12 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 prolong service life and increasing productivity of the machine.

12.1 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 should cooperate. While checking, it is necessary to switch off the power supply at first. For the check items, please refer to Table 15.

Table 15

No.	Checked Position	Checked Items
1	Electrical system	Check whether the emergency stop button is sensitive and reliable or not. Check whether the motor is normal running or not, and is there any unnormal temperature raising? Check whether the electric wire and the cable are damaged or not. Check whether the travel switches, buttons function normally or not, and their action is reliable or not.
2	Control system	Check whether every control handle/lever and button is reliable or not. Check whether the clearance of change gears and shaft bush are loose or not.
3	Cooling and lubricating systems	Check whether cutting fluid and lubricating oil has been in accordance with requirements or not. Check whether the liquid levels in the oil tank and the cutting fluid tank has been in accordance with the requirements or not. Check whether every lubricating point has been reasonably lubricated or not. Check whether cutting fluid has been obviously polluted or not and whether the quality of the lubricating oil is up to the standard. Check whether the chip-scraper has been damaged or not.

No.	Checked Position	Checked Items
4	Safety guards	Check whether the limit position device of apron, the protection cover of chuck and the chip guard can normally function or not.
5	Motor device	Check whether tension of the belts of motor has been proper or not, and is there any cracks, whether the pulley can normally run or not.
6	Front chip guard screen	Check whether the screen is so dirty that a decline in visibility is resulted in.

12.2 Periodic Inspection

After the machine has been working for a certain time, 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 to guarantee the accuracy of the machine, in general case, operator of the machine should take charge of this job by remedial instruction of inspector and maintainer.

The maintaining cycle of the machine can be determined according to the Table 16, or do centralized maintenance for the machine after it has been used for 500 hours.

For the inspection and maintenance of the machine, please refer to Table 16.

Table 16

No.	Checked Object	Inspection and Maintenance	Period
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 (manual, foot-pedal braking).	Three months
3	Cooling system	Clean the chip pan. Change the cutting fluid. Clean the filtering net and the water tank.	Do it 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 iron chip in oil hole, oil rope and the oil felt or not. Check the oiliness.	One year

No.	Checked Object	Inspection and Maintenance	Period
5	Safety protection	Check whether the safety device are reliable and adjust the over-load safety clutch.	Six months
6	V-belts	Appearance check: Tension and looseness. Clean the puley.	Six months
7	Miscellaneous	For the change gears, it is necessary to check whether shaft sleeve is shaken or not, and adjust the clearance of the gears. Adjust the friction discs and the 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 polluted by besmirch to affect observing workpiece being turned. If affecting, the besmirch should be lightly cleaned with soft dishcloth with abluent, then, cleaned out with clean dishcloth.	1 month
Note: Unless otherwise specified, the time interval is determined on the basis of two-shift work.			

12.3 Overhauling of the Machine

The machine should be overhauled once for five years on the basis of two-shift work 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 accuracies and level the leveling of the machine according to the TEST CERTIFICATE.

13 COMMON TROUBLES AND TROUBLE-SHOOTING

Refer to Table 17, please.

Table 17

Trouble Phenomenon	Cause Analysis	Trouble-shooting and Remedy	Remarks
The motor does not rotate when the button is pressed.	1) The general switch of power supply is not switched on.	Switch on the power supply.	
	2) Touching of the start button is not good.	Check the terminal of the start button.	
The spindle does not stop running as soon as possible after the machine stops.	1) The friction clutch is adjusted too tightening.	Re-adjust or change the friction discs.	
	2) The brake is too loosening or the braking band has been worn.	Re-adjust the brake or change the braking band.	
There is no oil flowing in the oil window of headstock.	1) The oil level in the headstock has been too low.	Add oil up to the oil level.	
	2) There is air in the pump body in the pipeline due to not good sealing interface.	Pour oil in the pump body and seal every interface well.	
There is taper with cut threads.	The tool is bad in rigidity, lower-position in installation or the tool edge is too blunt.	Extend the diameter of the tool rod properly. Tip of the tool is higher than the centerline. Thin 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 loosening.	Screw in the adjusting nut of un-engaging worm.	
	2) The positioning spring of automatic feed handle is loosening.	Tighten the spring.	
Spindle speed is reducing or automatically stop of the machine	1) The friction clutch has been adjusted too loosen or it has been worn.	Adjust the friction clutch, thin or change the friction discs.	

Trouble Phenomenon	Cause Analysis	Trouble-shooting and Remedy	Remarks
when heavy-cutting.	2) The transmitting belts of the motor is too loosen or too worn.	Adjust the transmitting belts properly or change the transmitting belts which are worn too much.	
There is deforming during the period of turning the screw of the thin long screw rod with 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 lower when finishing.	
	3) Feed amount is too large.	The feed amount be selected within range of 0.05-0.1 mm.	
The cylindricity of the workpiece to be turned is oversize.	The level of installation of the machine bed is bad.	Adjust the level of machine bed according to Test Certificate.	
There is vibration in machine groove and there is ripple on the workpiece to be turned.	The clearance between the carriage and the bed is too large.	Adjust the clearance of the front compressed plate and the rear compressed plate.	
	Radial run-out of spindle is too large.	Adjust the pre-tightening force of spindle bearing.	
The loading of the tool for the compound rest is inaccurate.	The clearance between compound rest and the middle of the carriage	Adjust the screws of gib for compound rest.	
The loading of the tool for the big leadscrew is inaccurate.	The clearance between slide and carriage is too large.	Adjust the screws of slide for compound rest.	
The amount of indexing of hollow travel for leadscrew is tool large. The operating force of leadscrew handle is too large.	The clearance between leadscrew and nuts is too large.	Adjust the nuts. (Refer to 9.3 Adjustment of the Machine)	
There is taper when machining the workpiece with tailstock.	The axis of centers of the spindle and the tailstock is not parallel with guideway of machine bed.	Adjust the adjusting screws at the two end of the tailstock, release one screw and then adjust the other one.	

Trouble Phenomenon	**Cause Analysis**	**Trouble-shooting and Remedy**	**Remarks**
The handle of split nut is loose or tight.	The gib of apron is loose or tight.	Adjust the adjusting screws of gib of apron.	
The noise is too big at change gear.	The clearance among the gears of change gear is not proper.	Adjust the engaging clearance of change gear.	
Vibration of main motor	The screws for fixing the main motor are loose.	Tighten the screws of main motor.	
The hum is too big at change gear.	The belt is loose.	Adjust the tension for V-belt.	
Vibrating caused by the imbalance of the spindle	There is imbalance of the spindle owing to the fact that the assembling accessories for the spindle are not balancing or unbalancing after workpiece is clamped.	Adoption of bob-weight or change of the clamping condition can eliminate the vibration	
Note: 1. It is necessary for specialized people to perform maintenance for serious trouble in the headstock while opening the headstock is required, and the other personnel are not allowed to open the headstock for repair without permission. 2. Do trial running again after the troubles related to safety performance is remedied.			

14 WEARING PARTS

14.1 Table of Wearing Parts

Table 18

Part No.	Fig. No.	Part Name	Material	Heat Treatment	Qty.	Weight per piece (kg)	Remarks
16C04017	49	Leadscrew	Y40Mn		1	0.88	Special for metric machine
16C04018	50	Nut	HT200		1	0.5	
16C04031	51	Gib of carringe	HT150		1	0.8	
M16×70 GB83-76	52	Screw	45	C35 HY	12		
16C05050	53	Leadscrew	Y40Mn	D	1	2.8	Special for metric machine
16C05051	54	Nut			1	2.25	
16C05038	55	Guideway plate	TSF		1		
16C05036	56	Guideway plate	TSF		1		
16C05042	57	Gib	HT150		1	1.6	
16C06012	58	Worm wheel	HT100		1	1.2	
16C06020	59	Split nut			1	2	Special for metric machine
16C06025	60	Bush	MITI		1	0.13	
16C06135	61	Gear			1	0.24	
16C02204	62	Braking disc	Braking band of asbestos resin		14	0.052	
16C02025	63	Friction disc	15	S0.5-C59	15	0.16	
16C02024	64	Friction disc	15	S0.5-C59	2		
16C08H01	65	Gear	Cloth phenolics plate		1	0.33	
16C08H02	66	Gear	Cloth phenolics plate		1	0.23	
16C04042	67	Leadscrew of carriage	Y40Mn		1	0.89	Special for Inch machine
16C04041	68	Nut	HT200		1	0.5	
16C05060	69	Leadscrew	Y40Mn		1	2.8	

Part No.	Fig. No.	Part Name	Material	Heat Treatment	Qty.	Weight per piece (kg)	Remarks
16C06170	70	Split nut			1	1.6	
16C05061	71	Nut			1	2.25	
16C63015	72	Bevel gear	ZQSn6-6-3		1	0.09	
19Q05002	73	Leadscrew	Y40Mn	D	1	2.8	Special for metric machine
19Q05003	74	Nut			1	2.25	

