

# TSL8S

## Instruction Manual

(Mechanical Part)

Max bar dia. :  $\Phi 40\text{mm}$

Max turning length: 320mm

Document No.: TSL8S-01000-SCJ

Factory No. :

Before installation and use, please read this **Manual** first

KIMHOO AUTOMATION U.S. CORPORATION



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## Part 1 Instructions for use

### Chapter 1: Overview of Machine Tool Data

#### 1 Scope of application of this document and other random materials

Adaptation products: TSL8S CNC lathe and customized products based on it.

This document and other materials accompanying it are designed to help and guide users in the proper use of our products purchased by us. Please read them carefully before using this product.

Note: Users are advised to specify whether they are purchasing standard or customized products. For custom configurations other than standard configurations, such as special fixtures, robots, etc., please refer to the relevant information.

#### 2 Machine related materials

##### 2.1 Contents of this manual

This "Instruction Manual (Mechanical Part)" contains the operation manual (mechanical part), maintenance manual, installation and operation manual, operation manual (pneumatic part), operation manual (hydraulic part), etc.

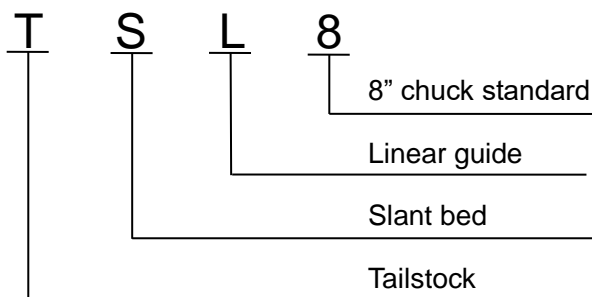
##### 2.2 Other random data

"Instruction Manual (Electrical Part)", Instruction Manual (Machine Customization), "Operation Manual (Electrical Customization)", various manuals related to CNC systems, related purchased component descriptions and other random materials.

Note: The "Instructions for Use (Machinery Customization)" and "Operation Manual (Electrical Customization)" only apply to customized products not covered by the standard instructions.

#### 3 Machine model interpretation

Product naming: based on relevant national standards, with reference to industry characteristics, named according to enterprise standards. Product model: The specific interpretation is as follows:



## Chapter 2: Safety Precautions

Although CNC machine tools can realize automatic control to complete many complicated actions, they must be in a reasonable, orderly and correct programming and action arrangement, and the operators must undergo strict training and comply with the regulations to complete the operation smoothly. Among them, security issues are crucial. According to the characteristics of the CNC machine tool and the specific structure of the machine tool, please pay attention to the following safety matters.

Safety precautions list the safe operation of the machine and personal safety. Be sure to fully understand these before operating the machine.

These contents mainly specify the safety matters that we can foresee and require special attention in the normal operation. Of course, when the user uses the machine, unconventional workpiece machining or machine use conditions can occur. Therefore, in the process of using the machine tool, the user should always pay attention to the safety of himself and the machine tool, and strictly abide by the safety precautions.

A description of the meaning of the classification of safety precautions in this document and on the machine:



### **Danger:**

*The “Dangerous” Hazard Area indicates a high level of risk. A warning that indicates an emergency hazard that would result in death or serious injury if not avoided;*



### **Warning:**

*The “Warning” Hazard Area indicates a medium level risk. A warning that indicates a potential hazard that could result in death or serious injury if not avoided;*



### **Attention:**

*The “Attention” hazard area indicates a low level of risk. A warning that indicates a potential hazard that would result in minor or moderate injury if not avoided.*

## **1 Safety responsibility**

### **1.1 Manufacturer's safety responsibility**

- The manufacturer is responsible for the elimination and/or control of the hazard in the design and construction of the supplied machine tools and their supplied accessories;
- the manufacturer shall be responsible for the safety of the supplied machine tools and accessories supplied;



- The manufacturer is responsible for the usage information and recommendations provided to the user.

## 1.2 User's safety responsibility

- Users should be familiar with and familiar with the contents of safe operation through the learning and training of safe operation of machine tools;

- The user is responsible for the safety and the resulting hazards after adding, changing or modifying the original machine or accessories;

- The user is responsible for the dangers caused by not operating, adjusting, maintaining, installing and storing the product in accordance with the provisions of the data.

## 2 Safety precautions for machine tools

### 2.1 Job Preparation Precautions

#### 2.1.1 Basic matters

For the safety and equipment of the operator from accidental injury, please refer to the manual and other information attached to the user before installing and using the machine.



#### **Danger:**

- *Before sending power, make sure that all doors and guards are in place. If not in the specified position, First cut off the main power and prevent others from opening.*
- *Electrical cabinets, transformers, motors, junction boxes and other electrical devices, there*

is a high voltage (  labeled), do not touch.



#### **Warning:**

- *Remember the EMERGENCY STOP position and press it quickly in any unusual situation.*
- *The pressure of the liquid (gas) pressure system shall not exceed its use, otherwise it will cause equipment or personal injury.*
- *To prevent malfunction of the machine, carefully check the position and function of the switch before operation.*
- *If you have any questions, you must report to the responsible person.*
- *Do not modify the machine in any case, so as not to affect the safety of the machine.*
- *When equipped with robots and other automatic loading and unloading device, be sure to check within the scope of its movement shall not have obstacles or people to enter.*

**Attention:**

- *If power is off, turn off the main power switch quickly.*
- *Do not change the electrical parameter values, variable values, or other electrical settings.*

*Must be changed, first to confirm the security after the change, while the factory settings set, easy to restore when needed.*

### 2.1.2 Precautions regarding wear and physical safety

**Attention:**

- *Long hair beam tied to the back and into the work cap, otherwise it will be involved in the movement of the machine.*
- *Wear safety gear (work clothes, goggles, etc.).*
- *Wear a safety helmet when there is an item at the top of the work area.*
- *Wear a protective mask when machining magnesium alloy workpieces.*
- *Wear a safety shoe with a steel lining and a non-slip head.*
- *Do not wear open or loose clothing.*
- *Department of clothing and cuffs on the buttons or hooks to prevent clothing involved in the machine.*
- *Do not operate the machine after drinking.*
- *If dizziness, confusion and other physical discomfort, do not operate the machine.*
- *Wear gloves when installing and removing workpieces, tools, and chip cleaning to prevent scratching.*

### 2.1.3 Precautions on safety devices

*The machine is equipped with a variety of safety devices to protect the operator and machine tools. These devices include interlocking devices and emergency stop switches that are as important as doors and shields.*

**Warning:**

- *The machine is equipped with a variety of safety devices to protect the operator and the machine, do not cancel or modify these devices. Otherwise it may cause serious casualties.*
- *Do not smear, dirty, damage, modify or remove any safety label. If the writing is blurred or the label is missing, please inform the manufacturer of the FireWire machine and re-install it in the original position (if the label is missing, you can find the label number in the manual).*

#### 2.1.4 Note on the operation panel, display information



**Warning:**

- *Button on the operation panel, the function should be familiar with, pay attention to misuse.*
- *The screen displays the alarm information; operation tips must be checked by one by one implementation.*
- *Do not let CNC units, operation panels, electrical control cabinets and other impact.*

#### 2.1.5 Precautions on the job site



**Warning:**

- *Timely wipe the machine around the water stains, grease, to slip to.*
- *work pedal to be strong, non-slip.*
- *flammable items away from the work area and high temperature chips.*
- *Operation area to ensure adequate lighting.*
- *to ensure adequate operating area, to keep the road open, easy to form obstacles to the items placed in the designated location.*
- *Do not put objects such as knives on the protective cover.*
- *Verify that the power supply to the main power switch of the machine meets the maximum load requirements of the machine.*
- *Check all cables to check for damage, to prevent accidental leakage or electric shock.*
- *Take protective measures against shortcuts that may be scratched by chips.*

#### 2.2 Notes on the operation process

##### 2.2.1 Basic matter



**Warning:**

- *Close the machine protection door and CNC control cabinet, operation panel, electrical control cabinet, sub-box cover, to water, chips and other entry.*
- *Before starting machining, make sure that the machine door is closed, and the interlock is activated. Otherwise it may lead to major personal injury or death.*
- *Do not open any doors or shields during automatic operation.*
- *If more than one person operates the machine, do not proceed to the next step without notice and confirmation of the location of others.*
- *Do not enter the inside of the machine. If you must enter, press the emergency stop button and place the prompt label in a conspicuous position to prevent others from operating the*

machine.

