



STC1835pipe CNC PIPE-THREADING LATHE

INSTRUCTION BOOK

(For Mechanical Unit)

**SHENYANG MACHINE TOOL (GROUP) CO.,LTD
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THE CHINESE VERSION OF THIS TECHNICAL DOCUMENT IN ENGLISH IS REGARDED AS FINAL.

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

MATTERS NEEDING ATTENTION TO OPERATION

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

Before operating the machine, put on all covers, safe guards that were dismantled 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 edited according to the current modules. In future, new module(s) will be added, the Instruction Book will be modified at any time. If you need to new this Book owing to that it is damaged or lost, pay attention to this point mentioned above.

Although this Instruction Book has been checked carefully, 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.

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

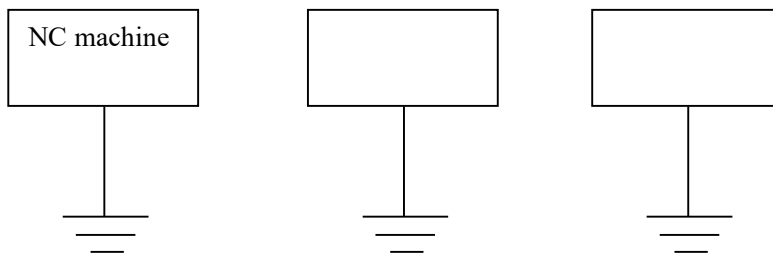
- 1.1 The performance values of wire used for connecting the electrical parts should be equal to or more than the specified values in this Book.
- 1.2 Never use the common terminal block 3with the equipments like welding machine or high frequency quencher, etc. which can make noise.
- 1.3 Power cable should be connected by skilled electrician.

2 Grounding

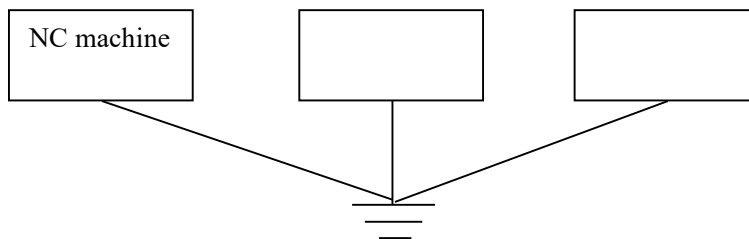
Cross section and grounding resistance as well as matters needing attention to grounding, the grounding wire used for the machine must be in accordance with the standard GB/T5226.1-1996.

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

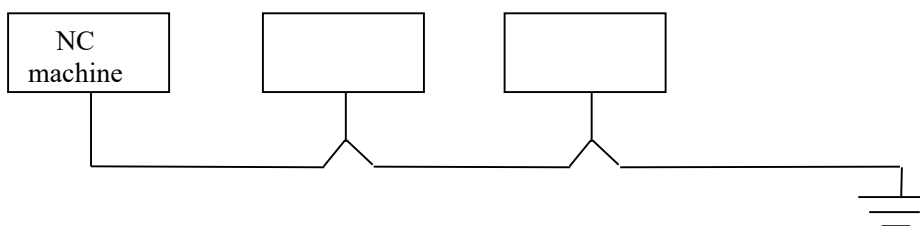
Independent grounding wire:



Common grounding wire



Never connected to one grounding rod for some equipments 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 be 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	PREFACE	1
1.1	Applicable Range and Purpose of the Instruction Book	1
1.2	Meaning of Product Model	1
1.3	Major Applications of the Machine	1
1.4	Accuracy of the Machine	1
1.5	Environment Available for the Machine	1
1.6	Effects of the Machine to Environment	2
2	MATTERS NEEDING ATTENTION TO SAFETY PROTECTION	3
2.1	Requirements for the operators and the maintainers	3
2.2	Basic Operation Requirement	3
2.3	Requirement prior to Switching on the Power Supply	4
2.4	Requirement after Switching on the Power Supply	5
2.5	Normal Inspection	5
2.6	Temperature Raising	5
2.7	Preparation for Operation of the Machine	5
2.8	Matters Needing Attention:	6
2.9	Machining Interruption	7
2.10	After Completion of Turning Job	7
2.11	Safeguard Devices	7
2.12	Preparation before Maintenance	8
2.13	Maintenance Operation	8
2.14	Handling after Maintenance	8
2.15	Miscellaneous	9
3	HANDLING AND INSTALLATION	10
3.1	Preparation for Installation	10
3.1.1	Ambient Requirement (for machine)	10
3.2.1	Ambient Requirement (for NC)	10
3.2	Handling of the Machine	10
3.3	How to Install the Machine	11
3.2.1	Foundation	11
3.3.2	Temporary Leveling	12
3.3.3	Inspection of Inner Devices Connection	12
3.3.4	Inspection before Operation	12
3.3.5	Maintenance and Inspection of Inner Devices Connection after Installation	13
3.3.6	Maintenance of Primary Period after Installation	13
3.3.7	Check the Connection of Inner Devices	13
3.3.8	Check Electric Control Panel	14
3.3.9	Occupied Floor Space and Arrangement of Foundation Holes	15
4	SPECIFICATION OF THE MACHINE	16
5	TRANSMISSION, ADJUSTMENT AND MATTERS NEEDING ATTENTION	18
5.1	Main Transmission of the Machine	18
5.2	Longitudinal/Transverse Feed	20
5.3	Turret	23
5.4	Principle of Zero Point Reset	24
6	LUBRICATION OF THE MACHINE AND COOLING OF WORKPIECE	25
6.1	Lubrication of the Headstock	25

6.2	Lubrication of the Carriage and the Slide	25
6.3	Lubrication of Turret	25
6.4	Lubrication of Other Parts	25
6.5	Cooling of Workpiece	25
7	HYDRAULIC SYSTEM	27
7.1	Composition of Hydraulic System	27
7.2	Function and Working Principle of Hydraulic System	27
7.2.1	Oil Tank	27
7.2.2	Pipe Line	27
7.2.3	Hydraulic Device of Spindle and Control Board for Lubricating	27
7.2.4	Hydraulic Control Board of Sizing Device	27
7.3	Application and Maintenance of Hydraulic System	28
7.4	Trouble and Trouble-shooting of Hydraulic System	28
8	PNEUMATIC SYSTEM	31
8.1	Disposition of Pneumatic System	31
8.2	Working Principle of Pneumatic System	31
8.2.1	Pneumatic Source	31
8.2.2	Chuck Clamping	31
8.3	Use and Maintenance of Pneumatic System	31
8.3.1	Installation of Components	31
8.3.2	Adjustment of Pressure	31
8.3.3	Adjustment of Oil Amount	31
8.3.4	Maintenance	31
9	DRAWING OF WEARING PARTS	33

1 PREFACE

1.1 Applicable Range and Purpose of the Instruction Book

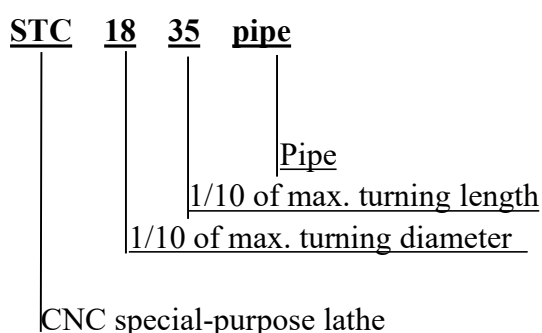
The Instruction Book of STC1835pipe (Japan FANUC 0i-TC system is adopted) CNC pipe-threading lathe consists of three parts of 《Instruction Book (for Mechanical Unit)》, 《Instruction Book (for Electric Unit)》 and 《Circuit Programs》. You should read the Instruction Book thoroughly and carefully before you operate the machine.

The Chapter 2 in this Instruction Book gives matters needing attention to safety protection. Operator should take it as routine inspection item of operation of the machine.

The chapter 3 Handling and Installation provides the method for installing the machine and the matters needing attention during the installation.

If you find any trouble which is not mentioned by this Instruction Book, please get in touch with the Marketing Department of our factory.

1.2 Meaning of Product Model



1.3 Major Applications of the Machine

The machine is mainly used to turn pipe threads and is suitable to turn cylindrical or taper pipe threads of metric/inch system. Further more, this machine also can undertake the work of universal lathe. For example, turn various shaft workpieces, disc workpieces of arc taper, common threads and internal/external cylindrical surfaces. It can be used in petroleum industry, metallurgy industry, chemical industry, water and electricity industry and geological industry, especially in machining oil pipe, casing pipe. Normal turning accuracy of the machine can catch up IT7 and the surface roughness of turned workpiece Ra 1.6 μ m.

1.4 Accuracy of the Machine

The accuracy of the machine is in accordance with 《Accuracy of Lathe S1-400》.

1.5 Environment Available for the Machine

Environment available for the machine working should be following:

- Air temperature of the environment: Range of 5°C – 40°C
- Humidity: Highest temperature: 40°C, relative humidity is not over 50% and the Changing principle of the humidity should not cause condensation.

- Sea level elevation: Less than 1000 m.
- Atmospheric pollution: There is not too much dust, acid gas, corrosive gas and salt component.
- Radiation: The machine should not be directly shining by sun or radiated by heat to prevent the temperature from changing.
- The position for installation of the machine should be away from vibrating source and inflammables and hazard articles.

1.6 Effects of the Machine to Environment

Sound pressure class of dry running noise of the machine is ≤ 83 dB (A). The machine does not exhaust/drain harmful gas or fluid because it uses semi-protecting structure, therefore, the machine does not give out harmful effects to the environment.

2 MATTERS NEEDING ATTENTION TO SAFETY PROTECTION

The machine is provided with some safeguards to prevent operator from injury or machine from damage. So Before operation of the machine, it is necessary to be acquainted with details on the all safety labels and the following regulations.