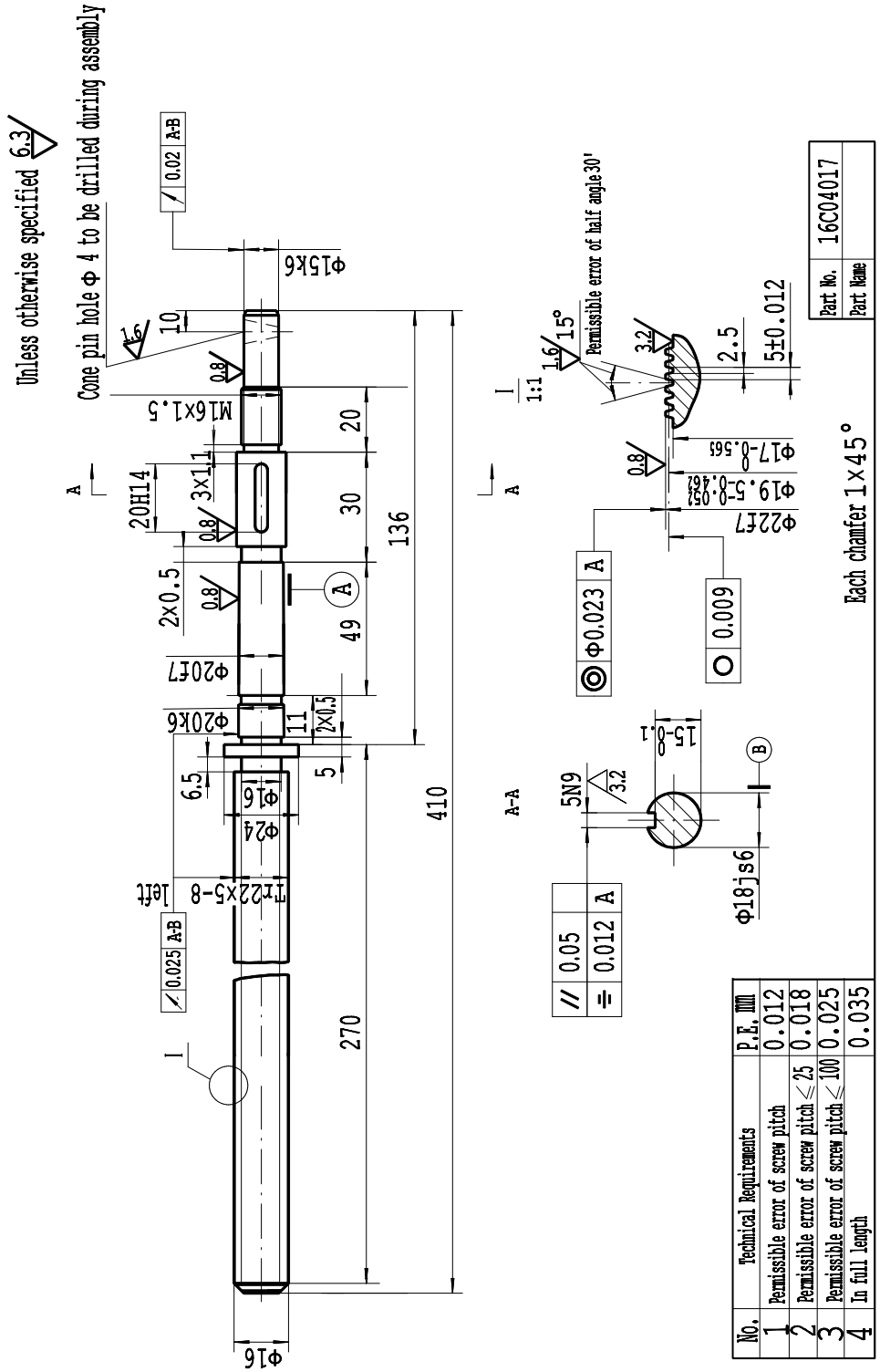
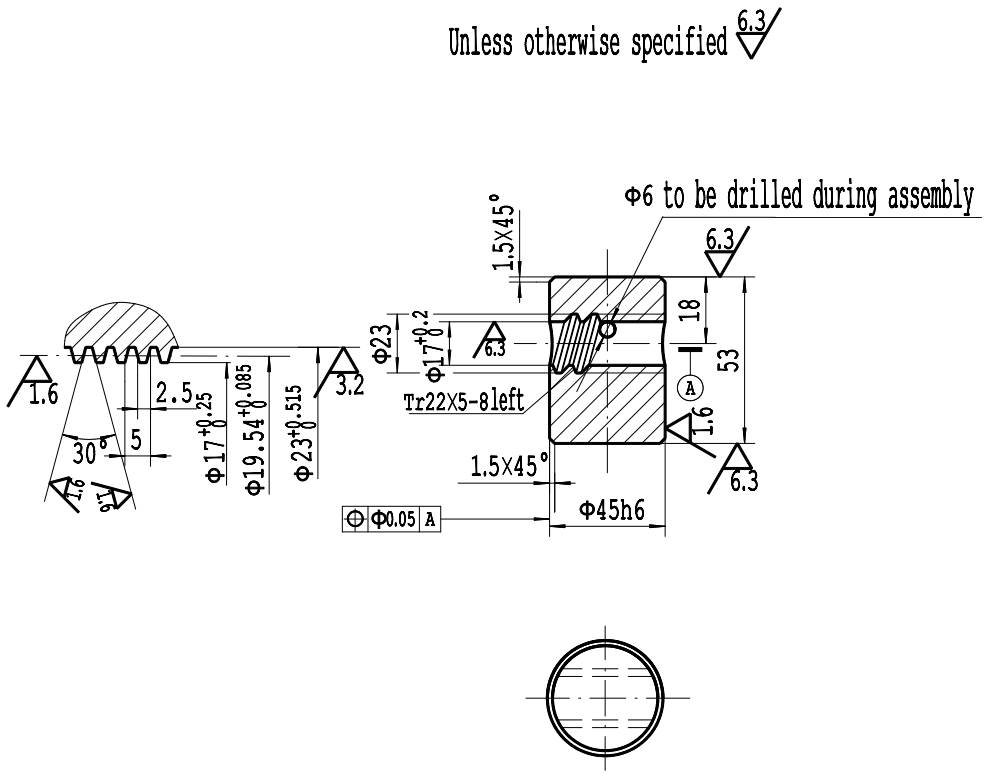

Unless otherwise specified 6.3
Cone pin hole Φ 4 to be drilled during assembly
Φ15k6
M16x1.5
20H14
3x1.1
2x0.5
Φ20f7
Φ20k6
Tr22x5-8 left
Φ16
Φ24
Φ16
6.5
11
2x0.5
5
20
30
49
136
270
410
Φ16
0.02 A-B
0.025 A-B
0.8
1.6
10
A
A-A
1:1
15°
Permissible error of half angle 30'
3.2
2.5
5±0.012
Φ17-0.565
Φ19.5-0.052
Φ22f7
Φ0.023 A
0.009
5N9
3.2
15-0.1
B
Φ18js6
Each chamfer 1×45°
0.05
0.012 A
Part No. 16C04017
Part Name
No. Technical Requirements P.E. mm
1 Permissible error of screw pitch 0.012
2 Permissible error of screw pitch ≤25 0.018
3 Permissible error of screw pitch ≤100 0.025
4 In full length 0.035

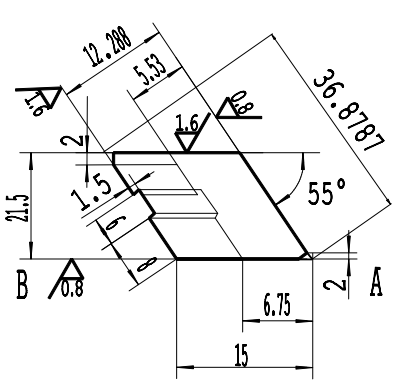
Fig. 49



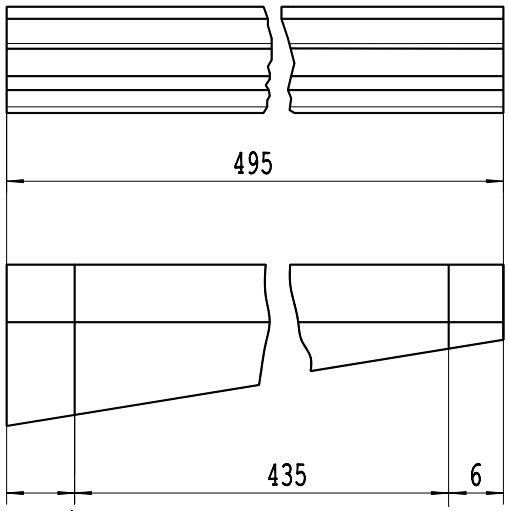
No.	Technical Reqirements
1	By means of leadscrew, check accumulatd pitch error of nut
2	By means of template, check the tooth profile.

Part No.	16C04018
Part Name	Nut

Fig. 50



Unless otherwise specified 12.5

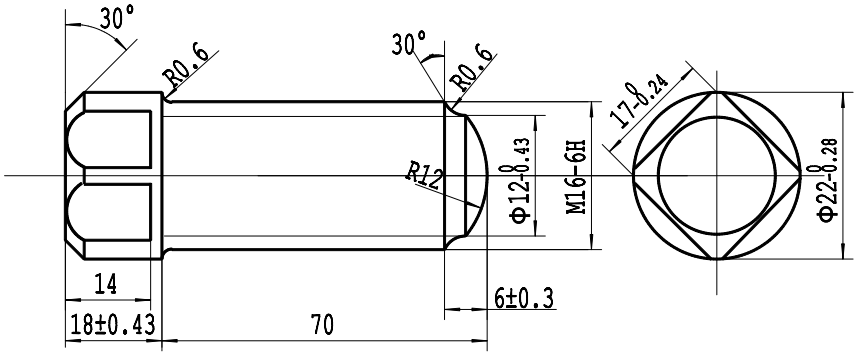


Part No.	16C04031
Part Name	Gib of carriage

Cut off after adjustment Cut off after adjustment

Fig. 51

Unless otherwise specified 6.3



H.Y

No.	Technical Requirements
1	Threads should be according to the accuracy of Grade II
2	H.Y.
3	H.T. C35

Screw M16×70 GB/T83-1988

Fig. 52

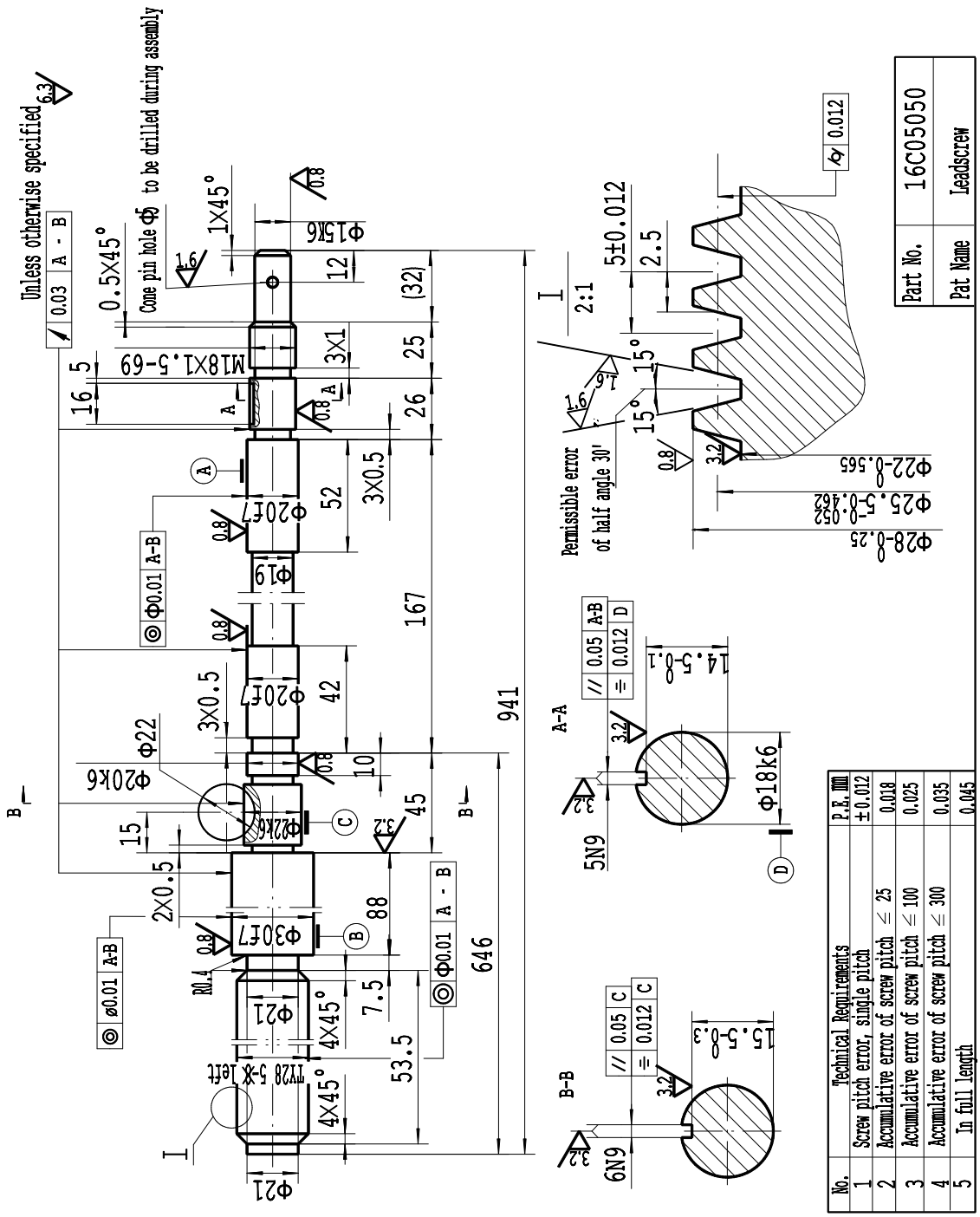

Unless otherwise specified
Cone pin hole Φ6 to be drilled during assembly
0.5X45°
1X45°
M18X1.5-6g
TX28 5-X left
4X45°
Permissible error of half angle 30'
2:1
A-A
B-B
Part No. 16C05050
Pat Name Leadscrew
No. Technical Requirements P.F. mm
1 Screw pitch error, single pitch ±0.012
2 Accumulative error of screw pitch ≤ 25 0.018
3 Accumulative error of screw pitch ≤ 100 0.025
4 Accumulative error of screw pitch ≤ 300 0.035
5 In full length 0.045