- Prevents inadvertently touching any keys while the machine is running.
- Body and other items to stay away from the belt and pulley and other moving parts.
- Do not touch any moving objects such as spindles and tools in rotation by hand or other

items.

• Do not let the hands and any parts of the body touch the chip conveyor, otherwise it may cause injury.

- Do not touch the chip with bare hands to prevent allergies. Allergies should be more careful.
- Do not operate the machine when there is lightning.
- Use the appropriate tool or ask for help when handling heavy objects.
- Forklift truck, crane to be trained by the holder of the operation before the operation.
- When using a forklift and crane, make sure that there is an obstacle around the machine.
- Lifting heavy objects to use the appropriate sling, harness and other lifting aids
- Use sling, hanging chain and other spreader, the first inspection, found that damage repair

or replacement in a timely manner.

• Do not adjust the hydraulic, pneumatic and coolant nozzles during machine tool operation. Otherwise it may cause the workpiece clamping force loss or surge, resulting in the workpiece was thrown after the injury or workpiece deformation and other accidents.

• Do not cancel or adjust safety-related blocks, limit switches, and interlocks for increased travel.

• When loading and unloading workpieces on a machine without a pallet changer, make sure that the tool has been removed and stopped working.

• Do not wipe the workpiece by hand. Use a cloth to confirm that the tool or workpiece has stopped moving before proceeding.

- Do not clean up directly by hand. Wear gloves clean the chips with a brush or special tools.
- Do not start the machine when the protective cover is damaged, or the position is incorrect.



**Attention:**

• In the heavy cutting, do not let the chip accumulation, to avoid overheating fire.

• Check the drive belt before the machine is intact and its tension is appropriate.

• Before the machine is operated, perform the necessary preheat operation on the spindle and the feed shaft (preheat the operation for 20 minutes with 1/3 or 1/2 of the maximum running speed of the spindle and the feed shaft). Write an automatic run warm-up program that includes all the functions of the machine. If the maximum speed of the spindle is used, observe the presence or absence of an abnormality during warm-up.

- Do not wear gloves for button operation to avoid malfunction.
- When power is supplied to the NC unit of the machine, do not perform any operation (when

equipped with a robot) before the READY on the manipulator's control box is finished.

- Note that the workpiece of different materials to choose the appropriate chip conveyor, for the longer chip processing of the workpiece should pay attention to winding, jam chip conveyor.

### 2.2.2 Precautions on the use of workpiece clamping and tooling



#### **Warning:**

- Refer to the machine manual to select the appropriate cutting tool.
- Be sure to stop the machine when loading and unloading the tool.
- timely replacement of wear tools, so as not to affect the quality of the workpiece or accident.
- When setting the spindle speed, the limit speed of the chuck, oil cylinder and other spindle accessories must be considered.
- When using spare parts such as chucks and oil (gas) tanks, please confirm the maximum allowable speed and operating pressure.
- Before starting the spindle, make sure that the chuck (fixture) is securely clamped or the workpiece is securely loaded. The fixture pressure should not exceed the allowable value.
- If the workpiece center hole is too small, the workpiece may fall. When using the top center hole, check the center hole size and angle.
- Be careful not to fit into the fixture.
- Use the appropriate lifting tool when installing heavy objects.
- Do not leave the wrench at any time on the fixture.
- Do not leave the workpiece on the fixture when the power is turned off.
- When the workpiece is larger than the specified size or weight of the machine, Reluctant processing may lead to an accident.



#### **Attention:**

- Make sure that the tool length does not interfere with the fixture or workpiece.
- After installing the tool, make the necessary inspection and test cutting, and pay attention to the adjustment of the tool management parameters.
- After finishing the soft claw, check whether the workpiece can be reliably clamped and check that the fixture pressure is appropriate.
- Check that the tool is installed correctly, especially the difference between the left- and right-hand tool installation direction.

### 2.3 Job completion and maintenance precautions

**Danger:**

- *When the machine is in service, be sure to cut off the mains and prevent others from opening to prevent others from operating the machine.*
- *Repair or replacement of liquid (gas) pressure components, must be shut down, otherwise it will cause loss of function or oil (gas) jet and leakage.*

**Warning:**

- *When operating away from the machine, be sure to turn off the power and main power switch of the operation panel.*
- *Maintenance should be carried out by qualified personnel in strict accordance with the requirements of the manual.*
- *Do not disassemble or modify the stroke limit switch, interlock switch, proximity switch or other safety device.*
- *When removing parts, make sure that the parts that are easy to slip are pre-fixed to prevent them from falling off.*
- *When operating at high altitude, use ladder or gantry while wearing a helmet.*
- *When replacing the lamp or other electrical parts, turn off the machine mains and prevent others from opening. The new parts should be consistent with the original performance specifications.*
- *Do not start the machine until the protective cover is not installed.*
- *When cleaning the chip conveyor, make sure that the chip conveyor does stop moving. Otherwise it may cause injury.*
- *Do not use high-pressure air guns to clean up chips to prevent fines and dust from entering the movement.*
- *thoroughly wipe the machine water, oil, chips, etc., to keep the operating environment clean and tidy.*

**Attention:**

- *After completing a job, it is necessary to clean and clear up, and the parts of the machine are to be restored for the next work.*
- *When cleaning the machine and its peripherals, stop machine.*
- *Wear gloves to clean the chips and do not touch the chips directly by hand.*
- *Check that all shields are in good condition and are in place and repair or replace them if*

damaged or displaced.

- Fully read and understand the maintenance instructions.
- Without permission and adequate preparation work, shall not carry out maintenance work without authorization.
- Keep a certain number of commonly used spare parts.
- Use the recommended hydraulic oil, lubricants, grease, coolant or equivalent.
- When replacing insurance, make sure that the safety capacity is correct (use of excessively high fuses may cause malfunction of other machine tools)
- Refer to the manual and machine nameplate for the use of lubricating oil, replenish and replace the lubricating oil at the specified time.
- If a group of different lengths of the belt, or elongation exceeds the specified value, the need to replace the entire group of the belt.
- Arrange the management staff to implement the maintenance effect.

### 3 Security warning labels

As the machine is a high-speed sports machinery, the nature of its work has a certain risk, in order to prevent accidents, in the potentially dangerous host and its affiliated devices and prone to error where the security warning label.


The following describes the representative of the machine safety label. The labels that are not shown here are equally important.




Note: According to the different machine configuration selected the following corresponding label.

#### 3.1 Integrated safety project



Basic overall safety precautions, the operator should remember and fully understand. Follow the safety label warning content, always keep in mind the safe operation.