2.1 Requirements for the operators and the maintainers

- The operators who operate the machine should have been trained and gain the certificate to operate the machine. The operators should read carefully the «Instruction Book for Operation» and well understand the content of it, master the skill before operating the machine.
- The maintainer who has gained the concerned certificate or has had professional ability should perform maintenance to prevent accidental events.

2.2 Basic Operation Requirement

Danger:

- Do not touch some devices; such as control board, transformer, motors, terminal block and other places as well as high voltage terminals, otherwise, it may cause shock.
- Never touch any switch with wet hand; it will cause shock, too.

Warn:

- Be familiar with the positions of emergency stop buttons so that to touch them immediately whenever they are needed.
- It is necessary to cut off the power of the machine before replacing fuse.
- Turn off the switch of main circuit immediately as soon as trouble occurs on power supply
- When two persons should do a job, every operation step should set a signal for coordination, and next step cannot be done unless the signal specified is given.

Notice:

- Recommended hydraulic oil, lubrication oil and grease or the oil having same functions as the recommend ones that are allowed should be used.
- The fuse, which has satisfied rated current value, should be used.
- Protect the NC device, operation panel or electric control panel from being attacked, otherwise, resulting in trouble to make the machine do not work normally.
- Don't change parameter value or other electric devices. If it must be changed, you should register the original value before change, so that it can recover to the original value when needed.

- Do not dirty nick or fall down any caution sign label. If the words on it are not clear or it is lost, order new one from our Works. And when you order it, write clear the part No. of it, please.
- Enough working space should be given to avoid accident.
- Oil or water can make the floor slipping to cause danger. So, always keep the floor clean and dry.
- Confirm the switch you are going to use, don't mistake.
- Don't touch switches without any meaning.
- The worktable near the machine should be very strong and stable to prevent something from sliding down from it.

2.3 Requirement prior to 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 use.

Warn:

- It is necessary to understand all the details specified in the Instruction Book and Programming Manual, and make clear for every function and operation procedure.
- Wear the insulating shoes, overalls and other articles for safeguard.
- Close the doors and covers of NC unit, operation panel and electric control panel.

Notice:

- The cables used for electrifying switch and main circuit switch fitted for the machine should have enough section to meet the needs of requirements.
- The cables set on the floor must have the ability of chip proof to avoid shorts.
- After unpacking the wooden cases of the machine and before starting to operate it at first time make the machine to dry run for several hours, and oil the slip parts with new lubrication oil, the lubrication pump should continuously work until the oil seeps from chip scraper.
- The oil tank of the machine should be filled to the oil level, and check it, refill it when necessary.
- For lubricating point, the kind of oil and relative oil position, please refer to their sign labels.
- Every switch and operating lever should be nimble, smooth and their actions should be checked.

- When you do feeding to the machine, it is necessary to switch on the factory electrifying switch, main circuit switch and power supply switch (set them to Positions “ON”) on the operating pendant in turn.
- Check the amount of coolant; add it when necessary.

2.4 Requirement after Switching on the Power Supply

When the power supply switch in the operating pendant is set to ON (electrifying), check whether the indicator lamp READY (preparation) lights or not.

2.5 Normal Inspection

Warn:

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

Notice:

- Check if the reading on the pressure meter is correct.
- Check if there is any abnormal noise comes from motor, gear box or other parts.
- Check the lubrication state of slide parts.
- Check if the safeguard device or protective cover is under good status.
- Check the tension of the belts. If they are too loose, replace them with new matchable ones.

2.6 Temperature Raising

Notice:

- When you raise the temperature of the machine, especially for spindle and feed shaft, the machine should run at half or one third of max. speed for 10-20 minutes in Auto mode so that let the machine reach the stable temperature.
- Automatic operation program of this machine controls all the actions of the machine, so every action of it should be checked.
- If the machine has been stopped for a long time, you would better not to start the machine with actual machining, otherwise, the slide parts will be damaged because of the lubrication is not sufficient. For this reason the machine parts may get heat expansion, to affect the machining accuracy. In order to avoid this situation the machine temperature should be raised.

2.7 Preparation for Operation of the Machine

Warn

- Tooling should accord with the technical parameters, size and type of the machine.
- New ones should replace excessively worn tools beforehand.
- For the convenience of safe check, the working area should have enough brightness.
- Tools and other things cannot be put on the headstock, the cover of the turret or other similar positions.
- Tools or other things around the machine or equipment should be arranged in perfect order and easy to reach, the path is unlocked.
- 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.

Notice:

- The length of workpiece should be limited within the limitation specified range to avoid interference.
- When the tools were set, trial running should be performed first.

2.8 Matters Needing Attention:**Danger:**

- Long hair should be covered with cap when operating the machine.
- Workpiece must be chucked tightly.
- Workpiece can be unloaded only when the tool and spindle are under stop status.
- During machining don't touch workpiece or spindle by hand or by other mode
- Do not open the door of machine during automatic machining.
- During heavy cutting, the hot chip may cause fire, so prevent the chip from congestion.

Warn:

- When operating the machine, operate the switches without gloves to avoid disoperation.
- Workpiece can be unloaded only when the tool and spindle are under stop status.
- Do not remove chip during machining.
- Do not operate the machine before the safeguard devices are not closed well.

Notice:

- When moving heavy workpiece, more than two people must work together to ensure safety.

- The operators of fork type lifter, crane or other similar equipment must have been professional trained and have gained certificate.
- Whenever operating the fork type lifter, crane or other similar equipment, great attention should be paid to avoid collide with other devices.
- The steel wire or hook being used for handling must have enough strength to satisfy the requirement of loading, and they must limited within the safe rules.
- Do not clean chip on the cutter by bare hand to use brush to clean it.
- The work of mounting and dismounting tools should be done only under status of the machine stop.
- Operator should wear anti-gas mask when machining the workpiece made of magnesium alloy.

2.9 Machining Interruption

Notice:

After machining, before the operator leave from the machine, turn off the switch of power supply on the pendant and switch off the main circuit switch.

2.10 After Completion of Turning Job

Notice:

- Do not do cleaning work before the machine stops.
- When the machining is ending, remove the chip and clean the door, window and cover.
- Back all parts of the machine to their original positions.
- Check the chip scraper; if it is damaged, replace it with a new one.
- Check coolant and lubricating oil, if the lubricating oil is very dirty, change it with new oil.
- Check the amount of coolant and lubricating oil, add them when necessary.
- Clean the oil filter of the water tank.
- Before you leave from the machine, turn off the power supply switch on the pendant, also turn off the main circuit switch and main switch of the machine.

2.11 Safeguard Devices

- Front and back protection device and coolant protection device.
- Overtravel limitation switch
- Protection device for chuck, tailstock and tool (NC software is set by user parameters).
- Store travel limit (NC software)

- Emergency stop button

2.12 Preparation before Maintenance

Warn:

- Any maintenance cannot be done without allowance
- Replacement of parts, wearing parts (seal, O-type ring, bearing, grease and oil) should be made according to preplan.
- Prepare record, preventive measures and correct maintenance method.

Notice:

- Carefully read and acquaint the safeguard devices specified in the INSTRUCTION BOOK.
- Read the INSTRUCTION BOOK carefully and thoroughly and acquaint the relative principle, structure and notices included in the Book.

2.13 Maintenance Operation

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:

- A professional maintainer should do the work of electric maintenance and the man should always get in touch with the chief, never make any decision by himself.
- Travel limit device, approach switch or interlock devices cannot be dismantled or modified.
- In order to ensure the ladder or the lifter used for altitude work must be maintained and controlled every day.
- Fuses and cables used for the machine should be certificated products.

2.14 Handling after Maintenance

Warn:

- After maintenance is finished, the working place should be cleaned and rearranged, the oil, water on every part should be cleared away to get a good working ambience.
- Take the dismantled parts and dirty oil far away from the machine to keep safety.

Notice:

- Maintainer should check if the operation of the machine is safe.
- Register and keep all the data of maintenance and inspection for later use.

2.15 Miscellaneous

Rated allowed loading of the machine:

Power of man motor: common motor 11 kW; main servo motor 15 kW

Max. torque: common motor 965 Nm; main servo motor 764 Nm

It is forbidden for the dry-running of the chuck in case that the chuck is clamping a workpiece, otherwise, the jaw may flick to hurt people.

3 HANDLING AND INSTALLATION

3.1 Preparation for Installation

3.1.1 Ambient Requirement (for machine)

Machine should not be installed in the positions listed below:

- The ambient temperature can obviously change. For example, the machine's installing position is closed to the heat resource or there is a heat resource near the machine.
- Over wet place.
- Too dust, too dirty place.
- Near the vibration resource.
- The floor for installing the machine is not strong enough or soft.

Notice:

- If the machine has to be installed near the position with vibration resource, dig a canal around the machine or make similar measures for anti-vibration.
- If the machine has to be installed on the soft soil, it is necessary to use the pile way or similar measures to increase the force of support of the soil, so that the machine will not sink or incline.

3.2.1 Ambient Requirement (for NC)

- Refer to the Standard GB/T5226.1-1996.

3.2 Handling of the Machine

In general case, the machine is handled (transported) by fork truck. If steel wire rope is used for handling, the action of front two points and rear two points should be adopted, shown by Fig.1.

During handling, great attention should be paid to avoid the NC system and the high voltage switchboard to be shocked. Before handling the machine, check if every part is stable or movable, whether there is article which is not allowed to be put on the machine.

Handling the machine should be carried out according to the following requirements:

- When handling the machine, do not make the steel wire rope directly touch the machine. Before the machine is lifted, wooden block or waste cloth should be padded between the strong steel wire rope and the machine to prevent the face of the machine from being scratched.
- The machine should be kept balance in both horizontal and vertical directions during handling, therefore, at the very beginning when the machine being lifted up from the ground, the machine should be kept balance.
- The angle of the handling steel wire rope shall not be more than 60° .