Fig. 53

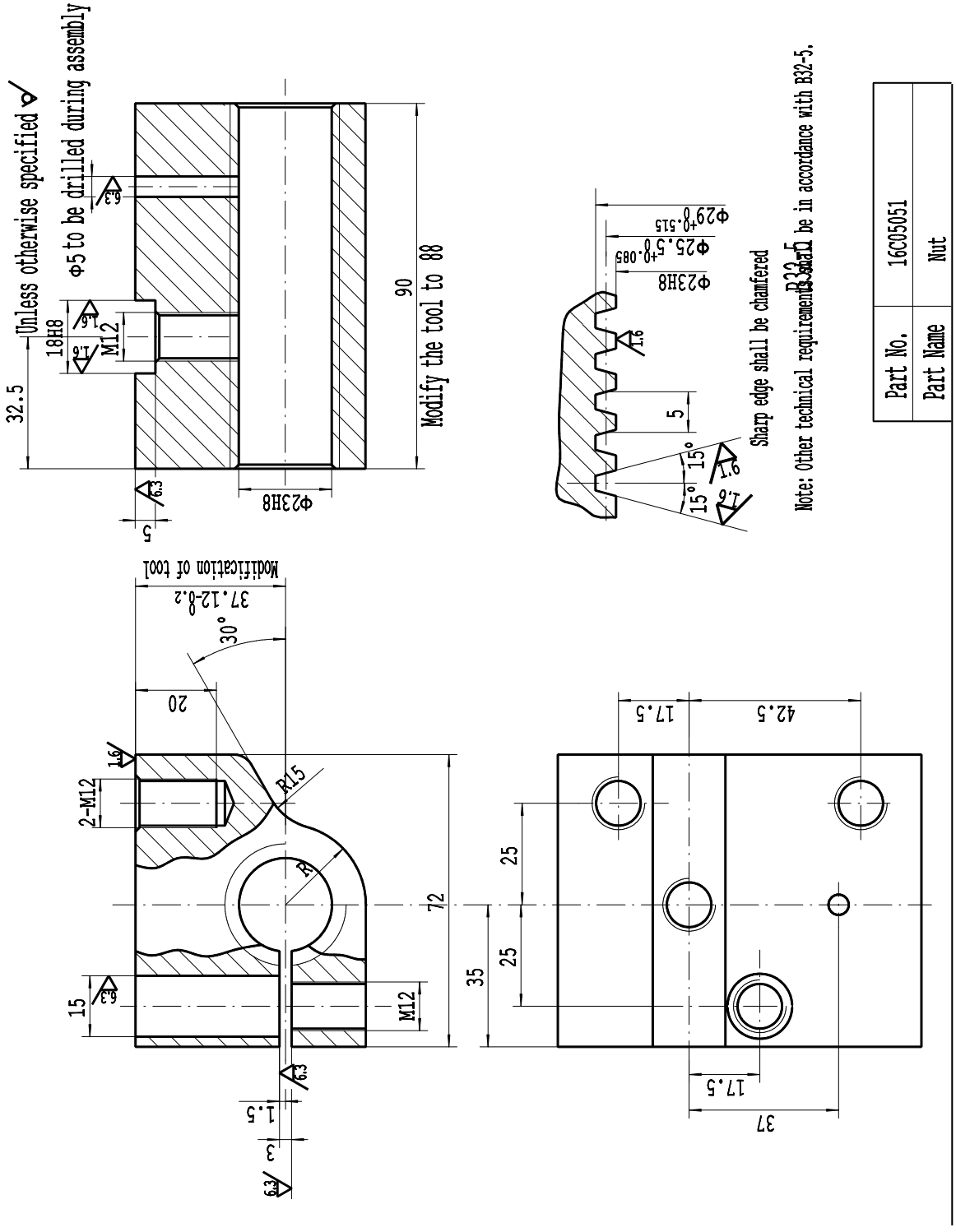
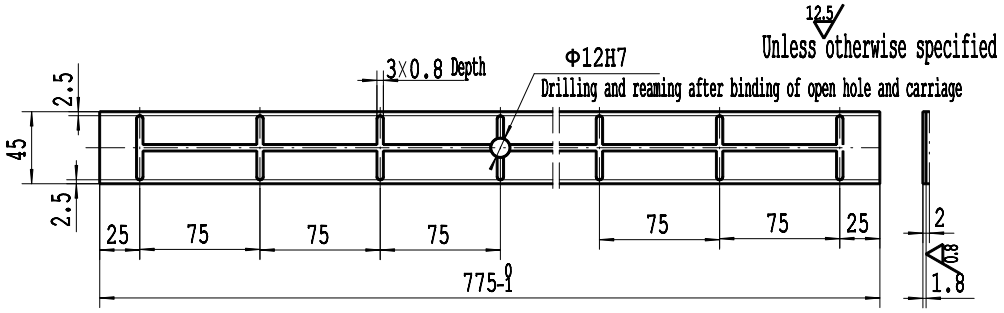

Unless otherwise specified
Φ5 to be drilled during assembly
Modify the tool to 88
Sharp edge shall be chamfered
Note: Other technical requirements shall be in accordance with B32-5.
Part No. 16C05051
Part Name Nut
Modification of tool
2-M12
M12
R15
30°
20
72
90
32.5
25
35
42.5
17.5
37

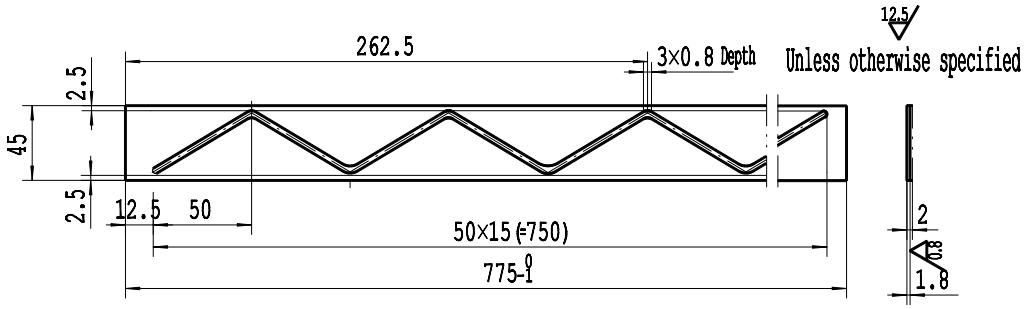
Fig. 54



This part will bind with 16C05011 and the oil groove will be machined.

Part No.	16C05038
Part Name	Guideway plate

Fig. 55



This part will bind with 16C05011 and the oil groove will be machined.

Part No.	16C05036
Part Name	Guideway plate

Fig. 56

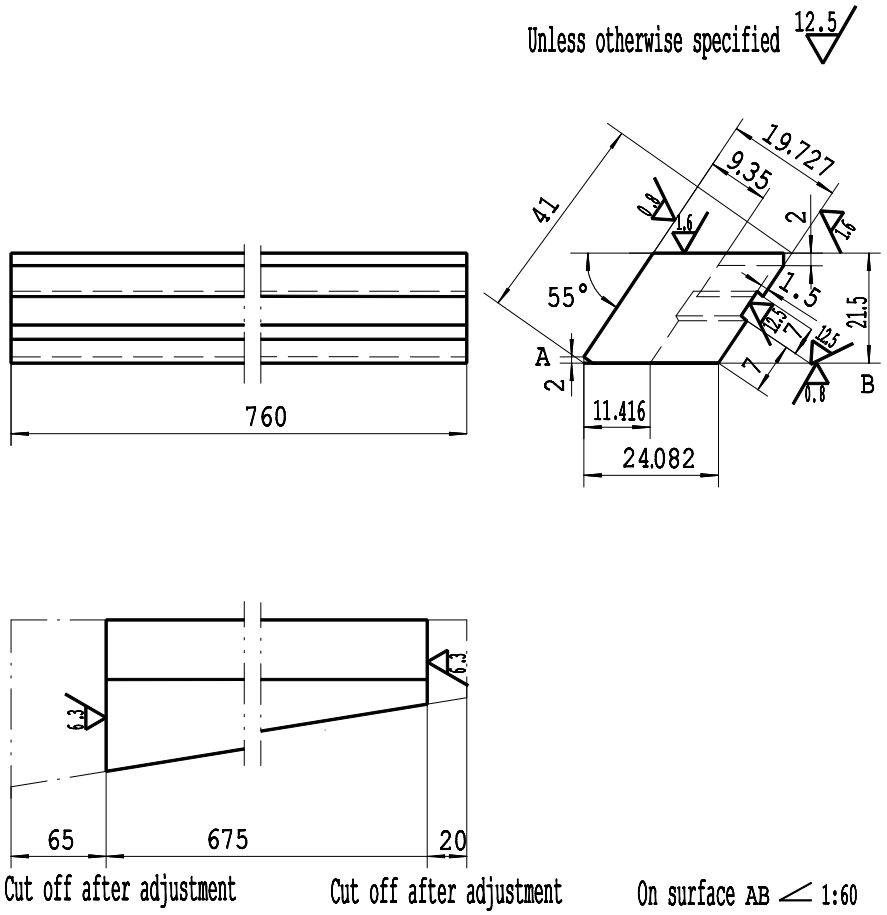
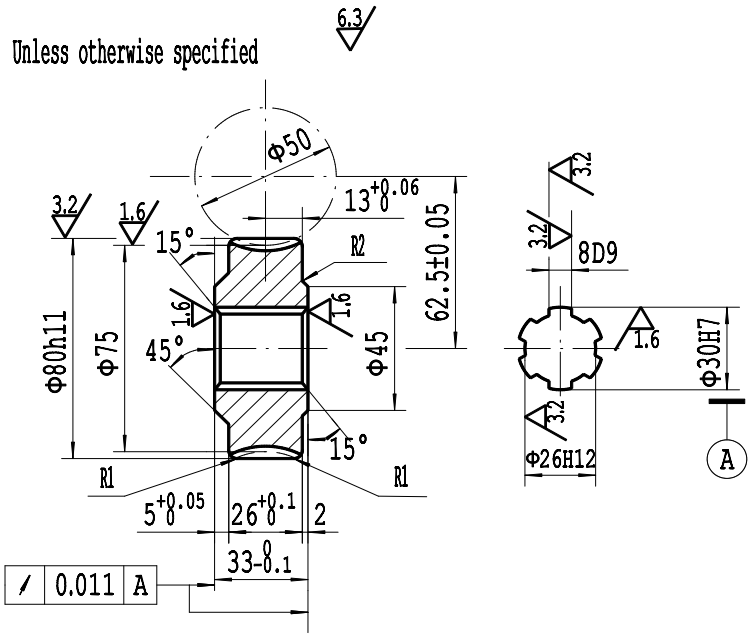

Unless otherwise specified 12.5
19.727
9.35
41
55°
1.5
21.5
A
B
2
760
11.416
24.082
6.3
65
675
20
Cut off after adjustment
Cut off after adjustment
On surface AB ∠ 1:60
Part No. 16C05042
Part Name Gib

Fig. 57



Part No.	16C06012
Part Name	Worm wheel

Part No.	16C06012
Part Name	Worm wheel

No. of teeth	30
Accuracy	Grade 3
Module of worm	
No. of threads	III
Helix angle	8º32′
Helix direction	Right hand
Lead	23.562
Outside diameter	55
Axial module	2.5
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	±0.09
Faces to be square	
A	0.03
B	0.03
Bearing of worm teeth by red lead method:	
Profile bearing	60%
Lengthwise bearing	65%
Fitting part No.	