#### 3.2 Danger sign


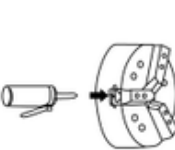
Number	Sign	Label installation location and description
JHQ91-36		<p>Mounted on the right fixed cover, near the door opening side.</p> <p>Hands, clothes, the body shall not enter the scope of movement of the spindle, operation and maintenance to be confirmed when the safety.</p>

JHQ91-40		<p><b>! DANGER</b></p> <p>Electrical Hazards. Authorized Personnel Only.</p> <p>JHQ91-40E</p>	<p>Installed on the cabinet door. Maintenance work, need to keep cutting off the main power; Do not touch any components in the cabinet with wet arms; The main power cut off after 10 minutes before touching the cabinet components; Please replace the fuse according to the instructions.</p>
JHQ91-30		<p><b>! DANGER</b></p> <p>Do Not Operate With Guard Removed.</p> <p>JHQ91-30E</p>	<p>Mounted on the sliding door, near the door opening side. Do not change the safety protection device and parameters of the machine, otherwise it will cause an accident.</p>
JHQ91-34		<p><b>! DANGER</b></p> <p>Keep Door Close.</p> <p>JHQ91-34E</p>	<p>Mounted on the sliding door, near the door opening side. Close the door when working</p>




### 3.3 Warning sign

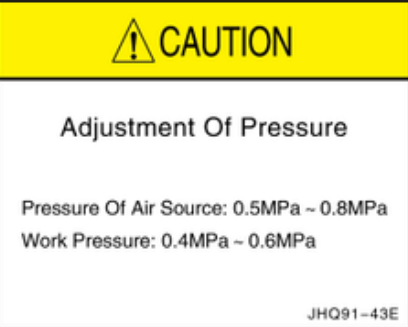
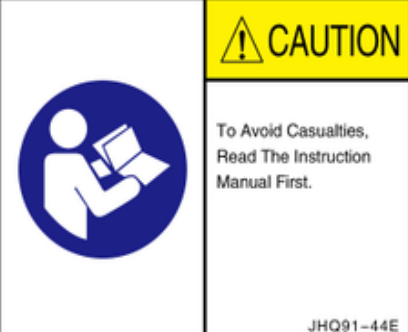
Number	Sign	Label installation location and description
JHQ91-32		<p><b>! WARNING</b></p> <p>Moving Parts Can Crush And Cut.</p> <p>JHQ91-32E</p> <p>Mounted on the left side of cover, near the belt. Hands, clothes, the body shall not enter the belt, the scope of movement of the wheel, operation and maintenance must be confirmed when the safety.</p>
JHQ91-35		<p><b>! WARNING</b></p> <p>Check The Speed Limited. The Speed Of Spindle Should Be Less Than The Allowable Speed Of Chuck.</p> <p>JHQ91-35E</p> <p>Installed in the spindle box cover, the chuck above chuck (if not enough space, mounted on the sliding door, near the door opening side). Cannot run before the workpiece clamping; Spindle speed should not exceed the maximum speed of the fixture.</p>



JHQ91-31		<p><b>! WARNING</b></p> <p>Keep Hand Clear.</p> <p>JHQ91-31E</p>	<p>Mounted on the right fixed cover, near the door opening side.</p> <p>Operation, shall not enter the knife range of movement;</p> <p>Confirm the indexing action of the tool holder;</p> <p>Really fit the tool;</p> <p>Keep the tool firmly installed;</p> <p>Note whether the tool is interfering.</p>
JHQ91-38		<p><b>! WARNING</b></p> <p>Follow The Instruction Manual To Lubricate Chuck.</p> <p>JHQ91-38E</p>	<p>Mounted on the end of the spindle box, in the chuck above (when the position not enough can also be installed in the sliding door near the door), not installed if no chuck.</p> <p>The chuck needs to be properly lubricated. Press the instructions to lubricate the chuck.</p>

### 3.4 Attention sign

Number	Sign	Label installation location and description
JHQ91-33	 <p><b>! CAUTION</b></p> <p>No Touch By Fingers.</p> <p>JHQ91-33E</p>	<p>Mounted on the right fixed cover, near the door opening side.</p> <p>Do not touch the chip directly by hand.</p>
JHQ91-39	 <p><b>! CAUTION</b></p> <p>Force From Above.</p> <p>JHQ91-39E</p>	<p>Mounted near moving parts.</p> <p>Manual operation and automatic operation, to avoid hand, clothing and other parts of the body near the machine moving parts, otherwise it will cause an accident.</p>
JHQ91-41		<p>Installed in the electric cabinet door and power, transformers, motors, sub-boxes and other prone to electric shock location.</p> <p>There may be an electric shock, careful contact.</p>

JHQ91-43	 <p><b>CAUTION</b></p> <p>Adjustment Of Pressure</p> <p>Pressure Of Air Source: 0.5MPa ~ 0.8MPa Work Pressure: 0.4MPa ~ 0.6MPa</p> <p>JHQ91-43E</p>	<p>Installed in the top of the pneumatic triple.</p> <p>To ensure that the pneumatic components of the gas source access pressure and the implementation of the working pressure range of components.</p>
JHQ91-44	 <p><b>CAUTION</b></p> <p>To Avoid Casualties, Read The Instruction Manual First.</p> <p>JHQ91-44E</p>	<p>Mounted on the front of the machine (sliding door or left and right fixed cover).</p> <p>Before starting the operation, you must carefully read and follow the contents and operating requirements of the accompanying manual.</p>

#### 4 Safe disposals when abnormal situation occurs

Although it is strictly in accordance with the safety requirements and operating instructions for operation and use, but due to the use of conditions or external conditions such as unexpected abnormal state occurs, the need to be proper act calmly. But in any case, security, safety especially personal safety is the priority.

- If involved in the machine or personal injury accident, should immediately stop, calm treatment should not cause secondary damage, life first.

- If you encounter an abnormality such as a knife and an object fall during operation, press the emergency stop button (on the operator's small operation panel on the left side of the operator).

- If the machine sound or temperature and other abnormalities, it should immediately press the emergency stop button, and asked the professionals to check the disposal.

- In case of fire and other environmental conditions should be immediately cut off the power, rapid alarm.

#### 5 Maintenance and inspection of safety warning labels

Warning labels should be maintained on a regular basis. At least once every six months, if deformation, damage, fading, etc.do not meet the requirements, it should be repaired or replaced in time.

The label with a long production cycle is replaced with a temporary label during maintenance, and the replace it after formal label is made.

## **Part 2 Operation Manual (Mechanical Part)**

### **Chapter 1 Machine Overview**

#### **1 Structure Overview**

TSL8S CNC lathe is a two-coordinate two-axis linkage and semi-closed-loop control CNC lathe. The machine tool adopts machine, electricity, liquid (gas) integration, fully enclosed protective structure design, beautiful appearance and compact layout.

The spindle rotation is controlled by the inverter or the servo drive to realize the stepless speed regulation function and the constant line speed cutting function; the X-axis and the Z-axis both adopt the AC servo motor, and the coupling is directly connected with the ball screw to realize the feed motion.

The machine tool control system can be selected from Taiwan's new generation, Guangzhou GSK, Beijing KND and other famous domestic and international numerical control systems to achieve Chinese character prompts and full screen editing.

#### **2 Machine features**

a) The bed and the guide rail are treated by high-frequency hardening, high rigidity, good dynamic characteristics and no creeping;

b) Modular and full protection design, compact structure, convenient chip removal, beautiful appearance;

c) reasonable layout and convenient maintenance;

d) The spindle has stepless speed change, low noise, low heat generation and stable operation;

e) The vertical and horizontal drive adopts high-performance AC servo motor with high positioning accuracy and stable and reliable performance;

f) The automatic lubrication device is adopted for each movement pair of the machine tool, and the lubrication is fully reliable;

g) Adopt hydraulic power collet (optional hydraulic chuck), which is convenient for loading and unloading;

h) The separation structure between the iron box and the water tank facilitates the cleaning of the water tank; the high-lift pump is used in the cooling system to make the parts process a strong cooling effect;

i) The machine has high power, high rigidity, stable precision and long service life.

#### **3 The purpose of the machine tool and its scope of application**

In addition to the basic functions of turning, grooving and chamfering, the machine can also perform various internal and external threading, as well as drilling, expanding, reaming, rolling and

other processing;

It can process short-axis (or disk) parts with complex geometric shapes, large dimensions and high precision, such as cylindrical surface, conical surface, step surface, spherical surface and other various curved surfaces;

Suitable for processing bars with a diameter of less than 40mm, discs with a diameter of less than 300mm and short-axis parts with a length of less than 450mm (this range will vary depending on the fixture);

Medium or small batch or single piece production for workpieces of medium and small size, such as colored and ferrous metals;

The machine tool is suitable for instruments, instruments, light industry, electronics, medical instruments and aerospace industries. It is an ideal equipment for batch and automated production of sophisticated complex workpieces.