- Whenever the handling work is carried out by more than one person, signals should be used between each other for coordination.

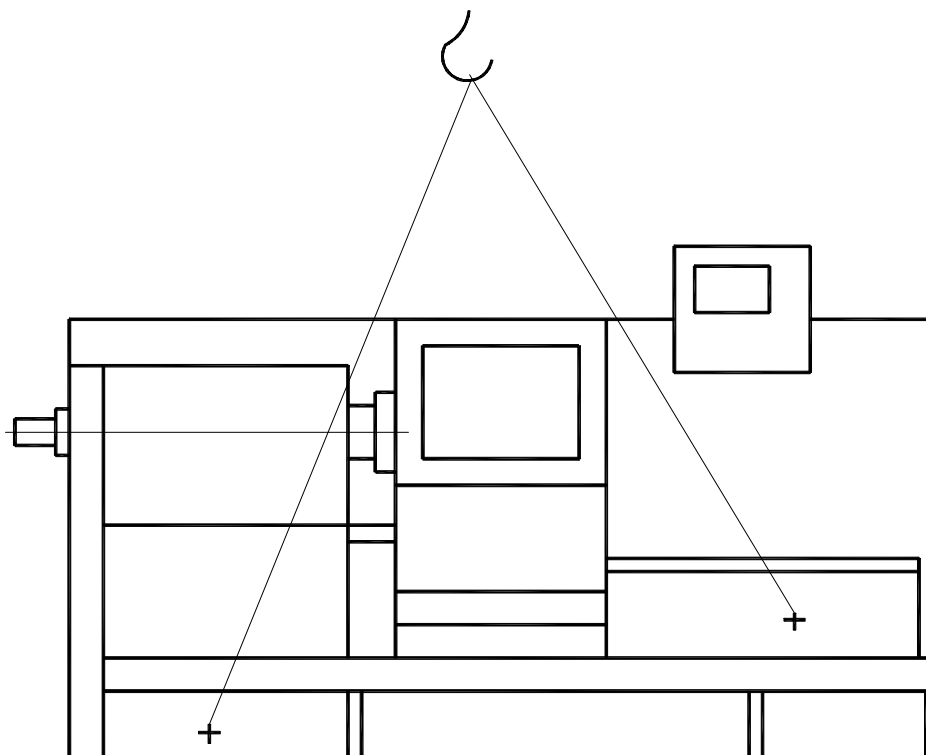


Fig. 1 Handling schematic plan of the machine

3.3 How to Install the Machine

The performance of a machine is greatly influenced by the installation way. If the guideways of a machine is precisely machined, but the original accuracy cannot be reached due to the reason of bad installation of the machine. And most troubles of the machine are caused by this reason; thus, it is very difficult to obtain required turning accuracy.

It is necessary to read the installing procedures carefully and install the machine according to the requirements specified so that the machine can perform high precision machining.

3.2.1 Foundation

For machine installation, a plane installation place should be first founded, then determine the installation space according to the regulations given by the chapter 3.1, and prepare the foundation according to the Foundation plan and ambient requirements.

For floor space of machine itself and machine maintenance, it is specified in Foundation plan.

3.3.2 Temporary Leveling

- ① Hang up the machine, put the foundation bolts and wedges into leveling boltholes.
- ② Put down the machine slowly, then, adjust the wedges and the bolts to obtain leveling. For the checked item and concerned permissible error of leveling of the bed of the machine, refer to the Test Certificate of the Machine.
- ③ After completion of leveling adjustment, tighten the wedge bolts to ensure no changing of the leveling.

3.3.3 Inspection of Inner Devices Connection

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

- Be sure that grounding wire connected correctly.
- Tighten the screws on terminals.
- Check again if every connector is tightly connected.
- Make sure that the relays and the timers are correctly connected.
- Make sure the printed-circuit boards inside NC devices firmly fixed.
- Make sure that input power supply is in correct phase.
- Make sure that the values set to the timer and the other meters must be accurate.

3.3.4 Inspection before Operation

After connection of inside devices, check the mechanical system and electrical system of the machine according to the following rules:

- Inspection of Machine:
- Check if any part of the machine has been damaged.
- Check if any part or attachment has been lost.
- Check if lubricating oil and hydraulic oil have been supplied to specified every location.
- Check if all the hydraulic pipes have been connected well.
- For check of electrical system before/after switching on (refer to the Chapter 2 : Matters Needing Attention to Safety Protection).
- Matters needing attention when the machine is under the condition of stopped for a long term:
When the machine is started first time after installation or after a long term of unused, it is necessary to pull the handle of lubricating pump a few times to make the slide surfaces have enough lubrication oil.
- Components dismantled from installation, transportation and packing.
- After the machine is installed, those plates, bolts and the other articles for handling should all be removed and keep them well.

- It is necessary to install it back to their original positions that the covers and the other attachments are dismantled and packed separately for packing.
- Cleaning:
Sliding surfaces and some metal surfaces of the machine have been covered with a film of rust preventive for antirust. Some dust, sand or other dirty things may come into antirust layer during transportation, so, before starting the machine, clean out this rust preventive layer with cloth dipped with cleaning oil. After cleaning, film each sliding part with lubricating oil.

Notice:

- When cleaning, pay attention to that dirty oil is not allowed to come into the inside of the machine.
- The waste oilcloth used should be put into given place.
- Connect the power supply on the switch of main power supply.

3.3.5 Maintenance and Inspection of Inner Devices Connection after Installation

In order to ensure keeping the accuracy of the machine and making the machine under normal and good working status for a long time, it is necessary to give proper maintenance to the machine. Carefully observe working status of the machine regularly check and change worn parts as earlier as possible to avoid accident.

3.3.6 Maintenance of Primary Period after Installation

For the primary period after the machine installation, the level of the machine bed will change obviously for reasons of unstable solidifying of the surface and the solidification of foundation are not steady, thus, the accuracy of the machine will be greatly affected. On the other hand, the machine is very easy to be polluted by primary wear, very easy to result in machine trouble.

Some measures which should be used for primary period service after installation are given below.

- Trial-run:
For first time trial-running, it should be carried out with great care, the time of trial-run is about 80 hours, and heavy load cannot be used during trial-run.
- Check the bed level and the foundation once a month at least after the machine is installed for six months. If any abnormal phenomenon is found, correct it to reach the specified requirement so that the accuracy of the bed level can be ensured.
- After six months, the checking period can be extended according to the situation of practical change. When the change reaches to certain steady, the checking period can be set for once or twice a year.

3.3.7 Check the Connection of Inner Devices

Check NC device, main machine, hydraulic devices control panel and other devices to make sure that their electric connections correct.

- Check if connectors were tightly connected.

Check if electric connectors between devices were tight, and tighten them when necessary.

- Check if terminals were connected well.

Check the machine interface and the terminal screws of electric equipment on control panel, if any of them is loose, tighten them according to the requirements.

- Check if the terminal screws of installing screws on micro switch are loose, and tighten them when needed.

3.3.8 Check Electric Control Panel

Before checking, switch off the power supply of the machine, then do following inspections.

- Terminal screw and weldments

Check every terminal screw on electric equipment, tighten them when loosen, softly pull the weldments on relay board to make sure they are welded well.

- Cleaning:

When some dust, chip or other dirty things were inside the electric control panel, clean them out carefully; otherwise, they may cause trouble.

- When the sir filter become black, that means it was polluted, dismount it and clean it softly with water.

3.3.9 Occupied Floor Space and Arrangement of Foundation Holes

Occupied floor space and Arrangement of foundation holes of the main machine are as follows:

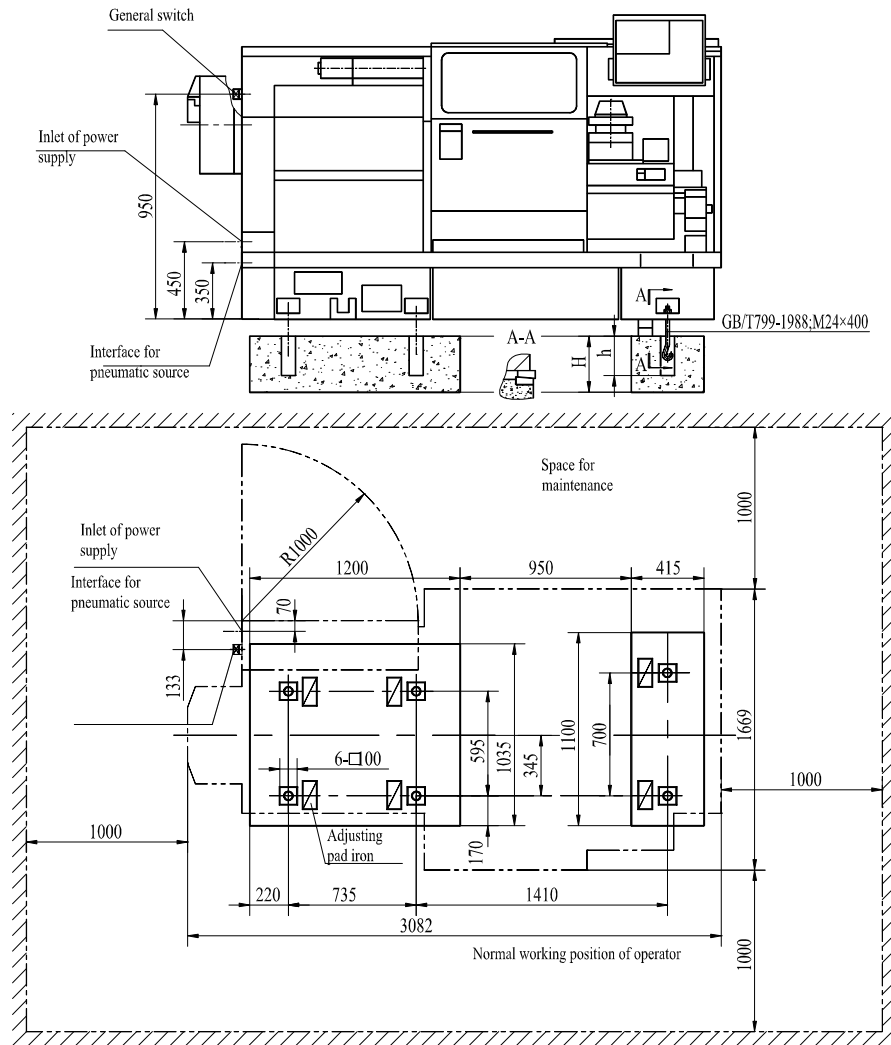


Fig. 2 Occupied floor space and arrangement of foundation holes of the main machine