Fig. 58

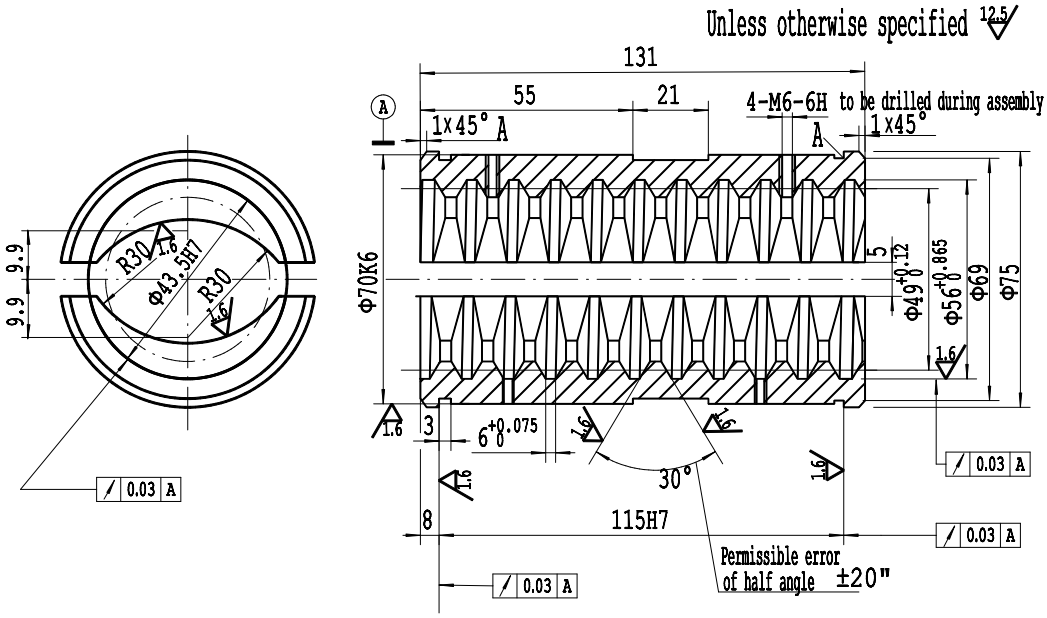
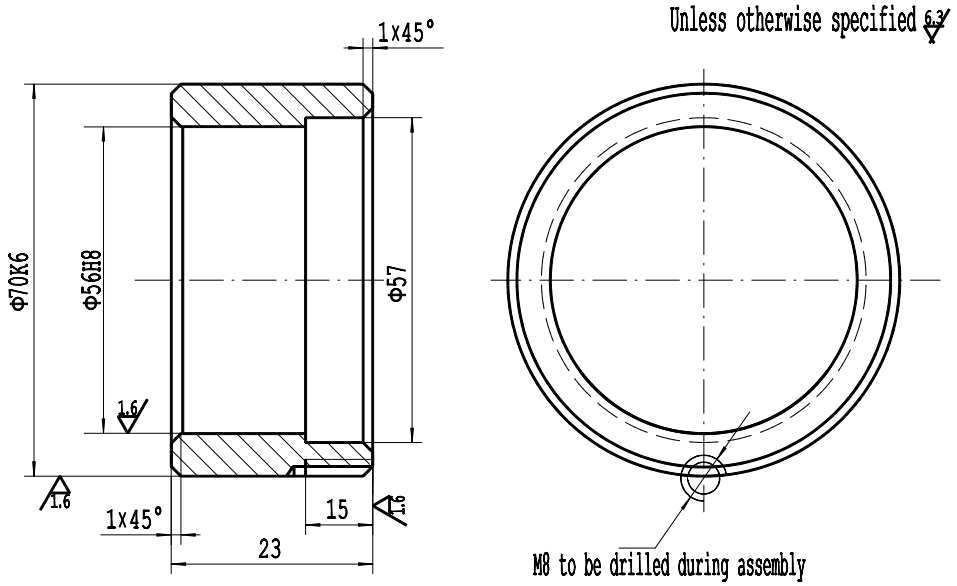


Fig. 59

Traperzoidal thread pitch=12 mm

Note:Cut off machining of whole form casting

Part No.	16C06020
Part Name	Split nut



Part No.	16C06025
Part Name	Bush

Fig. 60

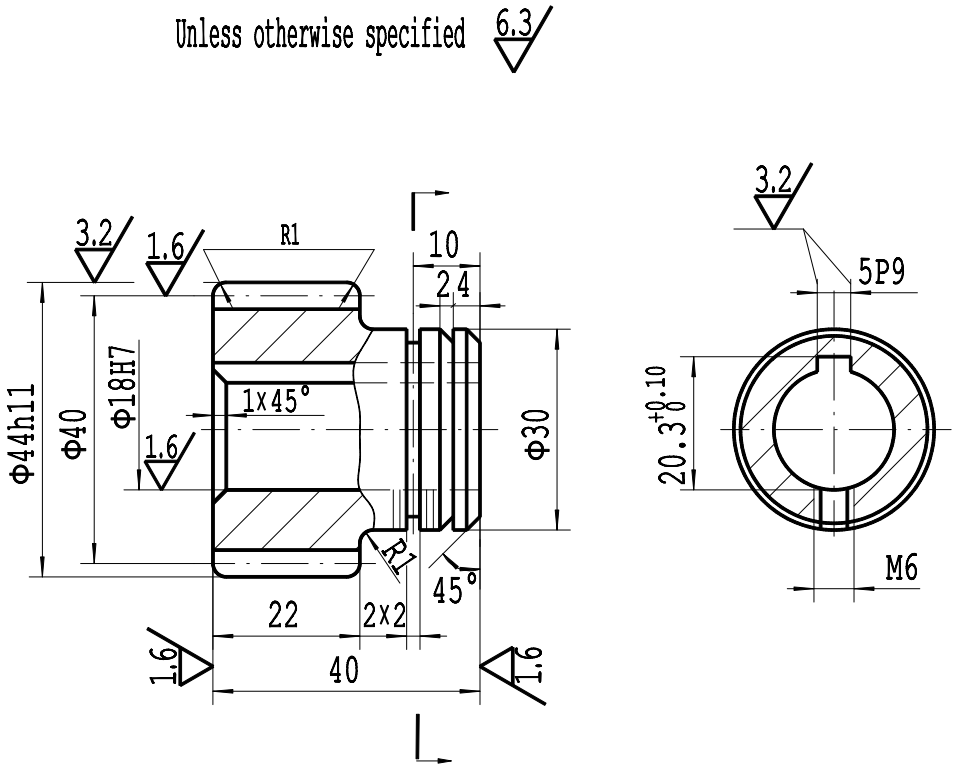
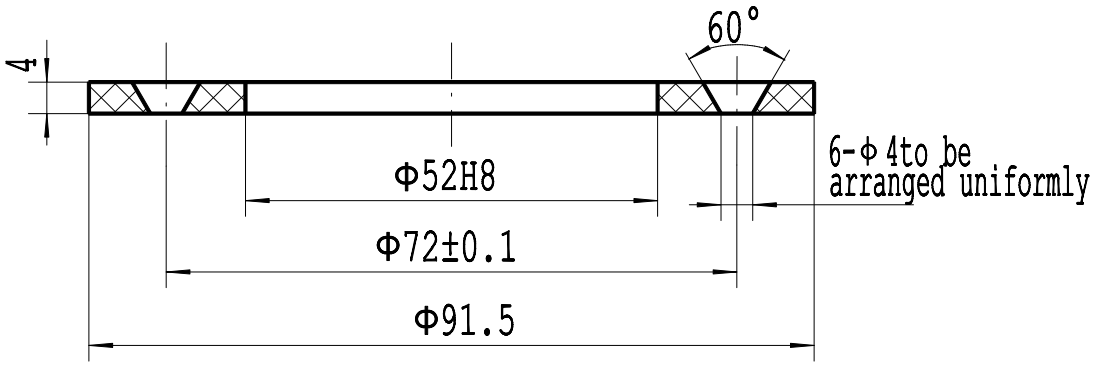


Fig. 61

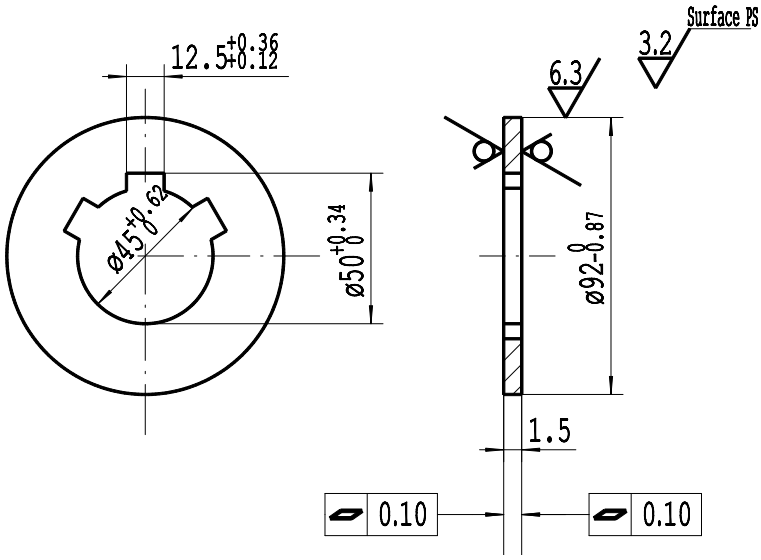
Part No.	16C06135
Part Name	Gear

Normal module			Mn	2
Number of teeth			Z1	20
Accuracy grade (JB179-83)			-	7-7C
Addendum modification coefficients			X	
Helix direction			-	
Helix angle			β	
Base tangent length	Length		W	15.321
	Permissible average error	Upper	Ews	-0.071
		Lower	Ewi	-0.099
Spoused gear	Part No.		-	16C06139
	Number of teeth		Z2	22
Accumulated error of transverse pitch			Fp	0.036
Limited deviation of transverse pitch			±fpt	±0.014
Permissible error of tooth profile			Ff	0.011
Permissible error of tooth direction			Fβ	0.011



Part No.	16C02204
Part Name	Braking disc

Fig. 62

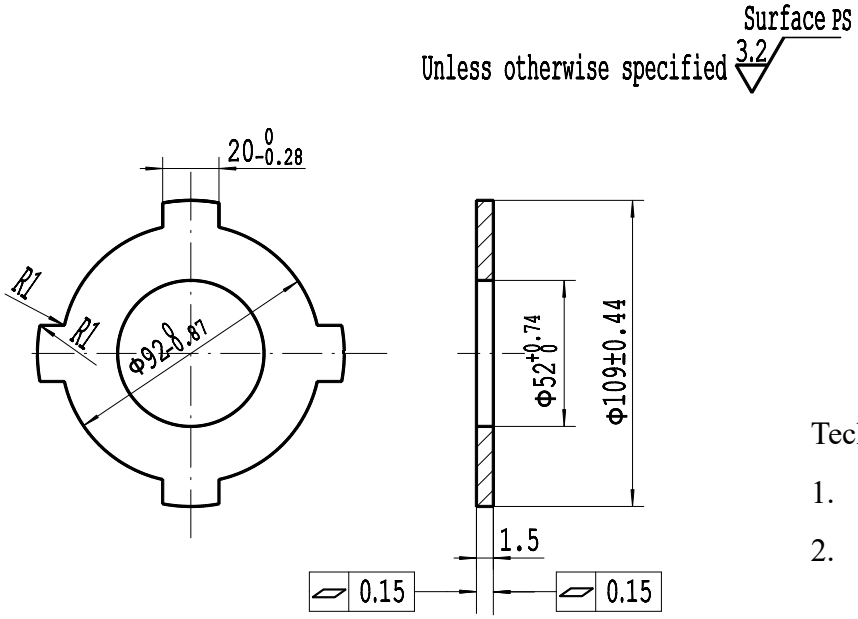


Technical Requirements:

1. H.T.: S0.5-C59
2. Deburring

Part No.	16C02025
Part Name	Friction disc

Fig. 63

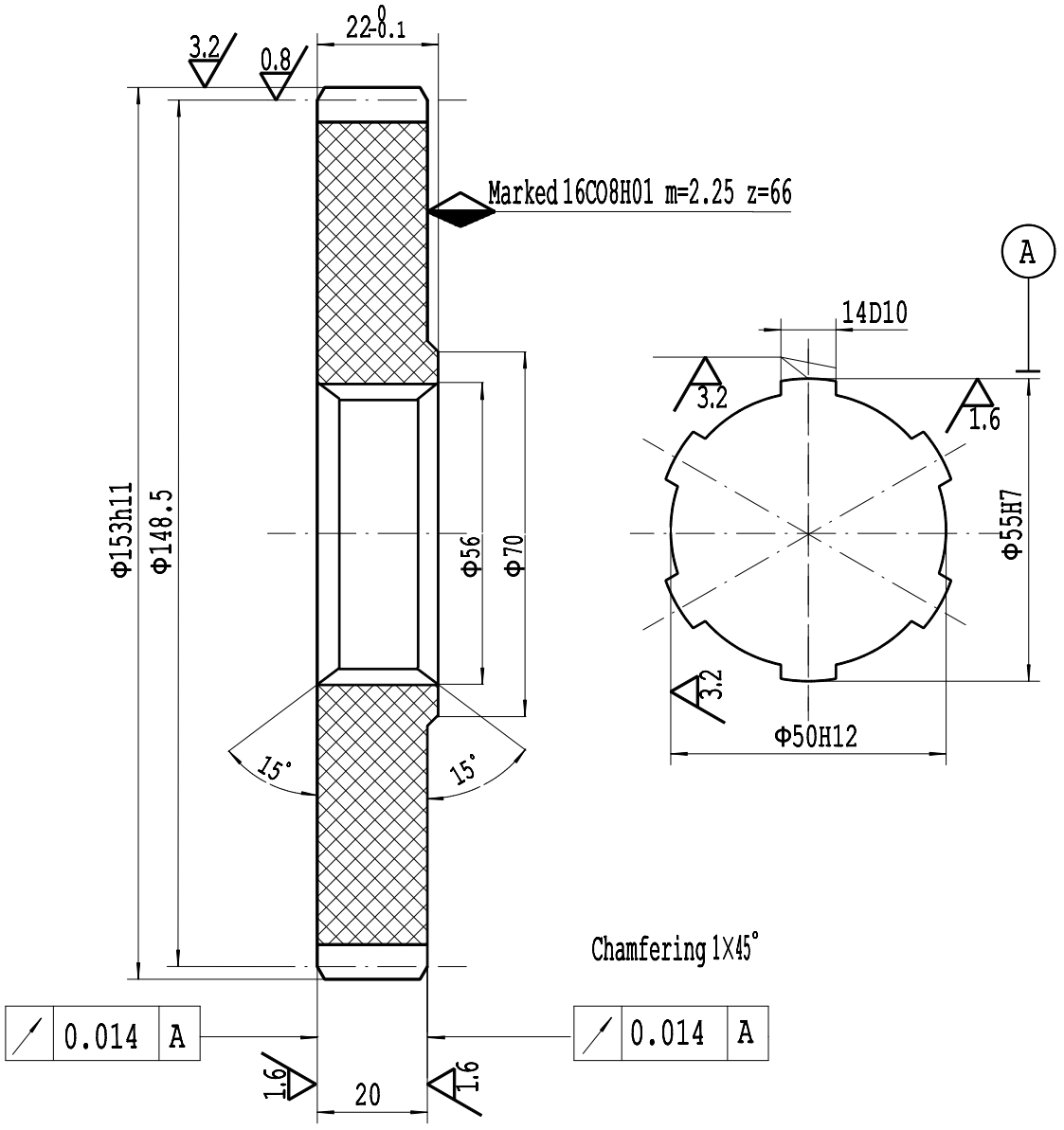


Technical Requirements

1. H.T.: S0.5-C59
2. Debur

Part No.	16C02024
Part Name	Friction disc

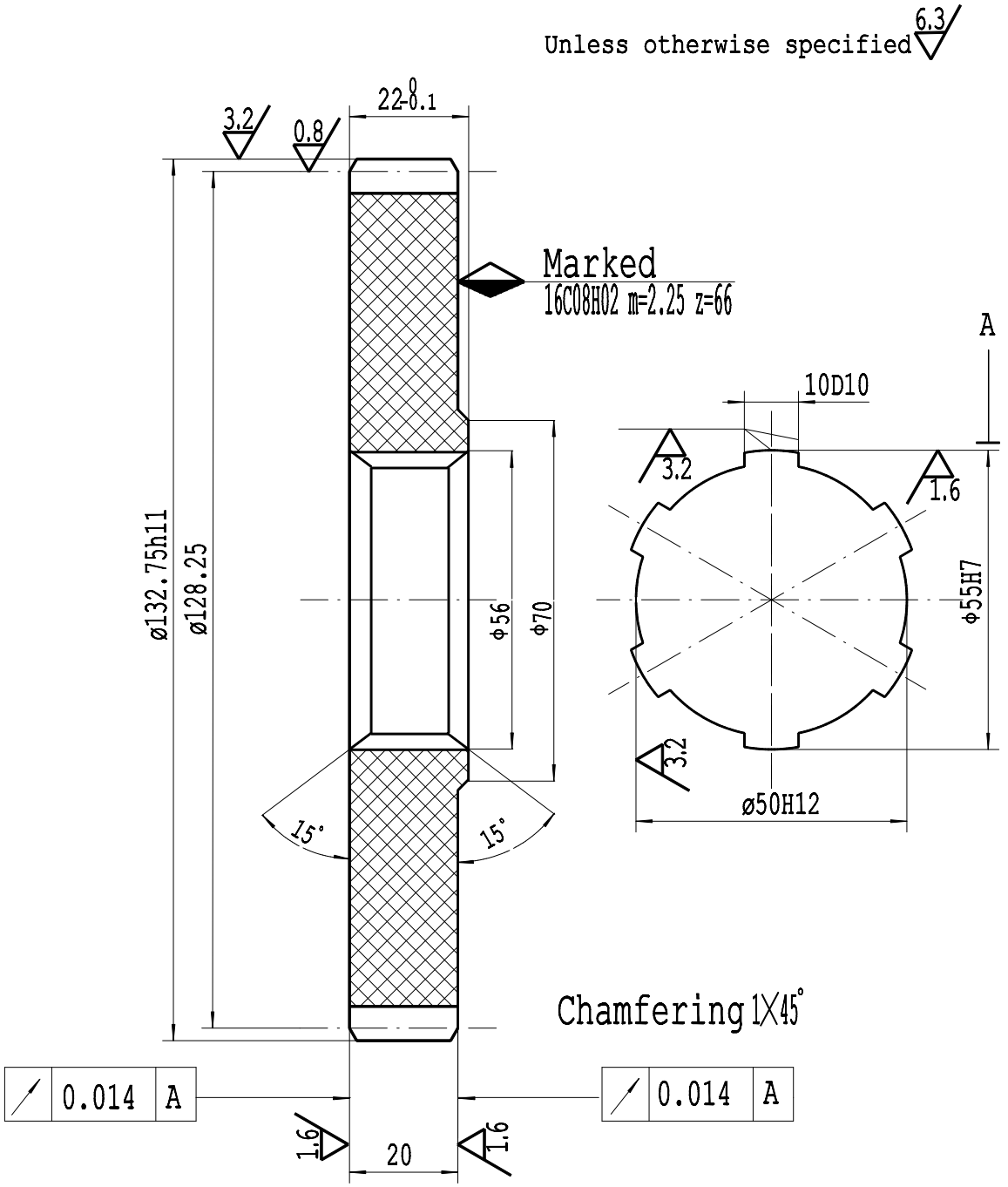
Fig. 64



Part No.	16C08H01
Part Name	Gear

Fig. 65

Normal module			Mn	2.25
Number of teeth			Z1	66
Accuracy grade (JB179-83)			-	8-7C
Addendum modification coefficients			X	
Helix direction			-	
Helix angle			β	
Base tangent length	Length		W	51.897
	Permissible average error	Upper	Ews	-0.132
		Lower	Ewi	-0.176
Spoused gear	Part No.		-	013
	Number of teeth		Z2	66
Accumulated error of transverse pitch			Fp	0.090
Limited deviation of transverse pitch			±fpt	±0.020
Permissible error of tooth profile			Ff	0.018
Permissible error of tooth direction			Fβ	0.018



Part No.	16C08H02
Part Name	Gear

Fig. 66

Normal module			Mn	2.25
Number of teeth			Z1	57
Accuracy grade (JB179-83)			-	8-7C
Addendum modification coefficients			X	
Helix direction			-	
Helix angle			β	
Base tangent length	Length		W	44.971
	Permissible average error	Upper	Ews	-0.132
		Lower	Ewi	-0.176
Spoused gear	Part No.		-	16C08033
	Number of teeth		Z2	66
Accumulated error of transverse pitch			Fp	0.090
Limited deviation of transverse pitch			±fpt	±0.020
Permissible error of tooth profile			Ff	0.018
Permissible error of tooth direction			Fβ	0.018