#### **4 Machine accuracy related**

According to the relevant provisions of GB/T 25372-2010, the accuracy grade of this machine is V class.

Its processing accuracy is IT6~7.

#### **5 Environmental conditions for the use of machine tools**

See Chapter 3 of Part 5 (Installation Handling Manual) for details.

### **Chapter 2 Machine layout and parameters**

Note: The following data are not specified under the standard conditions. Due to different matching parts, the relevant parameters may be inconsistent. The specific data is subject to the order agreement or the actual product.

#### **1 Machine tool master plan**

The machine consists of the base, bed, headstock, carriage, CNC system (including electrical system) and other components. Refer to the "Maintenance and Maintenance" section for the specific component structure.

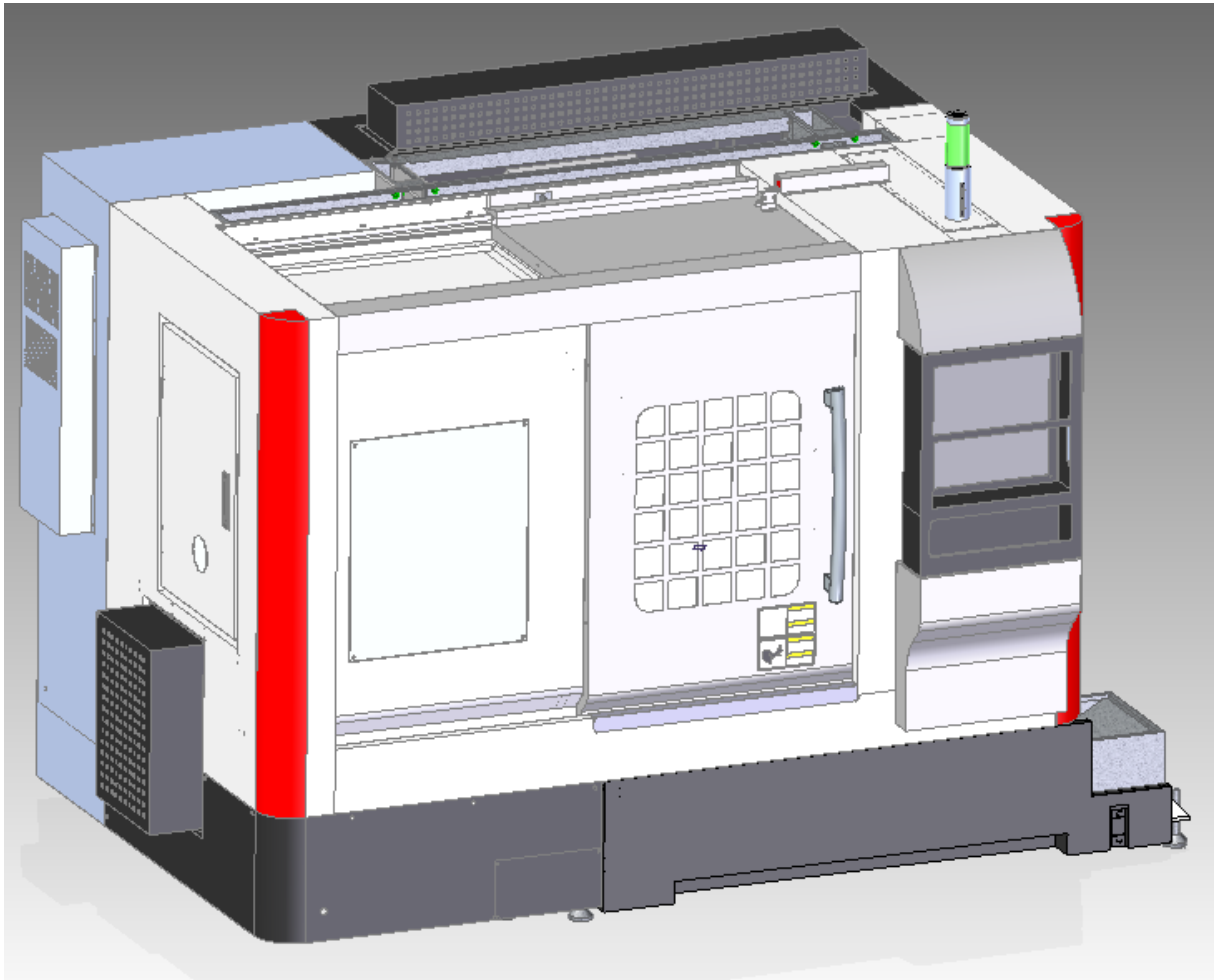


Figure1 machine layout

## 2 Parts and operation structure

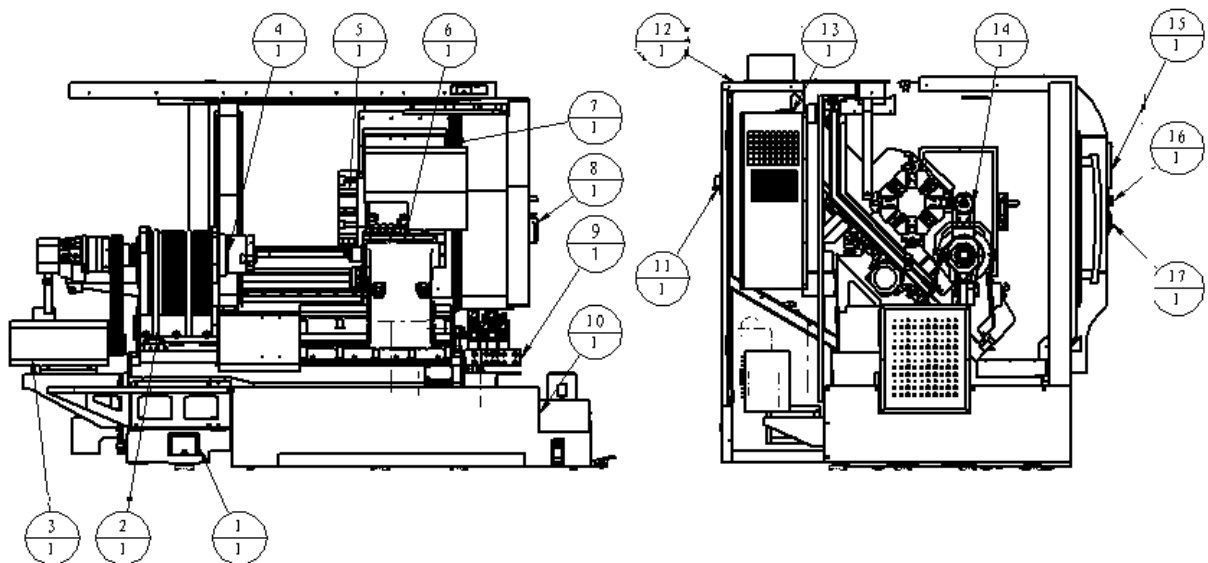


Figure2 Distribution of machine components and operating mechanism

This configuration is just for reference only, it can change due to production batch and user requirements.