4 SPECIFICATION OF THE MACHINE

Item		Unit	Specification	Remarks	
Max. dia. of workpiece to be turned		mm	180		
Max. length of workpiece to be turned		mm	14000		
Spindle speed		r/min	8 classes, 90~605	▲	
			Stepless, 90~610	★	
Spindle bore		mm	205		
Station of turret			4		
Rapid speed of X-axis		m/min	4		
Rapid speed of Z-axis		m/min	8		
Min. feed setting unit of X-axis		mm	0.0005		
Min. feed setting unit of Z-axis		mm	0.001		
Main motor	Type		YD160L-6/4	▲	
			FANUC foundation-type III α 15/7000i	★	
	Power		9/11	▲	
			15/18.5	★	
	Speed		970/1460	▲	
			1500/7000	★	
Servo motor	X-axis	Type	β 12/2000is (FANUC)	▲	
			α C8/2000i (FANUC)	★	
		Speed	r/min	2000	▲
				2000	★
		Power	kW	1.8	▲
				1.2	★
	Z-axis	Type	β 12/2000is (FANUC)	▲	
			α C22/2000i (FANUC)	★	
		Speed	r/min	2000	▲
				2000	★
		Power	kW	2.5	▲
				3	★
Cooling pump	Type		YSB- II -50		
	Power		W	90	
Hydraulic motor	Type		Y802-4-B3		
	Speed		r/min	1360	
	Power		kW	0.75	
Power supply	Voltage		V	380	
	Frequency		Hz	50	

Current consumption	KVA	40	
Control system		FUNAC 0i-Mate	
Overall dimensions of the machine (L.×W.×H.)	m ³	3070×1690×1740	
Weight of the machine	kg	4500	

The parts with “▲”symbol are equipped for double-speed motor.

The parts with “★”symbol are equipped for main servo motor.

5 TRANSMISSION, ADJUSTMENT AND MATTERS NEEDING ATTENTION

For transmission system of the machine with double-speed motor, refer to Fig. 3 below.

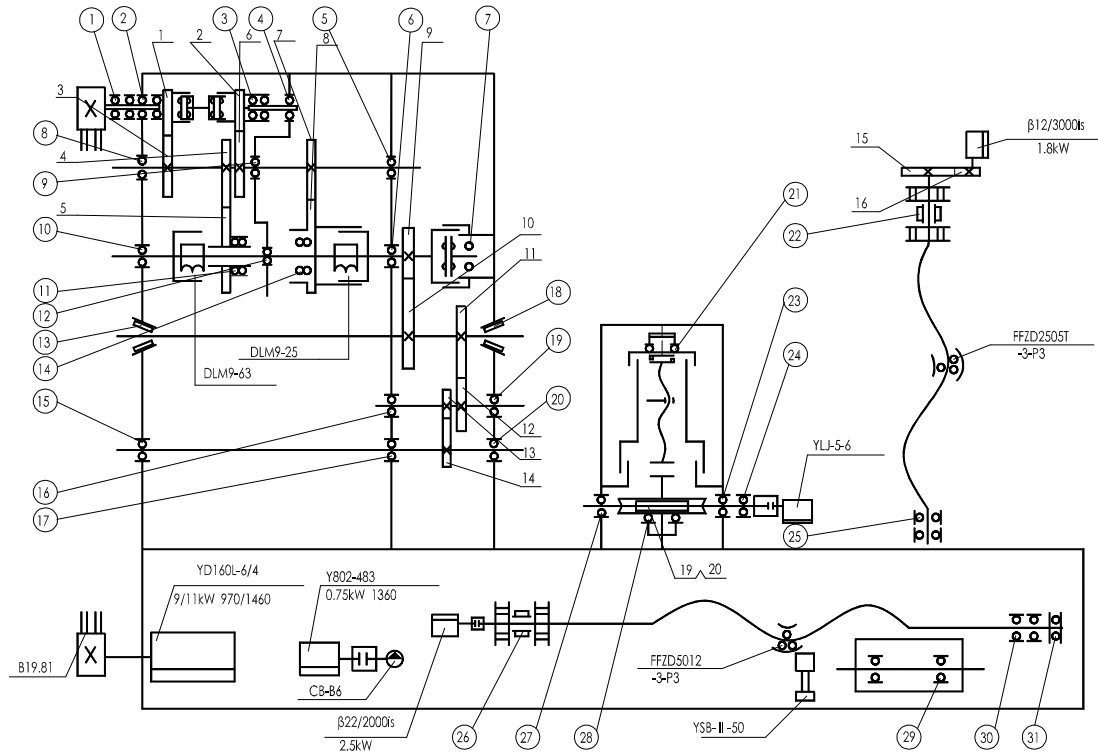


Fig. 3 Schematic drawing of transmission system with double-speed motor of the machine

5.1 Main Transmission of the Machine

- The main transmission of the machine is transmitted to headstock by the main motor through the pulley.
- In the headstock, there are two groups of hydraulic clutches and two groups of electromagnetic clutches; they transmit the power to the spindle.
- The machine has 8 classes of revolution. The double-speed motor, the two groups of hydraulic clutches and the two electromagnetic clutches can realize automatically to change over 8 classes of revolution without stop of the machine.
- The shaft III is provided with braking device.
- When stopping the machine, first, let the clutches unengaged for delaying braking, when starting the machine, first, unengaged the braking far delaying to engage clutches.
- The spindle of the machine adapts cone roller bearings. Axial clearance and radial clearance are adjusted by means of the nuts.

- Too large or too small of clearance of spindle bearings all directly affect turning accuracy and normal operation of the machine. If run-out of the spindle and camming of the endface of spindle are found not in accordance with the requirements given by Test Certificate of the machine, it is necessary to adjust them. If they are still not upto the requirements, check whether the bearings and concerned component(s) are damaged.
- After completion of adjusting the machine, the machine should be tested in condition of dry-run, running time of 605 r/min should not be less than one hour. The value of temperature increasing of the spindle during the running shall not be more than 40°C. It is necessary to pay attention to the temperature increasing change at all times. If unnormal occurs, stop the machine immediately, then, let the machine checked and adjusted by specialized person.
- Regularly check tension of the V-belts between the main motor and the headstock. If the belts are too loose, adjusting the tension device near the belts is OK.

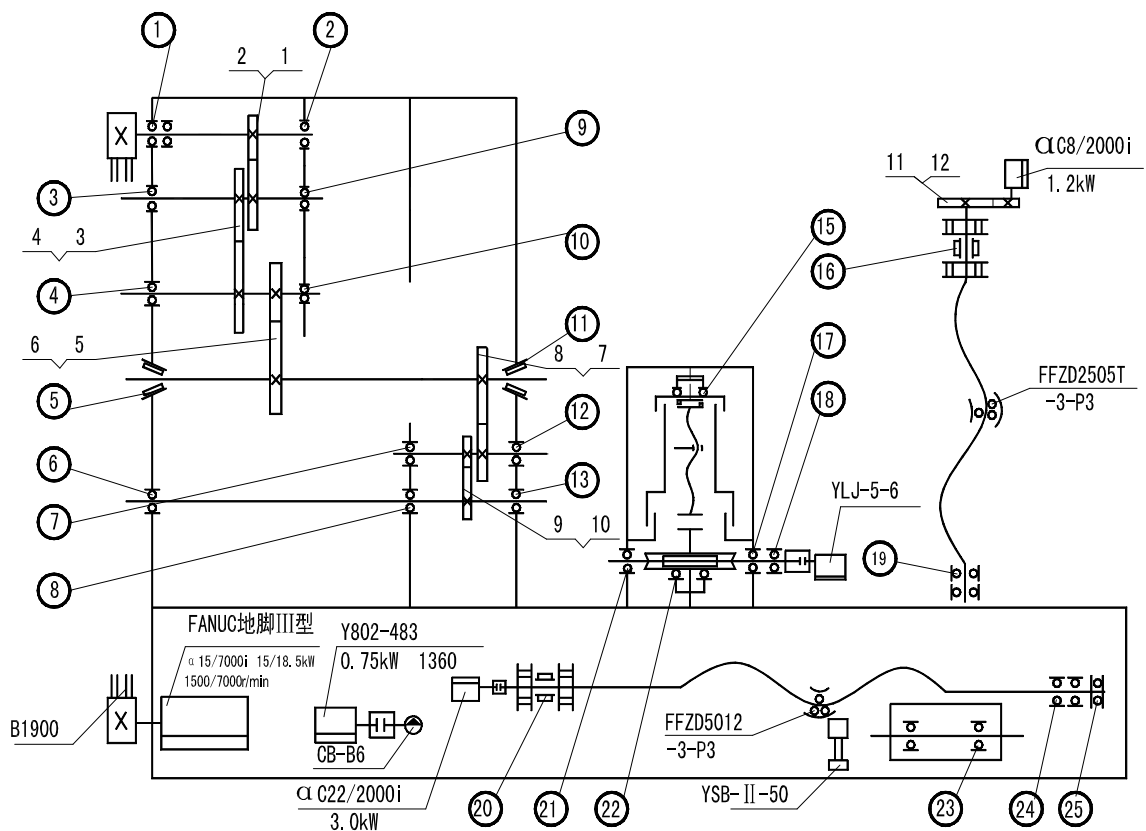


Fig. 4 Schematic drawing of transmission system with main servo motor of the machine

5.2 Longitudinal/Transverse Feed

- The longitudinal/transverse feed is realized through such a way that the servo motor drives the ball screw through one time retarding of the gears and rotary motion changes into straight motion by means of the ball screw and the nut on it.
- In order to eliminate the clearance between the two gears during feeding the machine is provided with a mechanism for eliminating clearance (shown as Fig. 4). If you want to shorten the clearance, you may first loose the locking nut 46, then three fixing screws 47, thus, the two gears can rotate in different direction under force action from the spring 48 to make the clearance be shortened, then, retighten the screws.
- The expansion sleeve 49 is used to fix the gears and the motor shaft. When dismounting or locking them, you may uniformly loosen and screw down the screws.
- If feed is found not exact, check if every screw and nut mentioned above is loosen, the clearance of the bearings is too large and the expansion sleeve is slip.
- The nut body of the ball screw is not allowed willingly to be dismounted, if there is any trouble, please get in touch with the manufacturer.