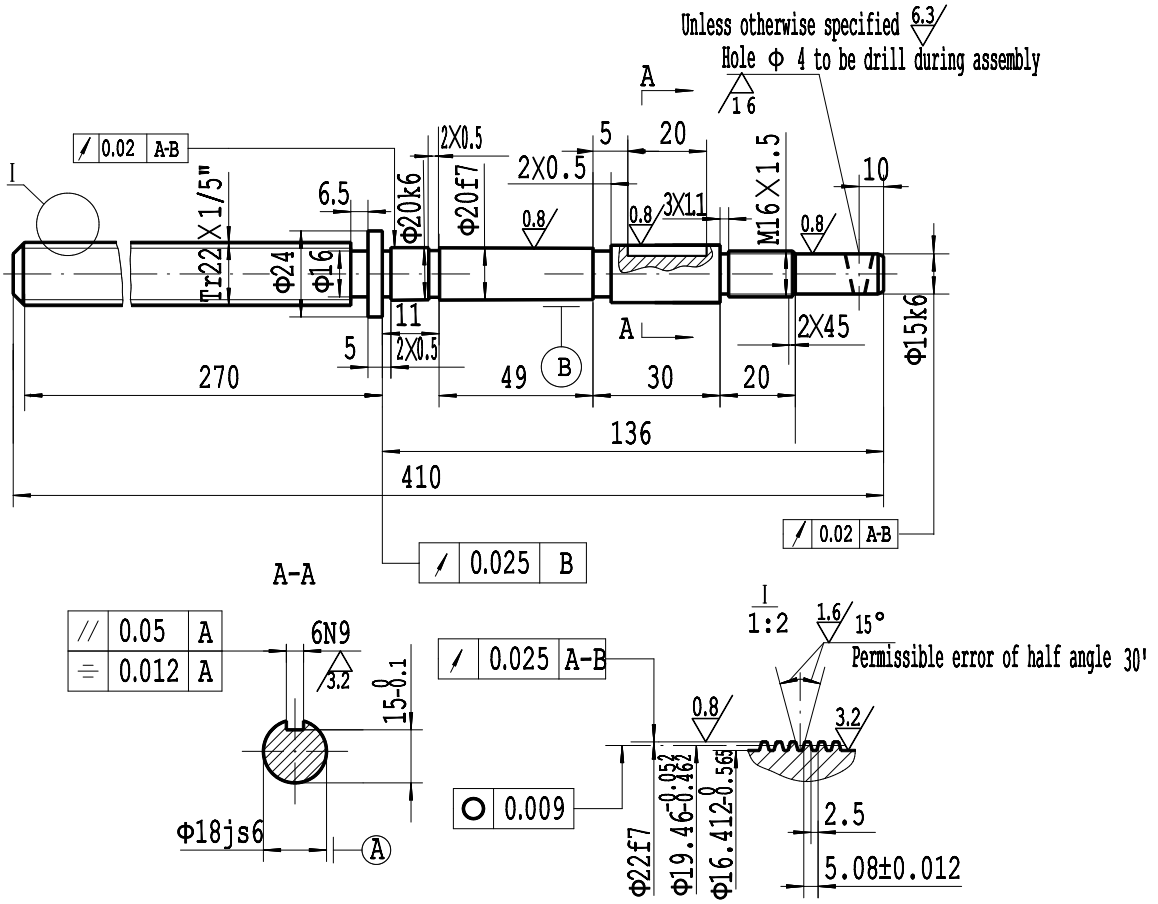
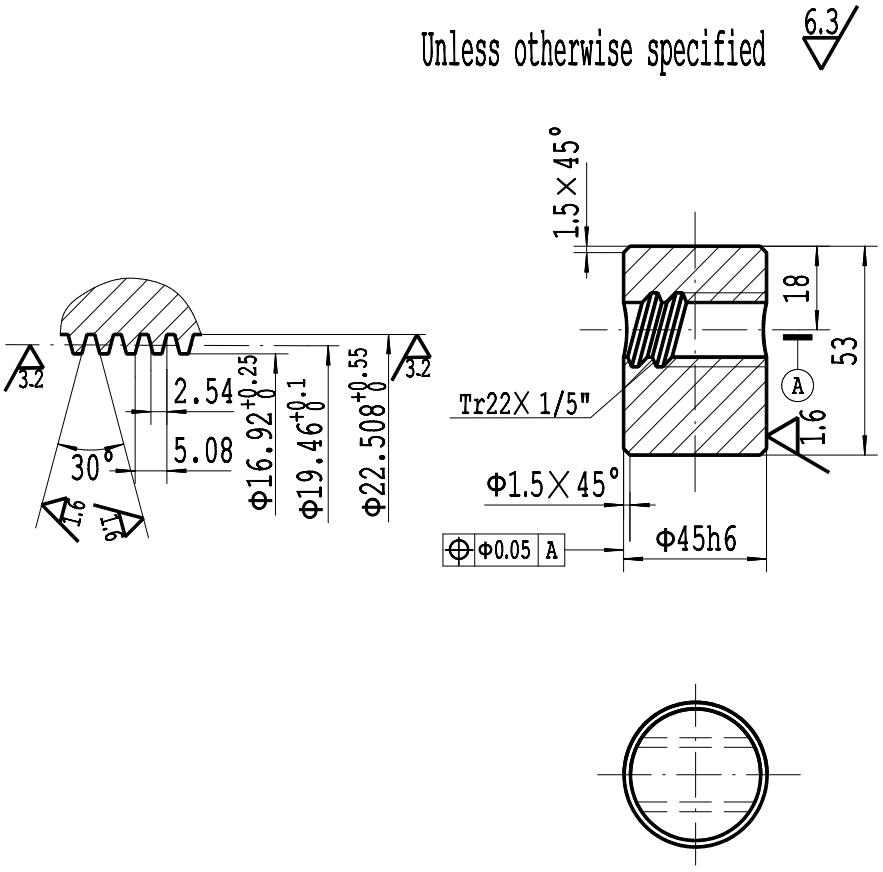


Fig. 67

Other chamfered angles 1×45°

No.	Technical Requirements	Permissible Error mm
1	Accumulative error of pitch in length of 25	0.018
	in length of 100	0.025
	in full length	0.035

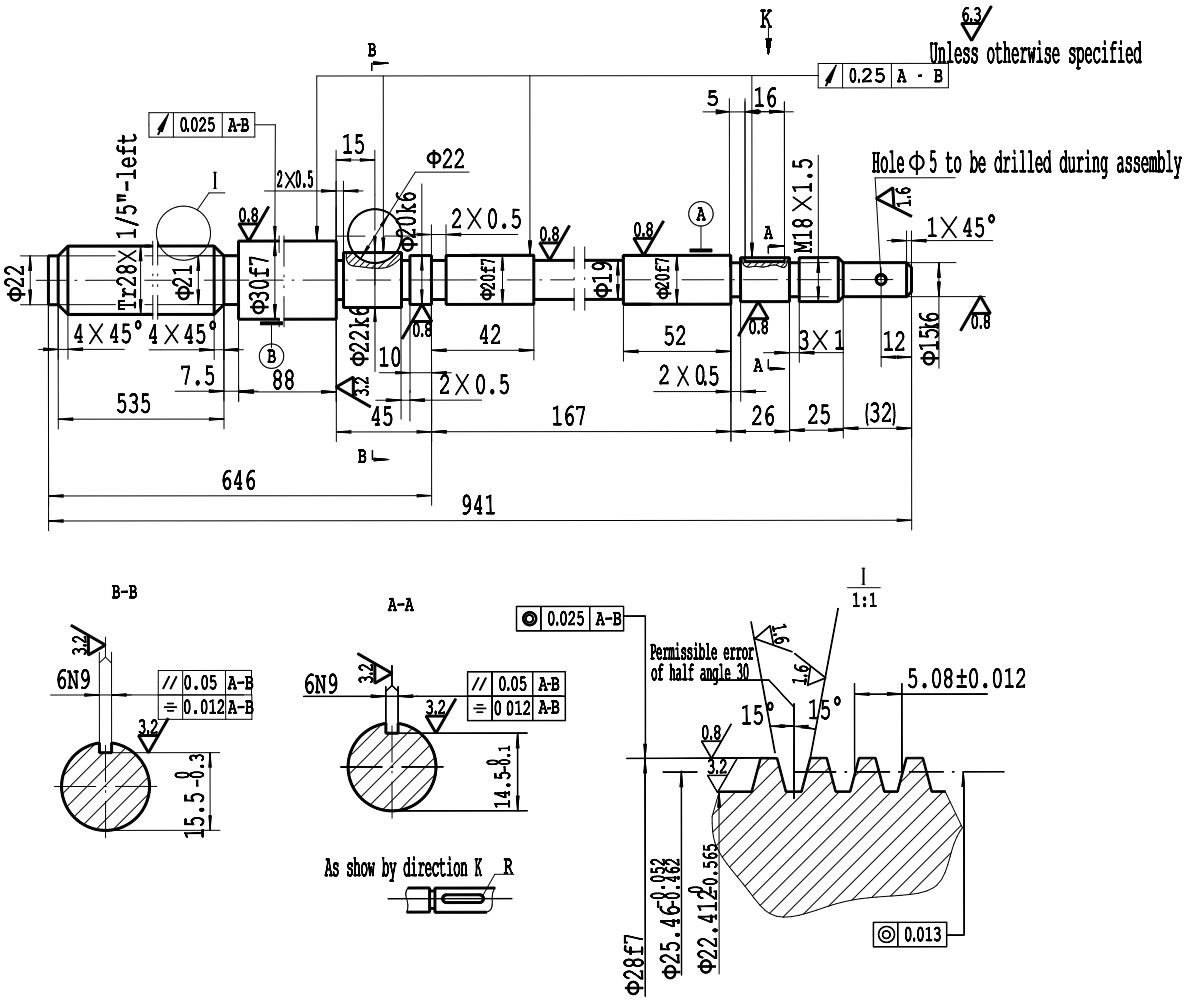
No. of part	16C04042
Name	Leadscrew of carriage



No.	Technical Requirements	Permissible Error mm
1	Pitch error of the nut.	Check it by screw rod
2	Check thread by template	

Part No.	16C04041
Part Name	Nut

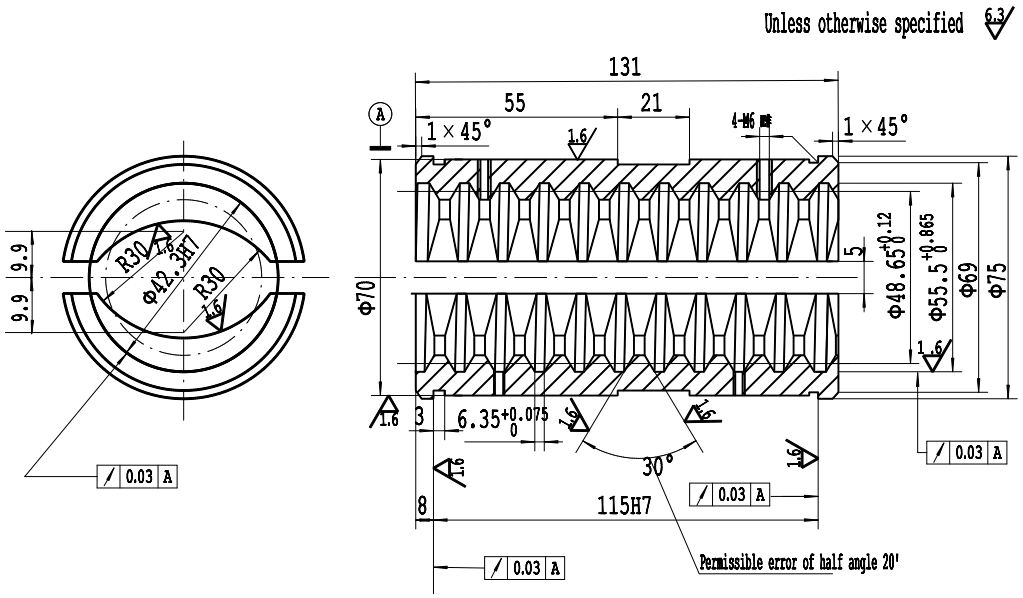
Fig. 68



No.	Technical Requirements	Permissible Error mm
1	Accumulative error of pitch in length of 25	0.018
	in length of 100	0.025
	in length of 300	0.035
	in full length	0.045

Part No.	16C05060
Name	Leadscrew

Fig. 69



Note: Cut it off after casting into whole.