Sheet 1 Machine parts table

Item	Name	Standard	Optional	Note
1	Base part	One-piece bed		
2	Headstock		Motor spindle	
3	Main drive	Servo main motor		No this item if install motor spindle
4	Clamp	Hollow chuck + hollow cylinder	Collet, solid chuck	
5	Knife tower	Servo turret		
6	Tailstock	Hydraulic, live top		
7	Pallet			
8	Lubricating	Centralized lubrication		
9	Hydraulic, pneumatic	Hydraulic		
10	Cooling chip	External		
11	Electric	√		
12	Protection	√		
13	Heat exchanger		√	
14	Encoder	√		
15	Console	√		
16	Emergency button	√		
17	MPG	√		

### 3 Main technical parameters

Table2 Technical parameter list

Name		Unit	Spec	Mark
Capacity	Max. swing diameter over bed	mm	Φ470	
	Max. turning diameter over slide		Φ208	
	Max. turning diameter		Plate Φ300	
	Max. turning length		320	With chuck and turret
Travel	X		165	
	Z		450	
Headstock	Speed of spindle	r/min	100-4500	The actual speed be limited by fixture and cylinder
	Spindle nose		A2-5	
	Spindle taper	MT	6	
	Spindle through hole	mm	Φ50	
Tailstock	Max travel of quill	mm	80	
	Dia. Of tailstock quill	mm	Φ75	
	Taper of tailstock quill	MT	4	
Tool post	Tool post form		8-position servo turret	
	Tool shank dimension	mm	□25	
	Boring tool size		Φ32	
Fixture	Collet	mm	8"	
Rapid travel speed	X	m/min	24	
	Z		24	
Overall dimensions (L*W*H)		mm	2665×1740×2020	Without chip conveyor
Weight	Net weight	kg		
	Gross weight			

## 5 Mechanical transmission system and bearings distribution

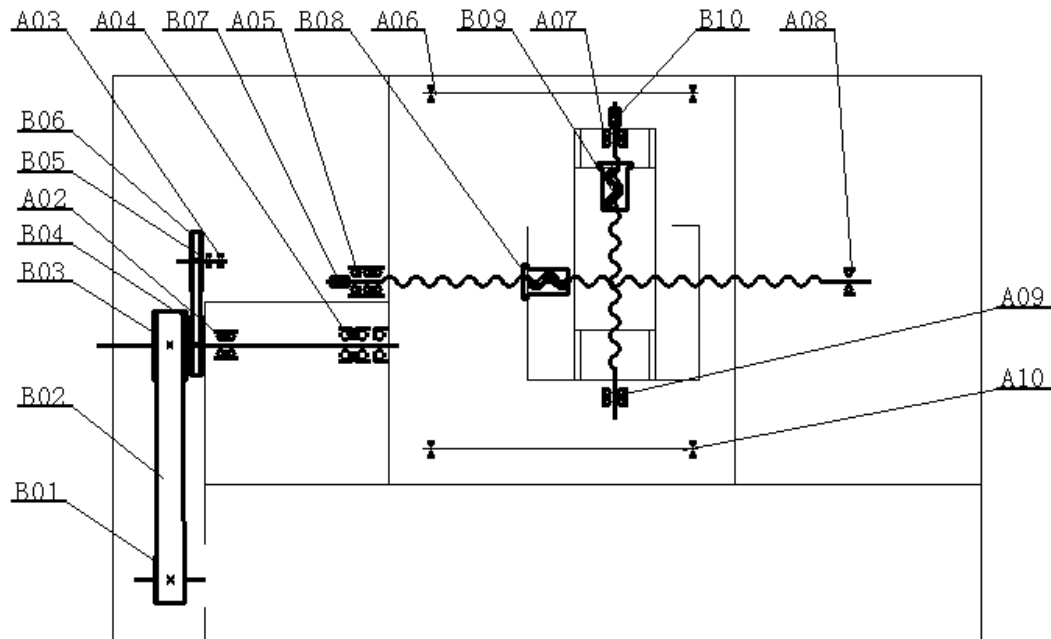


Figure3 Mechanical transmission system and bearings distribution

Table4 Table of rolling bearings

Location	Code	Model	Size	Name	Qty.	Serial number in structure chart
Spindle	A04	7016AC-2R2-TN 1-TBT B P4	125x80x(22x3)	Angular contact ball bearing	1 set	Figure 9
	A02	7015AC-2R2-TN 1-DB B P5	115x75x(20x2)	Angular contact ball bearing	1 set	Figure 9
Encode	A03	6004-2Z/P5	20x42x12	Deep groove ball bearing	2	Figure 9
Z-way driver	A05	30TAC62B-DDG TBTB P4	30x62x(15x3)	Angular contact ball bearing	1 set	Figure 8.2
	A08	6205 2Z P5	25x52x15	Deep groove ball bearing	1	Figure 8.2
X-way driver	A07	25TAC62B DDG DB P4	25x62x(15x2)	Angular contact ball bearing	1 set	Figure 13
	A09	25TAC62B DDG DB P4	25x62x(15x2)	Angular contact ball bearing	1 set	Figure 13
Cover	A06	SBR12S		Linear motion guide	1 set	
	A10	6201-2Z	12x32x10	Deep groove ball bearing	2	

Note: specific models may change by machine configuration and supply manufacturers

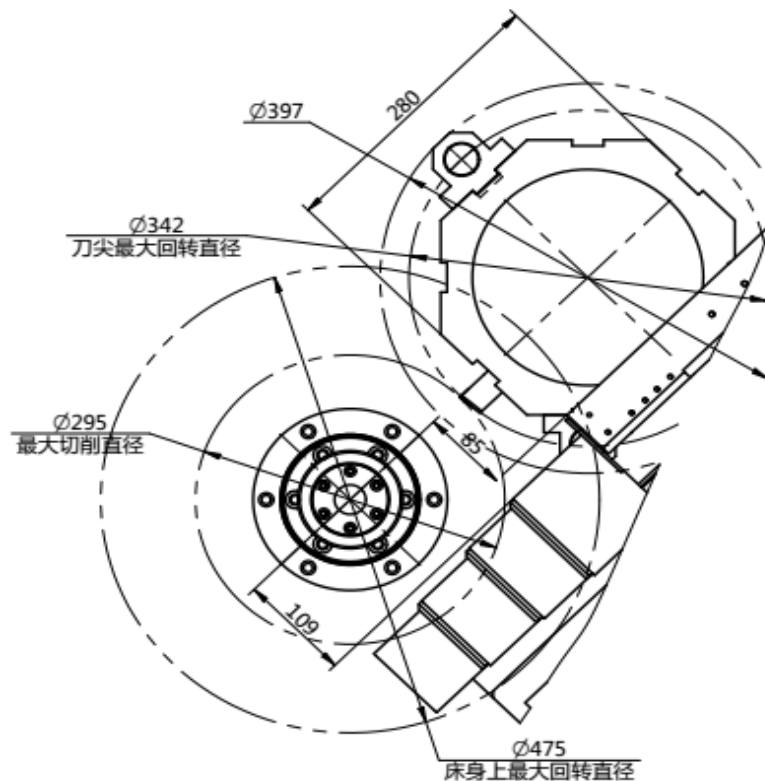
Table5, table of belt, pulley and ball screw

Code	Name	Design drawing serial number	Serial number in structure chart	Note
B01	Motor Pulley	CKX40-12102	Figure 12.1	Datum diameter $\phi$ 107.7
B02	Main motor belt	4-XPZ1412	Figure 12.1	specific models may different due to supplier
B03	Spindle pulley	CKX40-31102	Figure 9	Datum diameter $\phi$ 157.55
B04	sprocket	CKX40-31308	Figure 9	Z=60
B05	Odontoid belt	300 XL 037	Figure 9	
B06	Sprocket of encode	CK6132-32305	Figure 9	Z=60
B07	Z-way coupling	BF2-22x22-D55 L78	Figure 8.2	RUILIANDE
B08	Z-way ball screw	CKX40-21301	Figure 8.2	R32-10K5-FDC-709-945-0.0 08
B09	X-way coupling	CKX40-61301	Figure 13	R32-10K5-FDC-370-578-0.0 08
B10	X-way ball screw	BB1-22x22 D60L71	Figure 13	RUILIANDE

Note : specific models may different due to supplier.

## 6 Machine capability and extreme limit of travel

Machine capability and extreme limit of travel see figure4 and table2.