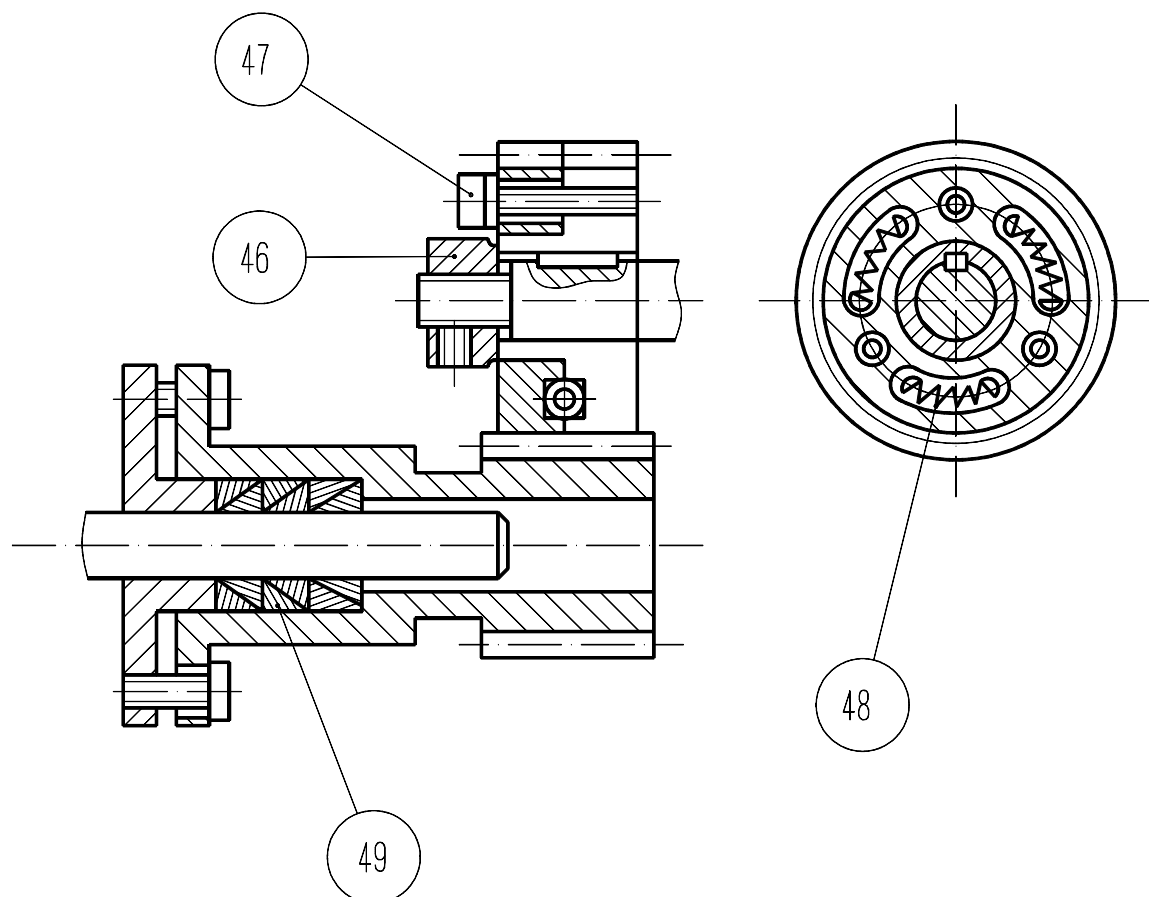


Fig. 5 Adjustment of clearance of the feed system

- Table of gears with double-speed motor

No.	Teeth	Module	Coefficient	Part No.
1	55	2.5	0.48	363-02003L1
2	46	2.5		363-02004L1
3	42	2.5		363-02049L
4	20	3	0.5	363-02050L
5	72	3	0.5	363-02038L
6	50	2.5		363-02051L
7	43	3		400-02046L
8	49	3		400-02023L
9	31	4.5		400-02021L
10	86	4.5		400-02028L
11	120	2.5		400-02007L
12	60	2.5		400-02051L
13	28	2.5		400-02050L
14	56	2.5		400-02039L
15	35	2		363-02028L
16	28	2		363-05005L
17				
18				
19				
20				

- Table of bearings with double-speed motor

No.	Size and Type		Qty.
1	45×85×19	209	2
2	45×75×16	109	2
3	45×75×16	109	2
4	45×100×25	309	1
5	30×72×19	306	1
6	60×110×22	212	1
7	45×85×19	209	1
8	35×80×21	307	1
9	40×80×18	208	1

STC1835pipe TRANSMISSION, ADJUSTMENT ANS MATTERS NEEDING ATTENTION

10	35×80×21 E307	1
11	70×110×20 114	2
12	50×90×20 210	1
13	260×360×63.5 D2007952	1
14	50×80×16 E110	2
15	50×90×20 210	1
16	30×55×9 7000106	1
17	45×75×16 109	1
18	260×360×63.5 D2007952	1
19	30×55×9 7000106	1
20	30×55×9 7000106	1
21	40×60×13 8130	1
22	20×52×46 ZARN2050TR	1
23	25×47×12 46105	1
24	25×47×12 105	1
25	20×42×24 DZ46104	1
26	35×70×54 ZARN3570TN	1
27	25×47×12 46105	1
28	45×65×14 8109	1
29	15×28×7 1000902	2
30	35×62×14 D107	2
31	30×52×16 D8206	1

- Table of gears with main servo motor

No.	Teeth	Module	Coefficient	Part No.
1	44	2.5		400A02023L
2	52	2.5		400A02013L
3	35	3		400A02014L
4	57	3		400A02008L
5	31	4.5		400-02021L
6	86	4.5		400-02028L
7	120	2.5		400-02027L
8	60	2.5		400-02051L
9	28	2.5		400-02050L
10	56	2.5		400-02039L
11	35	2		363-02028L
12	28	2		363-05005L

- Table of bearings with main servo motor

No.	Size and Type	Qty.
1	75×130×25 E215	2
2	55×120×29 311	1
3	35×80×21 307	1
4	60×110×22 212	1
5	260×360×63.5 D2007952	1
6	50×90×20 210	1
7	30×55×9 7000106	1
8	45×75×16 109	1
9	40×90×23 308	1
10	60×110×22 212	1
11	260×360×63.5 D2007952	1
12	35×55×9 7000106	1
13	35×55×9 7000106	1
14	40×60×13 8130	1
15	20×52×46 ZARN2050TR	1
16	25×47×12 46105	1
17	25×47×12 105	1
18	20×42×24 DZ46104	1
19	35×70×54 ZARN3570TN	1
20	25×47×12 46105	1
21	45×65×14 8109	1
22	15×28×7 1000902	1
23	35×62×14 D107	1
24	30×52×16 D8206	1

5.3 Turret

- For the turret, refer to the Instruction Book for turret for detail, please.
- Pay attention to that every part of the turret had been well adjusted before delivery of the machine. Do not dismount and move it at own will in the case of no specialized person in site or no through understanding the structure, push-button function of the machine.
- If any peculiar smell or abnormal noise or improper working occurs, you should press the red emergency stop button on the operator's panel at once to stop the machine. Only after the trouble is remedied by specialized person(s), and the machine goes through trial-run, you can be allowed to operate the machine normally.

5.4 Principle of Zero Point Reset

In the movement range of the turret, there is a reference position (usually called reference point) relative to zero point of the machine. Mechanical coordinate specified by NC device is used to control the movement of the turret. Since servo system for two axes of the machine adopts absolute position encoder which possess memory function, return reference point has been conducted and mechanical coordinate has been established after the machine had been delivered, this coordinate system can be memorized by the encoder after power-off of the machine. So it is not necessary for the user to return reference point after power-on each time when the user operates the machine. Even if there is not a system alarm if the reference point is lost due to loss of battery voltage or the reference point changes due to the change of relative position of X/Z servo motor and X/Z servo motor, the reference point has to be set again. Please refer to 《Instruction Book (for Electrical Unit)》 for the actual setting method.

6 LUBRICATION OF THE MACHINE AND COOLING OF WORKPIECE

6.1 Lubrication of the Headstock

- Lubrication of the headstock is supplied by the hydraulic system.

6.2 Lubrication of the Carriage and the Slide

- Lubrication of the carriage and the slide is lubricated by electron pump mounted in the apron and a special-purpose oil tank is in the apron. The operator's panel is provided with special-purpose switch. After power-on of the machine and before starting of the machine, shift the switch for lubricating pump on the operator's panel. The electron pump will start to lubricate guideways, leadscrews, etc., then make the carriage, the leadscrew, etc. moving.
- It is not allowed to let the electron pump supply oil and it should be controlled by operator timely to supply oil for lubrication because the volume of the oil tank is a limit and resulting in unnecessary waste. The supplying time of every time is about five seconds, two to four times every day. The supplying oil time will have some differences due to the change of oil viscous and temperature. When supplying oil: if a small amount oil leaked from the between of the carriage and the guideway surface appears, you should stop supplying of oil.