Part No.	16C06170
Name	Split nut

Fig. 70

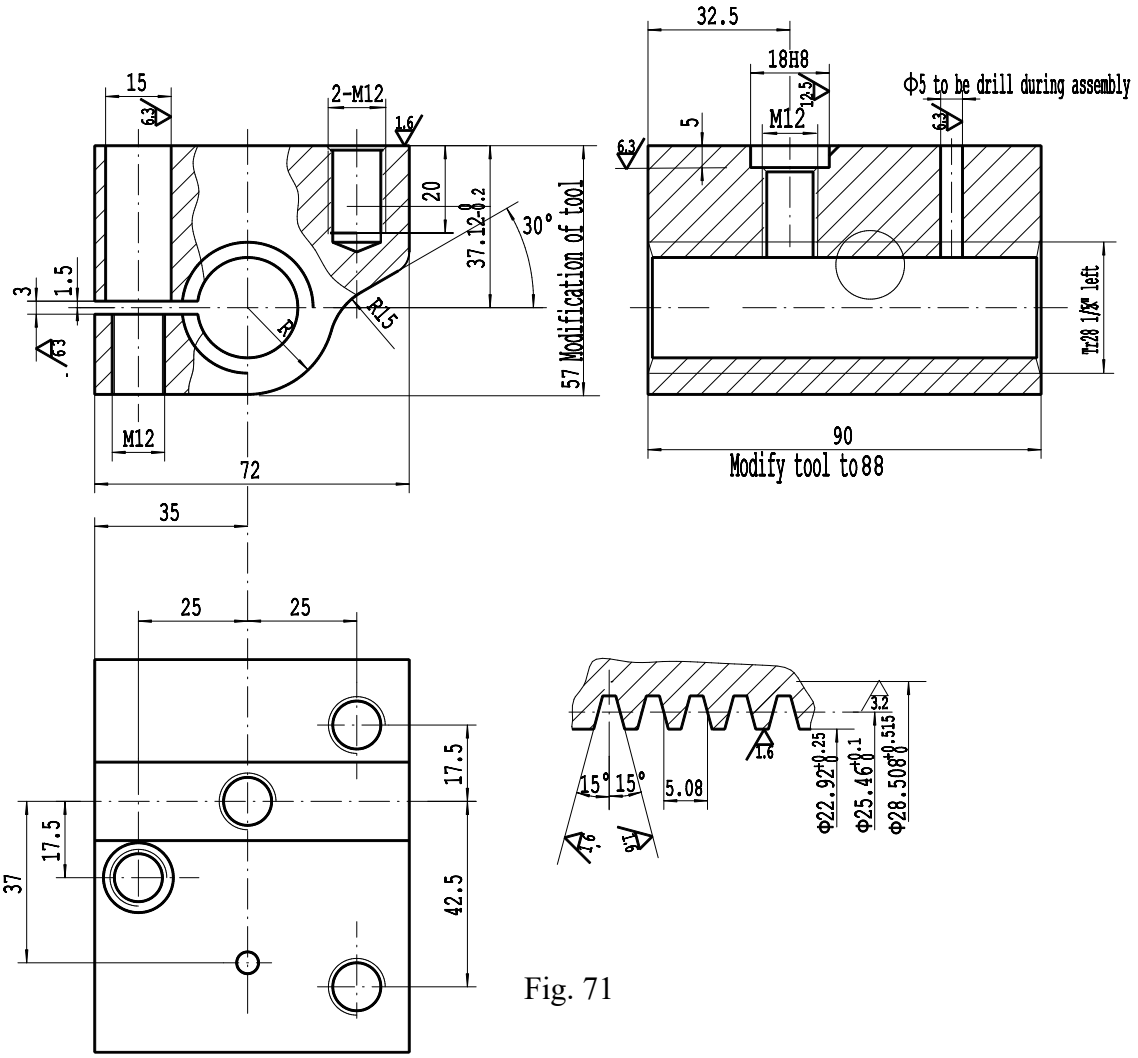
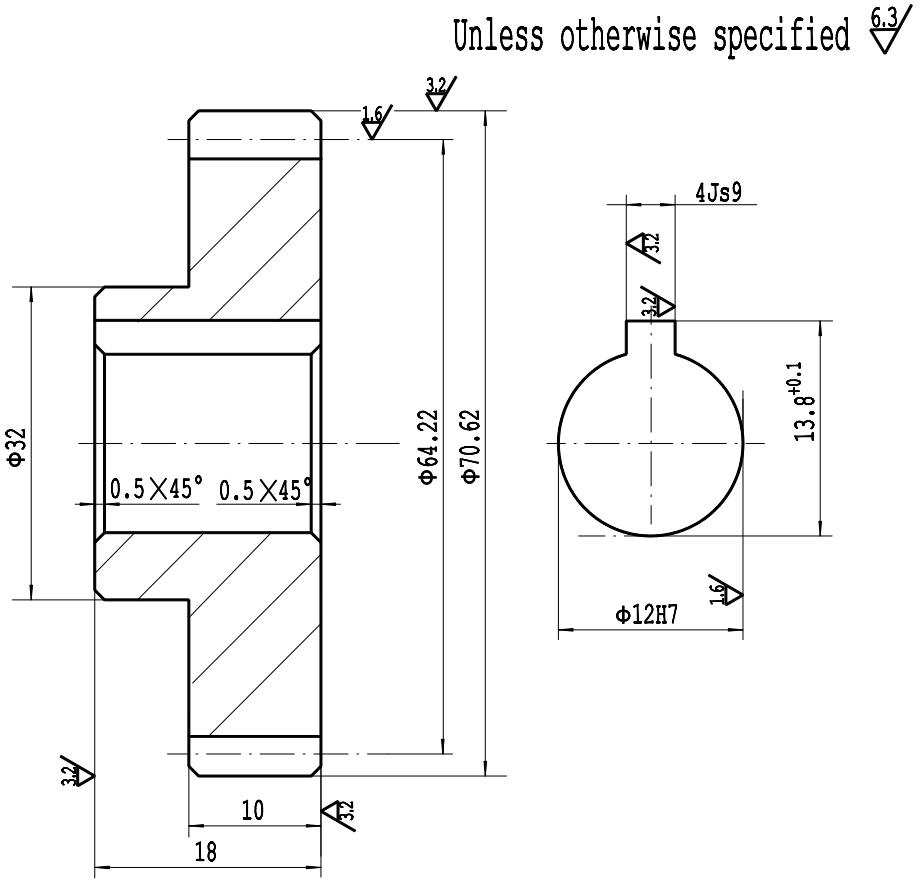


Fig. 71

Note: Other technical requirements should be in accordance with the standard B32-5.

Part No.	16C05061
Part Name	Nut



Other chamfered 1×45º

				Part No.	16C63015
				Name	Bevel gear
Normal module			m_n	4	
No. of teeth			Z_1	16	
Accuracy grade (JB179-83)			-	8-8C	
Addendum modification coefficients			X		
Helix angle:	Degree		-	$4^0 45'$	
	Direction		β	Right	
Common normal	Length:		W	18.596	
	Permissible average length error:	Upper	EWS	-0.090	
		Lower	EWI	-0.135	
Accumulative pitch error			Fp	0.063	
Limited deviation of circular pitch			±fpt	0.025	
Permissible error of tooth profile			f_f	0.020	
Permissible error of tooth direction			F_β	0.018	

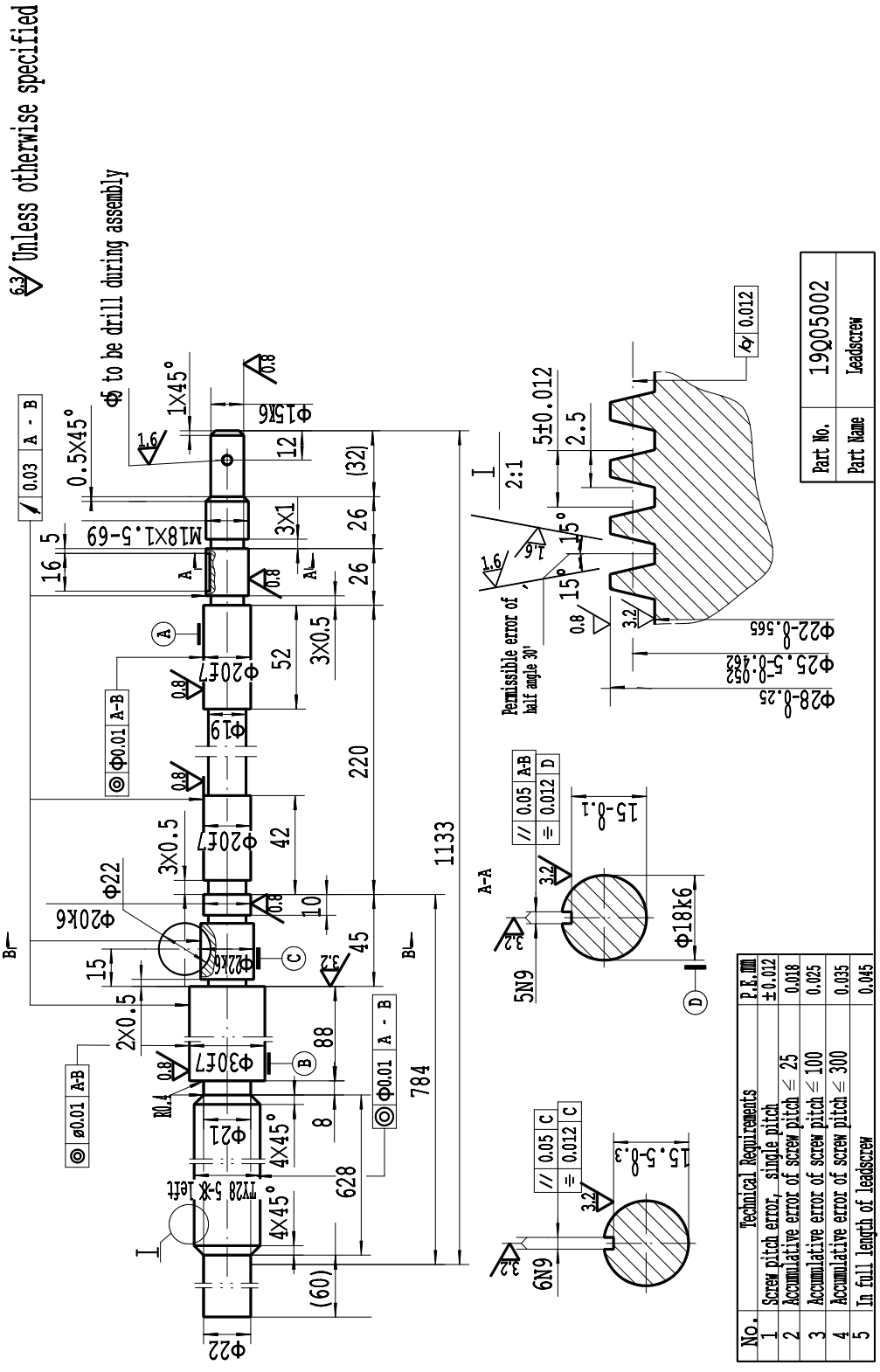

Unless otherwise specified
Φ to be drill during assembly
0.5X45°
1X45°
M18X1.5-6g
M72X6 5-X Left
Φ15k6
Φ20k6
Φ22
Φ20f7
Φ30f7
Φ19
Φ21
Φ22
3X0.5
2X0.5
3X1
4X45°
R0.4
Permissible error of half angle 30'
2:1
5±0.012
2.5
15°
Φ28-0.25
Φ25.5-0.052
Φ22-0.565
0.012
Φ18k6
5N9
6N9
15-0.1
15-0.5
A-A
I
Part No. 19Q05002
Part Name Leadscrew
No. Technical Requirements P.E.mm
1 Screw pitch error, single pitch ±0.012
2 Accumulative error of screw pitch ≤ 25 0.018
3 Accumulative error of screw pitch ≤ 100 0.025
4 Accumulative error of screw pitch ≤ 300 0.035
5 In full length of leadscrew 0.045