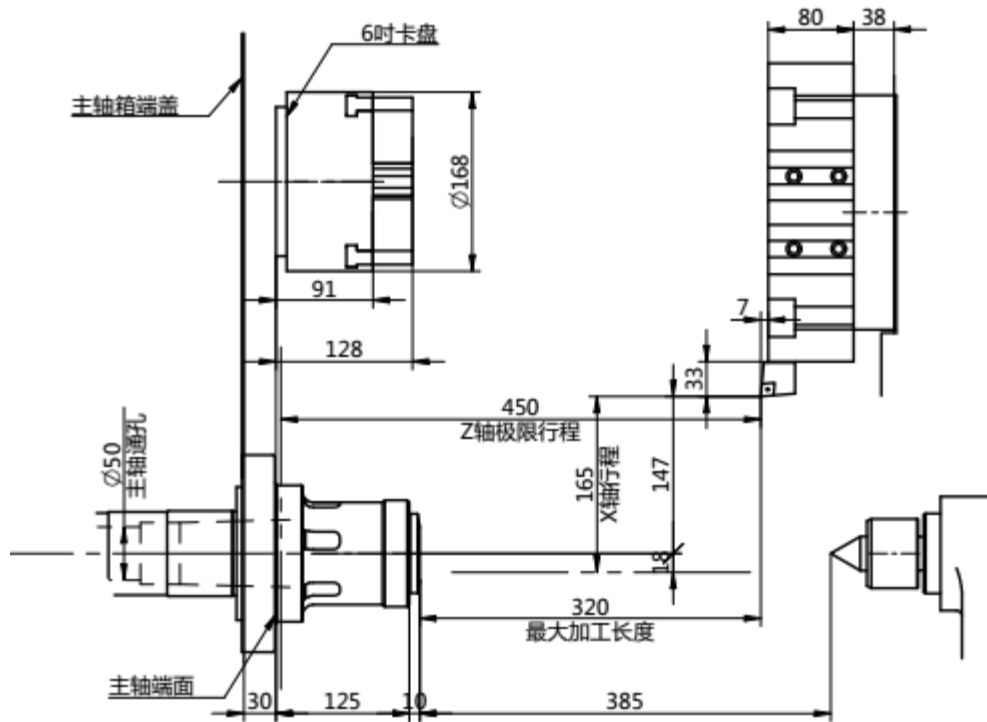


Figure 4 Machine capability range and stroke limit diagram

### 7 Machine power and torque

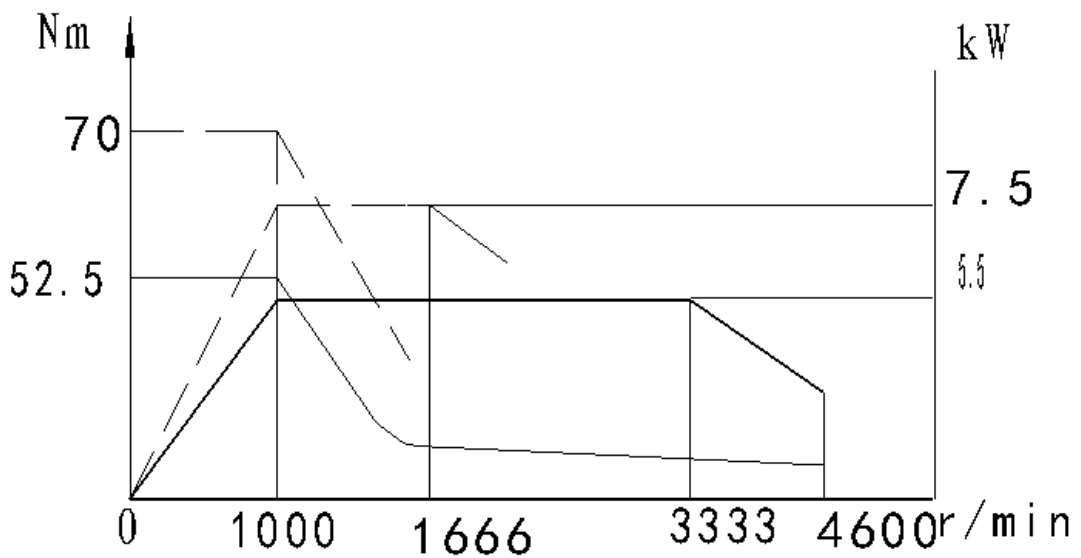


Figure 5 Spindle power and torque (speed rate: 1:1, YVF2-100L2-4-50-3 motor)

### Chapter 3 Machine use

Note: to installation, packing, shipping and storage of machine, see manual of installation, shipping and storage

**Warning:**

----open access door to load / draw material, start spindle after access door is close, never open access door during spindle is running

---- If the lathe use collet and air cylinder, which the top speed of spindle is 3500r/min.

----if the lathe use collet and air compressed rotary cylinder, which the top speed of spindle is 3000r/min.

----If the lathe use collet and hydraulic rotary cylinder, which the top speed of spindle is 4500r/min.

----If lathe use chuck and oil cylinder, which the top speed of spindle is according to the top speed of chuck (see the mark on chuck or manual of chuck).

----Before operating, it must be known well about control panel, CNC system and usage of all buttons; for more details, please read related information with machine.

----machine need preheat before operation.

**1 First operation**

Before the first operation, user manual and other information (electrical information, CNC user manual etc.) must be read. Understand the performance of machine, driving system, electrical system, parts structure performance, function of all buttons, purpose and location, and programming of CNC system.

If there are any fault during operation, stop machine immediately, check and trouble shooting.

Location and function of control button (see figure2) see user manual.

Note: as the configuration and CNC system are different, the control panel may different, please read system manual with machine.

**2 Machine first use and inspection**

After the machine be installed, check each parts of machine and observe it, in case of damage and accident during handing and shipping.

Clean the anti-rust oil on surface, and check liquid level of oil tank, lubrication tank and water tank, if it is necessary, refill them (when start machine, ball screw and linear guide need to lubricate); If machine is in normal condition, start machine.

After power on, operate the machine manually first, then do it again by automatic. Test the spindle without load, change the speed of spindle from low to high; observe and listen the vibration and noise during the testing. if the everything (moving parts, electrical, lubrication, cooling, pneumatic(hydraulic)system) is normal, the machine can be use.

Since then, according to contract and technical agreement for acceptance and test run.

### **3 Adjustment**

For use requirement, to adjust lubrication of pneumatic(hydraulic) and cooling, adjust the direction of cooling pipe nozzle, let it toward workpiece, not operator.

The block irons of vertical and horizontal way have been adjusted (BUS system doesn't have this equipment), user normally don't need to adjust it again. If have special needs, adjust the relative position of block iron and original block iron.

Other adjustment sees electrical manual.

### **4 Preparation of operation**

Before operating, need to prepare correlate clamping, fixture and tools.

The fixture with machine is collet or chuck, according the workpiece to turning operate fixture.

Base on technological, tool posts and tool need be prepared; tool and tool holder be selected by tool post. When use screw tap and reamer, it needs assistive tool for boring tool. Check the position of tool related to center of spindle.

When preparation is done, it can do testing operation, the result need to inspect.

The switch of fixture normally is controlled by control panel, when consider safety interlock, the switch of fixture can be set in front of machine.

When machine is on or stopped in long time, the machine need to preheat (special the environment temperature is low, run the spindle and feed shaft with 1/2 or 1/3 of maximum speed for 10-20mins), let the machine be fully lubrication.

### **5 Clean and refill**

See service manual.

Auto lubrication: fill the lubrication oil as the machine require (32~68#), use machine when the lubrication oil pump is working. Clean the lubrication oil pump and filter every three months.

Remove chips after work finished, specially the moving parts (access door etc.) must be clean. All exposure surface must be clean and covered with anti-rust oil. Check the tightness of belt in period. Clean the dust in power distribution cabinet and keep it clean.