6.3 Lubrication of Turret

- The tool post (turret) has been filled will grease in its inside. And the grease should be changed when maintaining the turret.

6.4 Lubrication of Other Parts

- Fill clean lubricating oil into concerned part on time according to the stipulation of Fig. 5 Lubrication chart.
- Oil level in every oil tank should not be lower than the center of oil level window, also pay attention to that whether there is any oil on every lubricating point.

6.5 Cooling of Workpiece

- The coolant for workpiece is contained in the coolant tank. Coolant is supplied by YSB-II-50 cooling pump, and coolant-on and coolant-off are controlled by the switch set on the operator's panel. The coolant is jetted from the square hole of the turret through the slide.
- User should select the coolant according to practical turning case. The coolant tank should be cleaned at proper interval; the principle of changing coolant is that coolant does not degenerate.

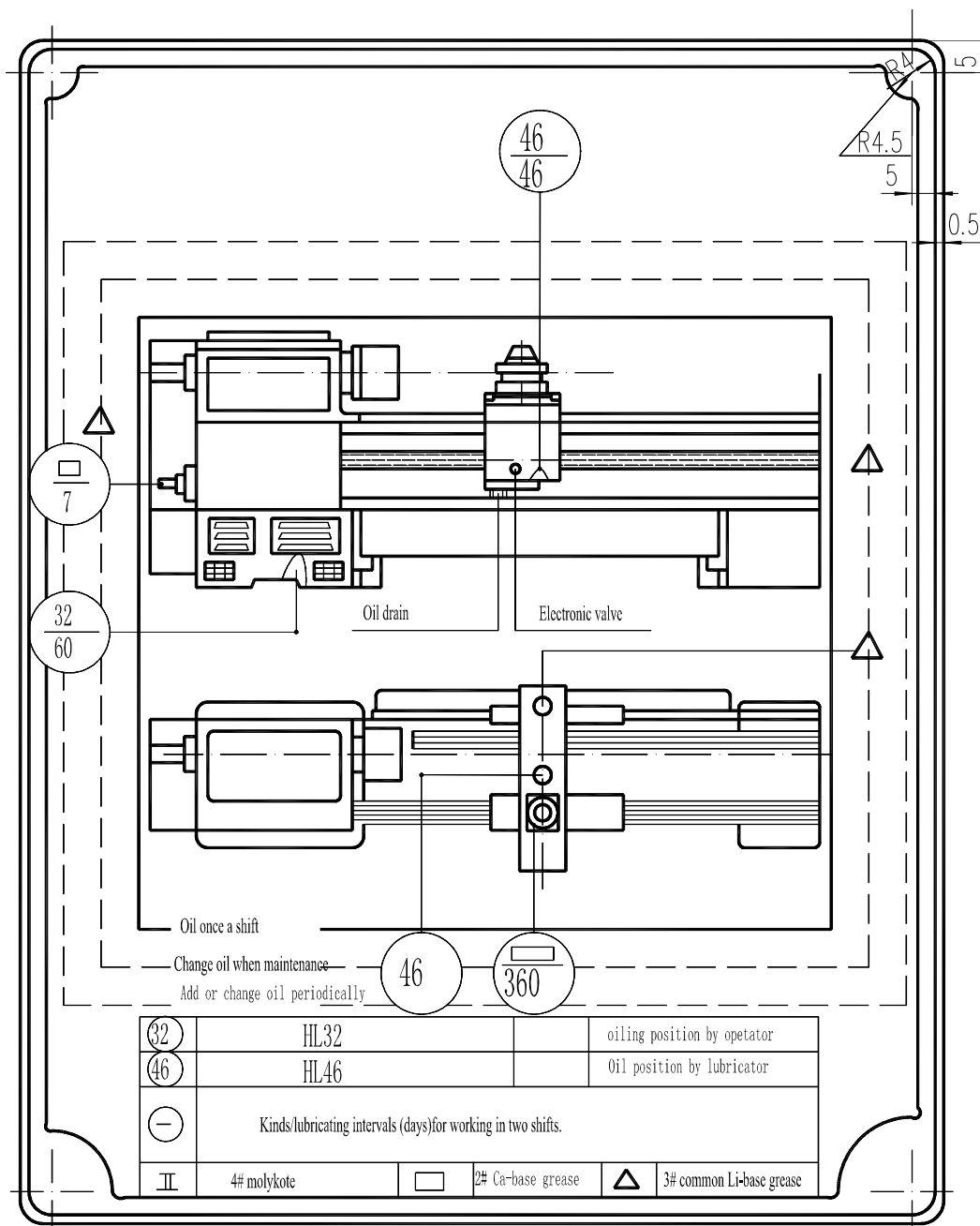


Fig. 6 Lubrication chart of the machine

7 HYDRAULIC SYSTEM

7.1 Composition of Hydraulic System

- Hydraulic system of the machine consists of three units, that is, Unit 80 (oil tank), Unit 82 (hydraulic device of spindle and control board for lubricating), Unit 81 (pipe line) and Unit 83 (hydraulic control board for sizing device). Among them, the Unit 80 mainly includes oil tank, oil leveler, etc. The Unit 81 is mainly composed of motor, hydraulic pump, oil pipe, etc.; the Unit 82 mainly consists of some control components such as control board, valves, pressure meter, etc.; the Unit 83 mainly consists of some components such as control board, valves, etc.

7.2 Function and Working Principle of Hydraulic System

- The hydraulic clutches in headstock have functions of changing speed, braking spindle, lubricating gears and bearings of headstock and locking and of sizing device. Refer to Fig.7 Hydraulic principle drawing 1 for details.

7.2.1 Oil Tank

- The two oil tanks of the machine are located respectively in side of the front leg and under the machine bed, one of the oil tanks can be visible when the protection cover is opened from the back of the machine. On the top of the oil tank there is a pouring hole and the draining exit is set on the bottom of it. The real-time oil amount of hydraulic system can be observed through the oil lever on the oil tank.

7.2.2 Pipe Line

- Unit 81 is mainly composed of motor, pump, oil filter, pipe line, etc. The motor is set under the electric cabinet. Type of the motor is Y802-4 (B3) and its power is 0.75 kW, the speed 1500 r/min. Type of the pump is CB-B6 (reverse) and type of the oil filter is XU-40×200.

7.2.3 Hydraulic Device of Spindle and Control Board for Lubricating

- This unit mainly consists of control board, electromagnetic reversing valves SWH-G02-C4-D24-20 and SWH-G02-C8SB-D24-20, spill valve MRF-02P-1-20 and pressure meter, etc. the electromagnetic reversing valve SWH-G02-C4-D24-20 control the changing speed 1 and the changing speed 2. When YV4 electrifying, the changing speed 1 is being controlled and when YV5 electrifying the changing speed 2 is being controlled.
- The electromagnetic reversing valve SWH-G02-C8SB-D24-20 controls braking. When YV6 electrifying, there is a braking action. The spill valve MRF-02P-1-20 controls pressure of the system, in general case, the pressure is regulated to 0.8-1.5Mpa and its changing readings can be observed from the pressure meter. Lubrication of the headstock is supplied by the spill valve. Returning oil flows into the oil tank through two nylon pipes set under the front lower part of the headstock.

7.2.4 Hydraulic Control Board of Sizing Device

- This unit consists of control board, valves and it can realize locking and swing of

sizing device. (Please refer to hydraulic principle drawing 2). The oil tank corresponding to this unit is under the machine bed, system pressure and oil amount is adjusted by variable pump, the max. pressure of system is 3 Mp, and the pressure is adjusted to 2.5 Mp in common working condition.

7.3 Application and Maintenance of Hydraulic System

- In order to protect the hydraulic system of the machine, hydraulic oil in the system should be regularly changed. It is necessary to clean the oil tank before pouring hydraulic oil. The poured oil has to be purified and cleaning hydraulic oil of type YA-N46, the level of poured oil should be up to the upper limit of oil leveler. Temperature in the oil tank is not allowed more than 60°C. The first changing oil time should be after the hydraulic oil is used for three months and the oil tank and the oil filter should also be cleaned. Later on, cleaning works and changing oil should be done once every six months. When changing with fresh oil, also open the window cover for cleaning, clean the dirt under the oil tank. During the period of using the hydraulic system, the oil level should be regularly checked and the level should not be lower than the lower limit of the oil leveler. In addition to those, the hydraulic system should be kept under cleaning status during work.

7.4 Trouble and Trouble-shooting of Hydraulic System

- If hydraulic pressure of the hydraulic system is too low or no pressure, check whether the adjustment of the spill valve is proper. If noise of the pump is too high, check whether the oil filter for sucking oil is being blocked or the oil level is too low or the oil pump is not firmly fixed or there is some place blocked.