Fig. 73

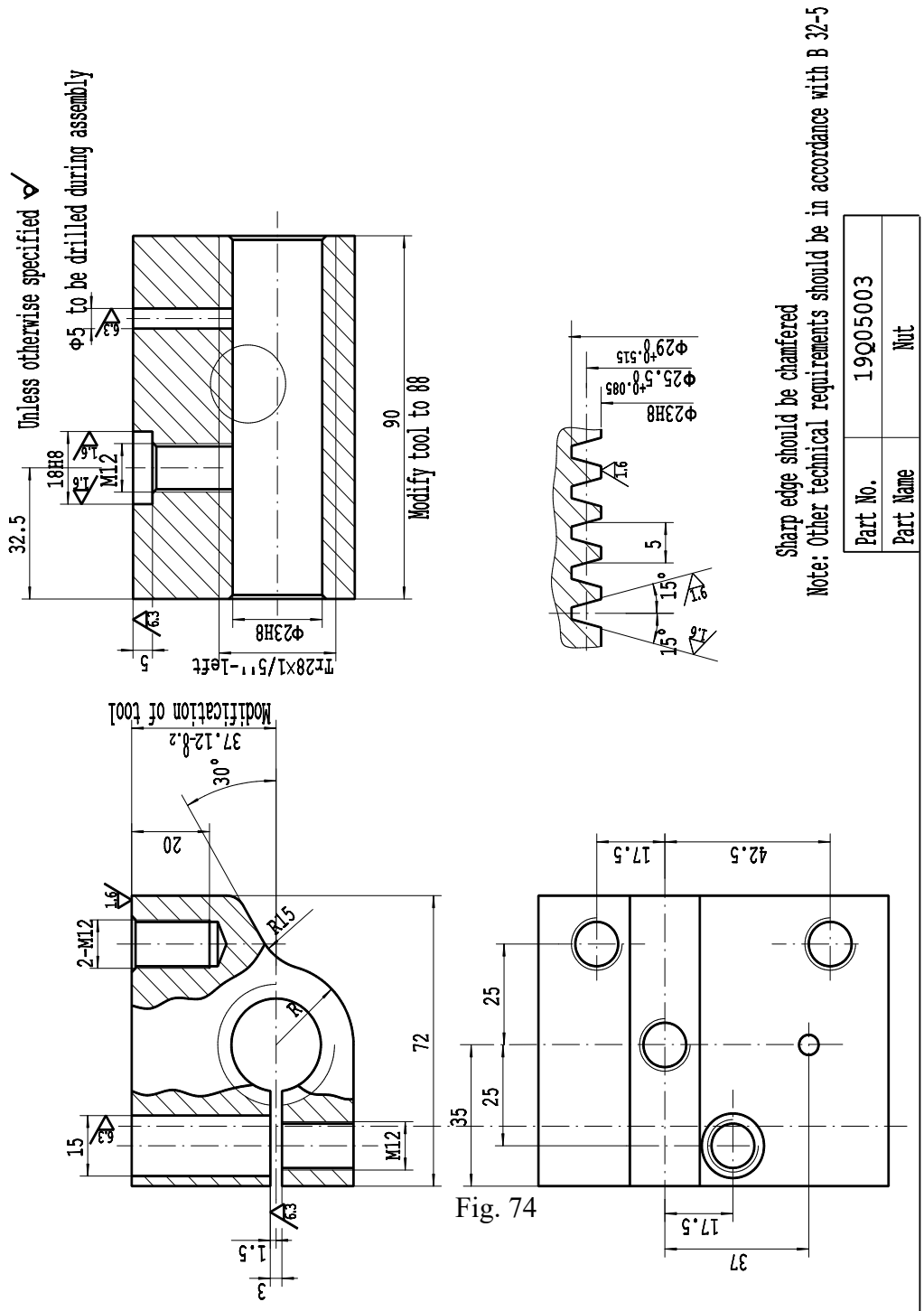

Unless otherwise specified
Φ5 to be drilled during assembly
Modify tool to 88
90
32.5
10H8
M12
Φ23H8
Tr28×1/5''-Left
5
Φ23H8
Φ25.5+0.085
Φ29+0.515
5
15°
15°
Sharp edge should be chamfered
Note: Other technical requirements should be in accordance with B 32-5
Part No. 19Q05003
Part Name Nut
Modification of tool
37.12-0.2
30°
20
2-M12
R15
R
72
15
M12
1.5
3
17.5
42.5
25
25
35
17.5
37

Fig. 74

15 PROTECTION MEASURES OF SAFETY OF THE MACHINE

15.1 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. For illustration of the warning labels, see Fig. 75, Fig.76, Fig. 77 and Fig 78

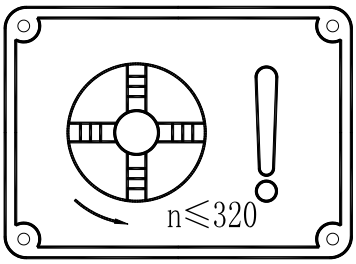


Fig. 75 Limit speed label of 4-jaw chuck

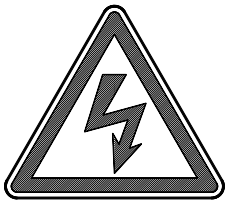


Fig. 76 Label for “Danger! Electricity!”

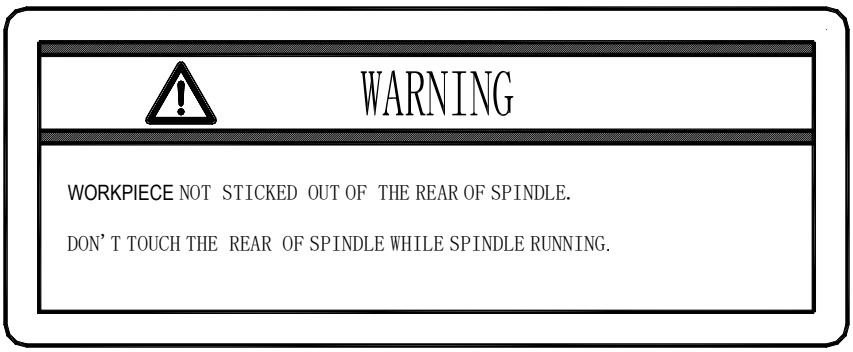


Fig. 77 Label for workpiece not sticked out of the rear of spindle

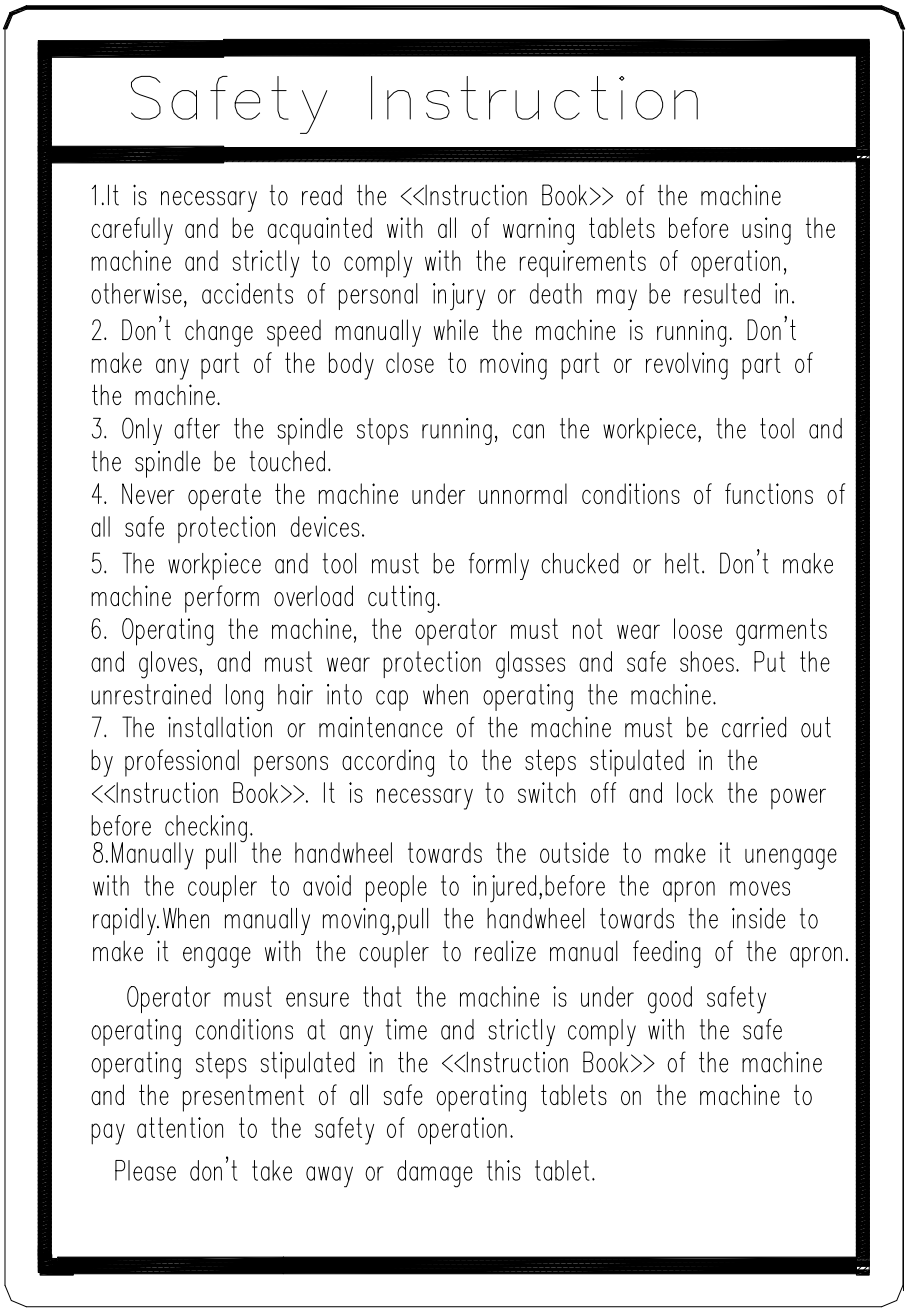


Fig. 78 Label for safety instruction

Declaration of Conformity

The equipment which accompanies this declaration is in conformity with EU Directive*(s)*:-

2006/42/EC Machinery Directive

2004/108/EC Electromagnetic Compatibility Directive

Manufacturer

Name:SHENYANG No.1 LATHE WORKS

SHENYANG MACHINE TOOL CO., LTD

Address：No.1, 17 A, Kaifa Road, Shenyang Economic &Technological Development Area, China

A copy of the Technical file for this equipment is available from:-

CCQS UK Ltd., Suite B Regal Court, 112 London Road, Headington, Oxford OX3 9AW UK

Description of Equipment

CW63,80,93&110series horizontal lathes

The following harmonised standards have been used:-

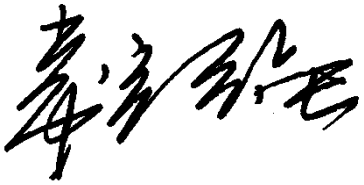
EN 12840:2001 Manually controlled turning machines

EN 60204-1:2006+A1:2009 Electrical equipment of machines — Part 1:General requirements

EN 50370-1:2005 EMC, Product family standard for machine tools — Part 1: Emission

EN 50370-2:2003 EMC, Product family standard for machine tools — Part 2: Immunity

Authorised signatory of manufacturer

Signature： 

Name of signatory：Baoqiang Chang

Position in company：General Manager

Place and Date：Shenyang. Apr.,2010

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