If use filtering chip conveyors, it need to be clean, the coolant should be changed regularly and keep clean.

## **Chapter 4 Safety and environment**

Note: this machine is environmentally friendly, but any improper behavior may make impact on environment.

Save power

Energy conservation be considered during designing and manufacture; but in actual energy saving also need to be considered, such as: swatch off accessory and power off machine when long time not use, adopt reasonable processing technology.

### Emission reduction

For the oil and coolant which machine exhausts, they need oil separation process and purification treatment, they cannot exhaust in to open environment directly; connect us, if necessary.

If this machine is scrap or not going to use any more, it needs innocent treatment (clean oil and other liquid, according to related procedure).

## **Chapter 5 Main purchased components and vulnerable parts**

- Main purchased components

See chapter 3 related information

- Vulnerable parts

Clutch lever (see figure: Clutch lever)

product covet of buttons (random)

fuse 1A 2A one each (random)

## Part 3 Operation manual (Pneumatic part)



### **Attention:**

To ensure the safe use of the machine, please confirm the full understanding of the manual and related information before you start the machine.

### **Chapter 1 Pneumatic system functions and requirements**

This lathe has pneumatic function part, mainly for power of clamping.

The air supply of lathe must be clean (filter fineness can't be less than 40 $\mu$ m),

Dry (humidity less than 50%)

Air supply power: 0.5 - 0.8 MPa (The access pressure must not exceed 0.8MPa).

Actuator pressure adjustment range: 0.4 - 0.6MPa.

Oil mist should be used within the viscosity of 2.5 - 7 ° E lubricants, the proposed use of ISO VG32 or similar oil.

The control part of the machine pneumatic transmission is installed near the actuator of the machine tool.

### **Chapter 2 Pneumatic system component and use**

Pneumatic system made by the gas source, pneumatic three (two) joint, valve, cylinder and other components.

#### **1 Pneumatic transmission**

The control part of the machine pneumatic transmission is installed near the actuator of the machine tool.

The compressed air is treated by a gas source treatment (BFC2000), which is made up of an air filter (water divider), a pressure reducing valve and an oil mist. The air filter removes dust, dirt, rust and condensed liquid from the compressed air. The pressure relief valve adjusts the outlet pressure to the set working pressure and stabilizes the working pressure. The lubricating oil passes through the oil mist After the atomization, into the pneumatic system, so that the control components and the implementation of components to be lubricated.

In order to reduce the noise generated by the system exhaust, the muffler is installed in the pressure relief port of the valve, the muffler is made of copper beads muffler material sintered at high temperature, high temperature resistance, good effect, long service life , Can effectively reduce noise.

## 2 Use of pneumatic system

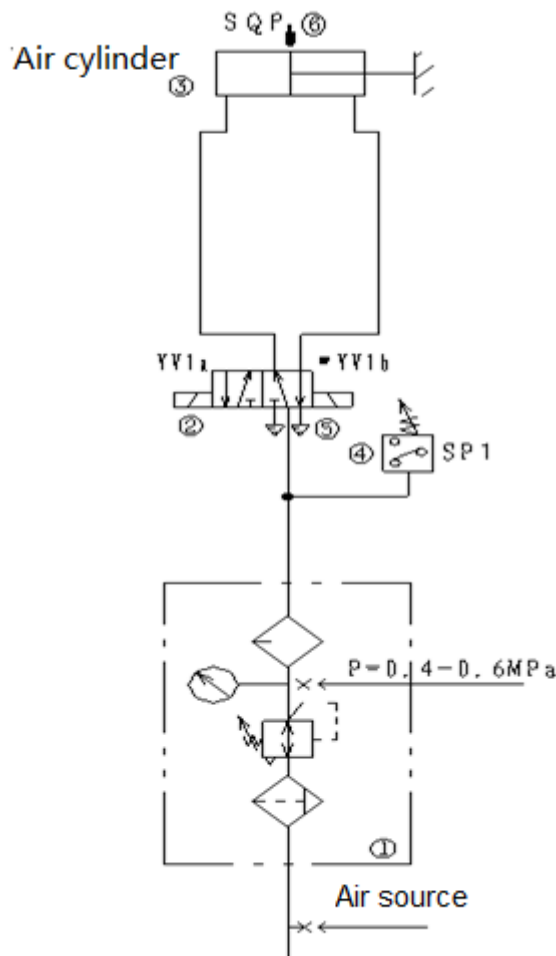
The release action of the jig is achieved by the forward and backward of the cylinder piston. Clamping, release and other actions by a two-way five-way electromagnetic valve (4V22008B), a pressure switch and cylinder control. The pressure switch is mainly used to detect and feedback whether the system pressure is normal. When the pressure is less than 0.4Mpa, the pressure switch action, resulting in an alarm, and another close to the switch ⑥ for the detection of cylinder piston rod movement, the card clamp action to confirm.

Solenoid valve solenoid according to the system requirements were carried on, power off action. Electromagnet YV1a power, YV1b power, the jaw cylinder ③ clamping, close to the switch ⑥ issued, the spindle for the next action; YV1a power, YV1b power, the lock cylinder ③ release.

Need to adjust the flow, relax the lock nut, slowly turn the adjustment screw, clockwise for the flow reduction, slow down; counterclockwise for the flow increase, speed faster. When the adjustment is completed, tighten the lock nut.

## 3 Pneumatic system Transmission principle

### 3.1 Pneumatic schematic



### 3.2 Pneumatic components details

Note: Specific parts of the random machine batch and supporting manufacturers may be subject to change.

Table6 Pneumatic components details table

Pneumatic components detail table					
Code	Name	Model	Supplier	Quantity	Note
1	Air Treatment FRL	BFC2000	YADEKE	1	
2	Two-position five-way electromagnetic valve	4V22008B	YADEKE	1	
3	Air Cylinder	SU63x50	SHENGDA	1	
4	Pressure switch	JNS-C110	GUONEI	1	
5	Muffler		YADEKE	1	
6	Proximity switch	IM12F04APA	OKE	1	
7					
8					

## **Part 4 User manual (hydraulic part)**

### **Chapter 1 Hydraulic system functions and requirements**

The hydraulic system is mainly used for CNC lathe fixture (hydraulic chuck, spring chuck) and other actuators to control the action.

The main action of the jaws for the claws of the contraction, open, keep in place.

Hydraulic oil should be used at 40°C viscosity of 30 - 50cSt, equivalent to ISO VG32, 46 petroleum-based hydraulic oil, such as: L-HL 32, 46; L-HM 32, 46 and other hydraulic oil (GB7631.2) but Cannot be mixed with different grades of oil. Attention should be paid to the effect of ambient temperature on the year of the oil. When the ambient temperature is low, select the lower viscosity of the oil; the other to choose a higher viscosity of the oil.

The system pressure of the hydraulic system is usually set at 3.5 to 4.0 MPa (except in special cases). General hydraulic oil normal operating temperature range should be: 30 - 60°C.

Hydraulic oil cleanliness level is better than 17/14, equivalent to NAS9 level.

### **Chapter 2 Hydraulic system components and use**

The hydraulic system is mainly composed of hydraulic station and pipeline and other components.

#### **1 Standard hydraulic station composition**

Hydraulic station consists of fuel tank and hydraulic pump, pressure reducing valve, commutation solenoid valve and other hydraulic components. The tank is installed on the bed bracket (or floor). The hydraulic station adopts the superposition valve structure, and the superimposed valve is superimposed directly into the required system by screw. Each superimposed valve is controlled, and the oil passage is compact, small, light in weight, flexible in configuration, Convenient to reduce the leakage between the passage, the pressure loss is small, improve the system efficiency and stability characteristics.

#### **2 Use of hydraulic station**

Under normal circumstances, users do not easily adjust the pump pressure.