Table of Hydraulic Components

No.	Name	Type	Manufacturer
1	Oil filter for sucking	WU-63×180	Shenyang Oil Filter Factory
2	Pump	CB-B6 (reverse)	
3	Motor	Y802-4 (B3) 0.75kW	Dalian Motor Factory
4	Fine oil filter	XU-40×200	Shenyang Oil Filter Factory
5	Spill valve	MRF-02P-1-20	Taiwan Northman Company
6	Pressure meter	Y60-Z-IV (axial direction)	
7	Electromagnetic reversing valve	SWH-G02-C4-D24-20	Taiwan Northman Company
8	Electromagnetic reversing valve	SWH-G02-C8SB-D24-20	Taiwan Northman Company
9	Electromagnetic reversing valve	SWH-G02-N2-D24-20	Taiwan Northman Company
10	Electromagnetic reversing valve	SWH-G02-D2-D24-20	Taiwan Northman Company

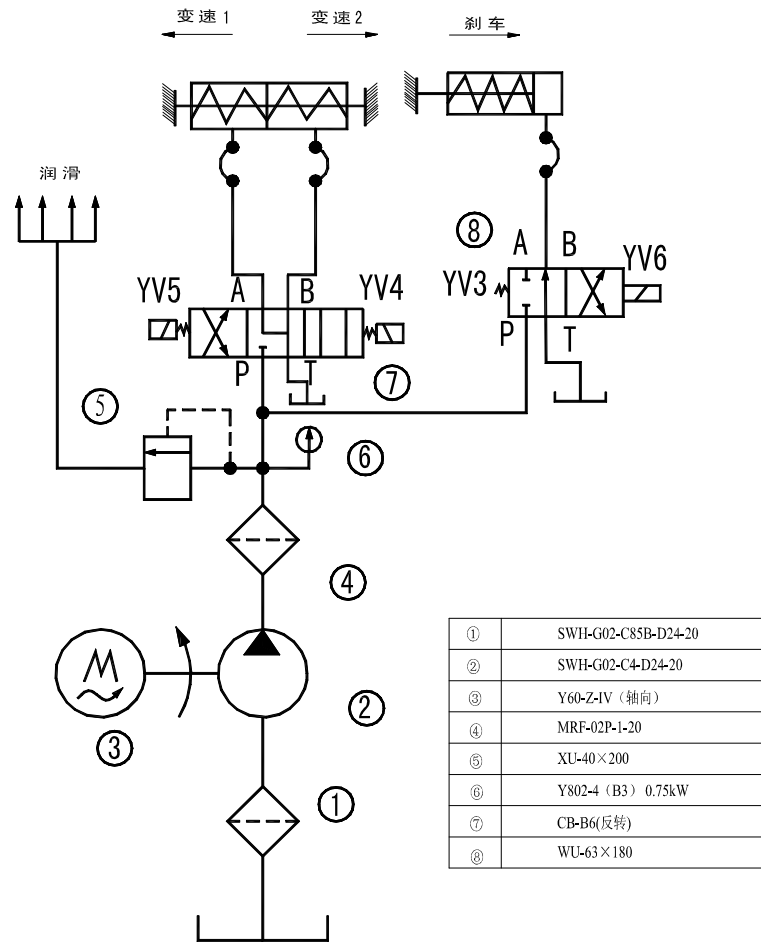


Fig. 7 Hydraulic principle drawing 1

Table of Electromagnet Action

Electromagnet	YV4	YV5	YV6
Action of Oil Cylinder			
Braking			+
Changing Speed 1	+		
Changing speed 2		+	

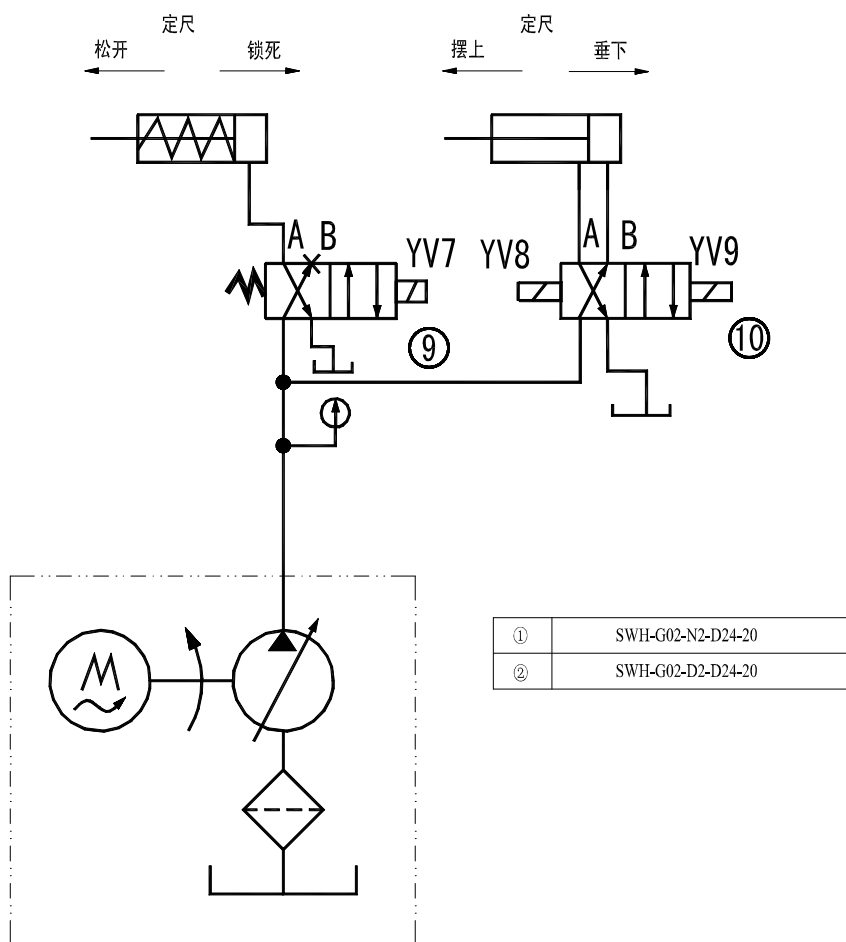


Fig. 8 Hydraulic principle drawing 2

Table of Electromagnet Action

Electromagnet	YV4	YV5	YV6
Action of Sizing Device			
Status of releasing			+
Swing up	+		
Swing down		+	

8 PNEUMATIC SYSTEM

8.1 Disposition of Pneumatic System

- The pneumatic system of the machine consists of components of pneumatic source, pneumatic triple-linked parts and solenoid valves, etc. The pneumatic system is used to realize the functions of clamping the chuck. For details, please refer to Pneumatic principle drawing.

8.2 Working Principle of Pneumatic System

8.2.1 Pneumatic Source

- The function of pneumatic source: The pneumatic source of the machine should be provided by the customer, and the pressure of the air source shall not be less than 0.85Mpa. The pressure of the system can be observed by the pressure meter. The pressure of the system can be adjusted by spill valve mounted on the pneumatic triple-linked parts, normally, it can be adjusted to 0.6 Mpa.

8.2.2 Chuck Clamping

- Clamping device is adopted for this machine. The chuck will be releasing when the electromagnet is electrified, the chuck will be clamping when the electromagnet is unelectrified.

8.3 Use and Maintenance of Pneumatic System

8.3.1 Installation of Components

- The pneumatic triple-linked parts must be installed in vertical direction, it must be installed as the indicated direction of the arrow even compressed air first goes into the filter device and then goes into pressure adjusting unit and then oil fog unit.

8.3.2 Adjustment of Pressure

- Turn counterclockwise the pressure-adjusting lever of the pneumatic triple-linked parts before switch on the pneumatic source until the pressure-adjusting spring is under free status. And then open the feeding air valve on the pipe line, turn clockwise the lever until the reading of the pressure meter meets the requirement.

8.3.3 Adjustment of Oil Amount

- The necessary oil amount can be obtained by adjust the needle-shaped adjusting valve for pneumatic triple-linked parts.

8.3.4 Maintenance

- Open the bleed-water valve twice a day (according to working status) to discharge the dirty water. The filter net, water-reserving cup and the oil-reserving cup should be periodically cleaned.

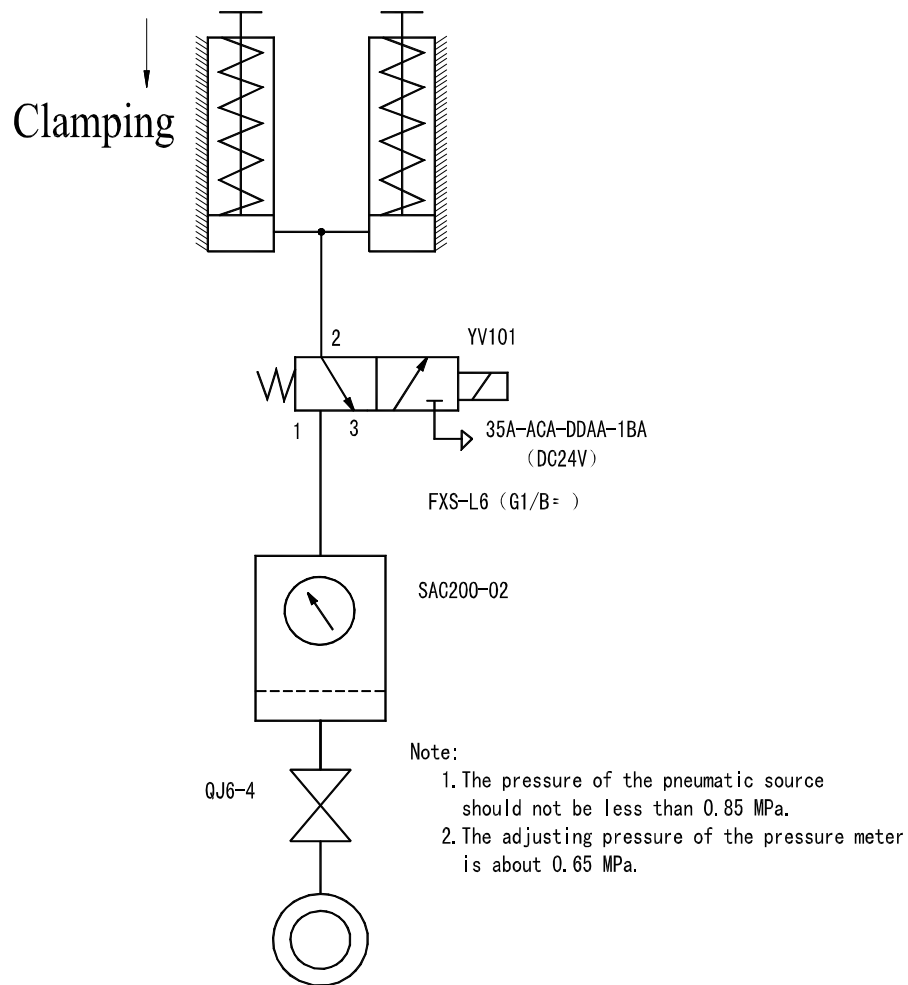


Fig. 9 Pneumatic principle drawing

9 DRAWING OF WEARING PARTS

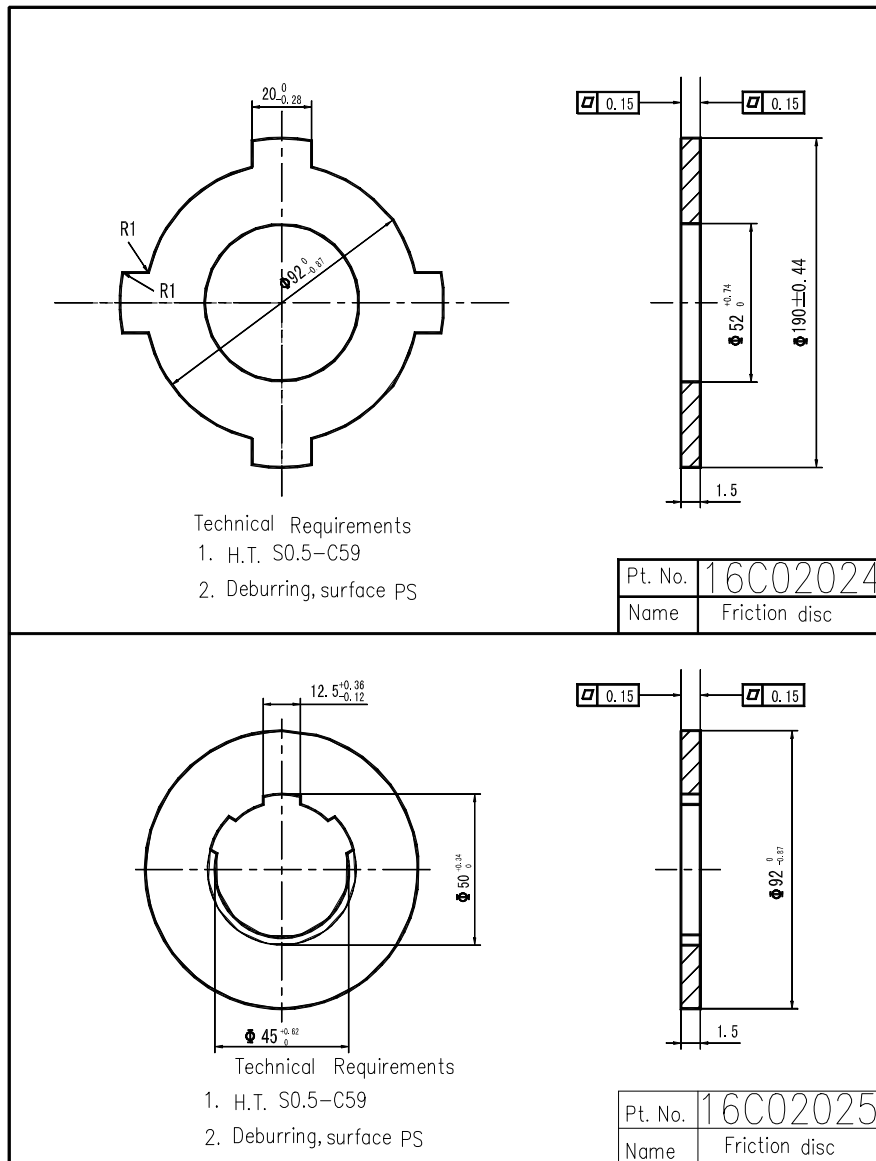


Fig. 10 (Friction disc in headstock with double-speed motor)

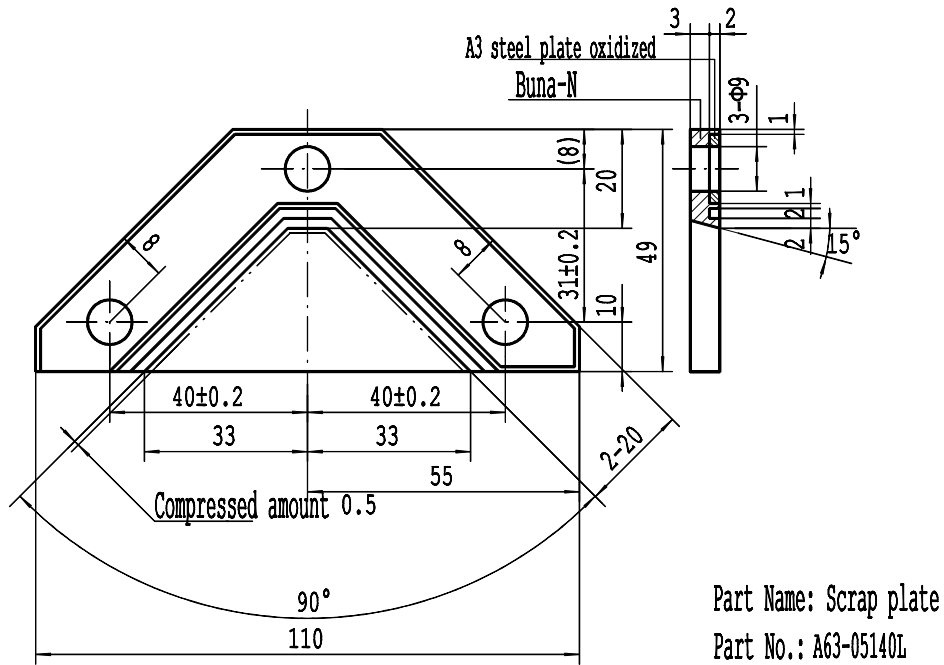


Fig. 11

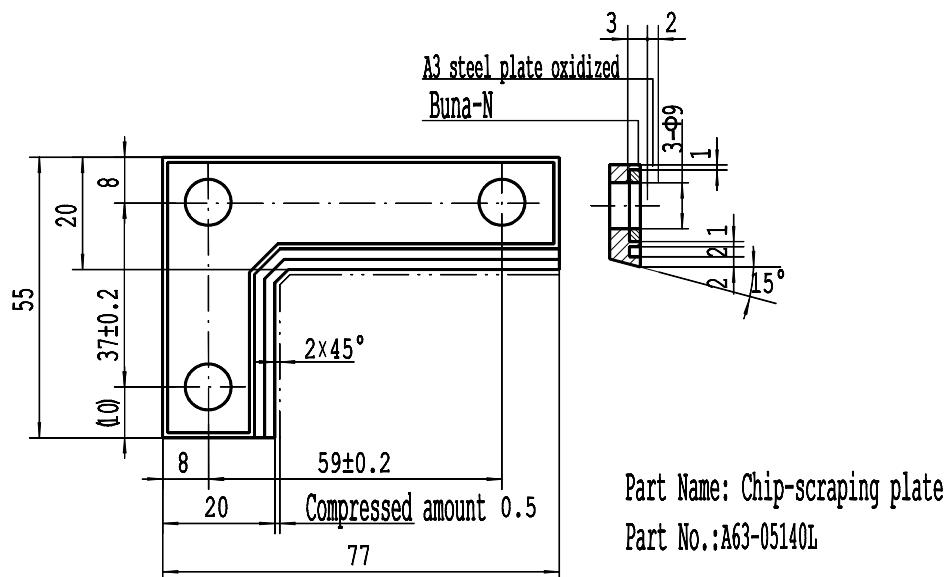


Fig. 12

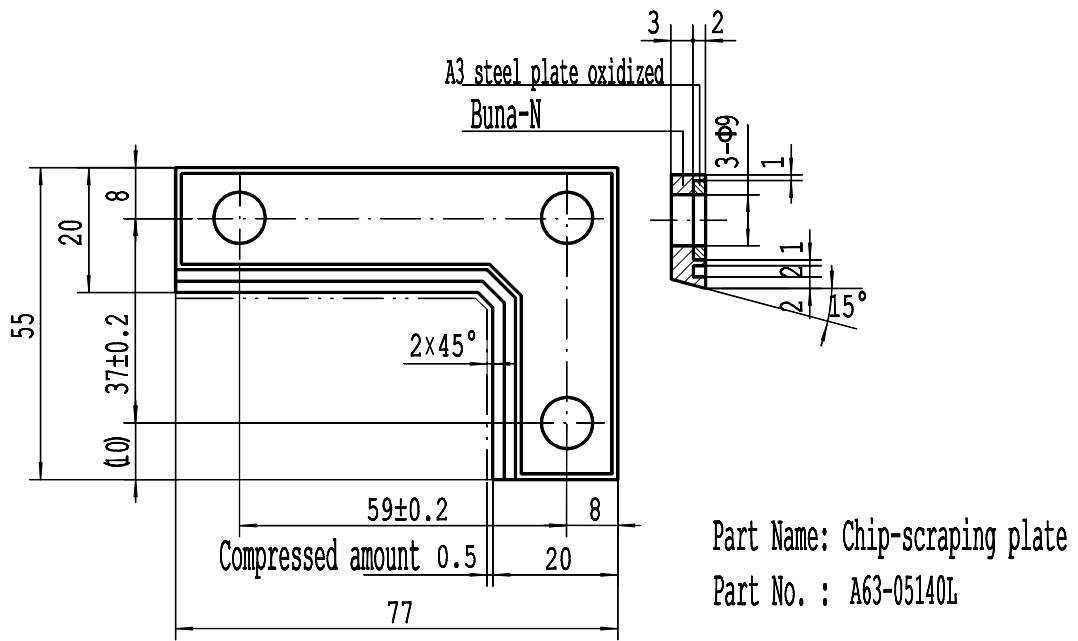


Fig. 13