Once the need to adjust, the user can adjust the pump pressure according to the workpiece, but the maximum does not allow more than 5.5MPa, otherwise the pressure of the pump is high, but the traffic plummeted, will seriously affect the operating speed of the implementing agencies. When adjusting, loosen the locknut on the oil pump pressure screw, adjust the screw clockwise, increase the pressure; adjust the screw counterclockwise, reduce the pressure, after adjustment, please remember to tighten the lock nut.



The hydraulic chuck claws are shrunk, open, and remain in place by a superimposed direct pressure relief valve, a two-position four-way (with mechanical positioner) solenoid valve, a stacking check valve and stack Type pressure relay system control.

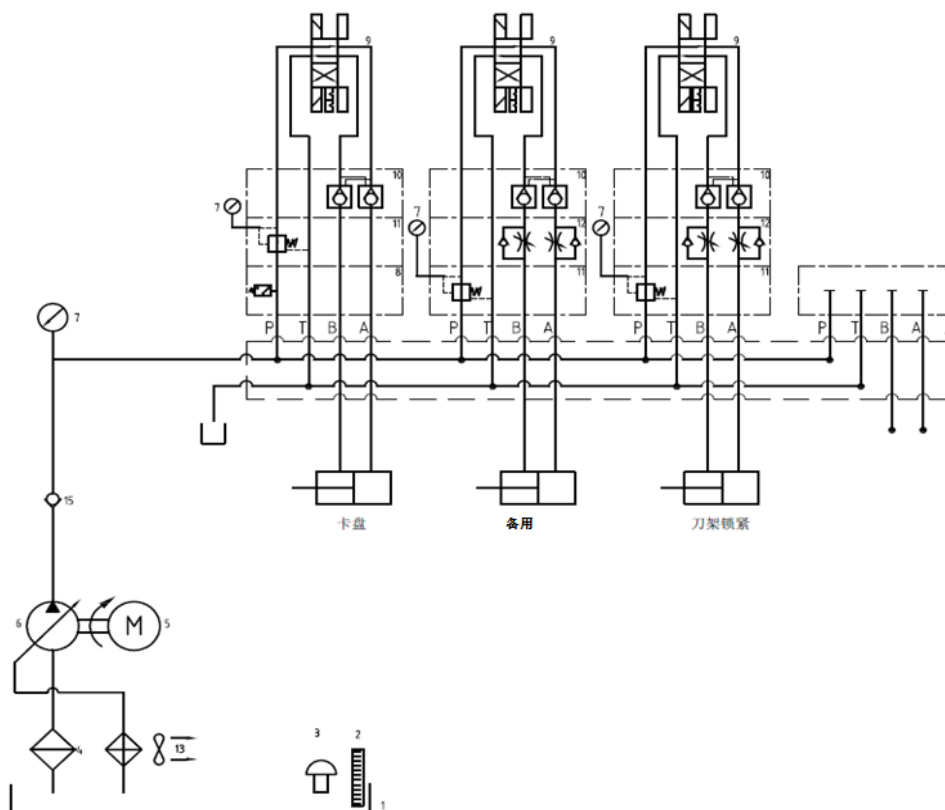
The hydraulic chuck claws are shrunk, open, and remain in place by a superimposed direct pressure relief valve, a two-position four-way (with mechanical positioner) solenoid valve, a stacking check valve and stack Type pressure relay system control.

Note: When using different cylinders, there will be a stroke detection switch on the back of the cylinder. When the switch is in place, the spindle can perform the next action. Care should be taken to check the switch.

The effect of the one-way valve is to avoid the sudden power lost and other oil interference on the impact of the oil, that is, self-locking effect. The clamping force is adjusted according to the situation of the workpiece by the pressure reducing valve. The clamping pressure of the hydraulic chuck of the machine is usually set to  $P = 0.5 \sim 3.5\text{MPa}$ . But must also refer to the attached hydraulic chuck, cylinder instructions in the use of the machine model used by the scope of the provisions of the scope, on the basis of the circumstances to allow flexible processing. The pressure of the pressure relay (indicated by its scale on the adjustment handle) must be consistent with the pressure of the chuck oil line (shown by the oil pressure gauge).

### 3 Hydraulic system transmission principle

#### 3.1 Hydraulic schematic



### 3.2 Hydraulic components details

Note: Specific parts of the random machine batch and supporting manufacturers may be subject to change.

Table 7 Hydraulic components details

Code	Name	Size/model	Quantity	Note
1	Fuel tank	50L	1	
2	Oil level indicator	LS-3	1	
3	Oil filler	AB1162	1	
4	Oil suction filter	MF-04	1	
5	Hydraulic motor	2HP4P(1.5kW)	1	Alittle
6	Variable vane pump	VP-30-FA3	1	
7	Pressure gage meter	0-10MPa	4	
8	Magnetic exchange valve	MJCS-02-NL	1	
9	Pressure relay	SWH-G02-D2-D24-20	30	
10	Check valve	MPCV-02W	3	
11	Modular pressure valve	MBRV-02P-1	3	
12	Stacked double/single directional throttle valve	MTCV-02W	2	
13	Air cooler	AJ0510	1	
14	Main fold block	02-4W	1	
15	Tubular on-way valve	CIT-03	1	
16	Cover plane	02	1	

## Part 5 Installation of storage and transportation manual

### Chapter 1 Transportation and deveining of lathe

#### 1 Lathe transportation

The net weight of the machine is 2800kg and the gross weight is about 3500kg. The carrying capacity of the transport or lifting tool should be sufficient to accommodate the load.

When transporting the machine, move the movable parts such as the pallet, the machine sliding door, the system box and so on completely to ensure the safe and reliable, without accidental tilt, movement, rotation and vibration.

The box cannot be stacked.

Should be safe and reliable means of transport, transport should avoid the box movement and collision. Transport should take a reliable rain, wind measures.

#### 2 Machine lifting

##### 2.1 FCL lifting:

See machine lift 1. figure 6.1

To be marked by the box position, cannot have a larger tilt (no more than 15 degrees) and vibration. Use a crane or forklift to lift.

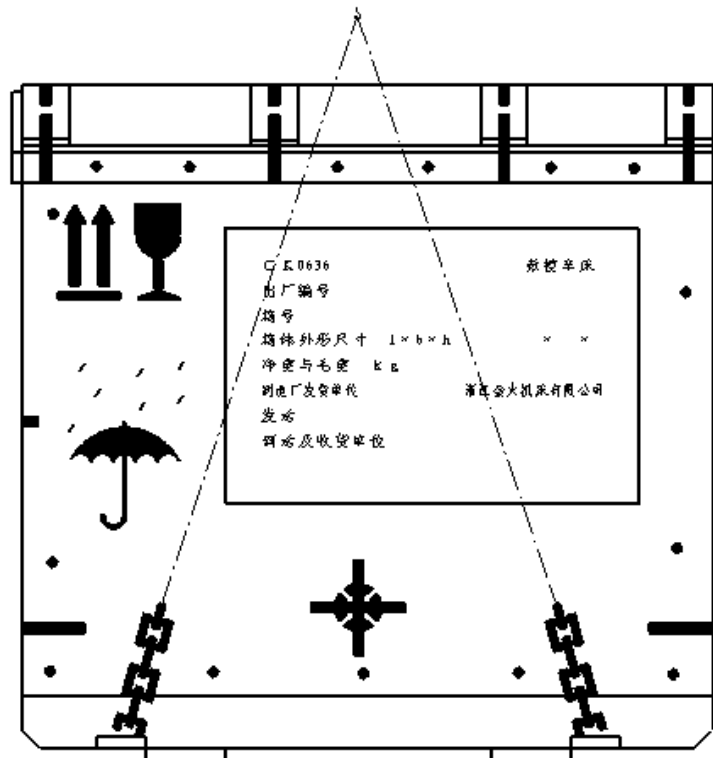


Figure 6 machine transport lift 1

##### 2.2 Machine lifting without package

See figure 6.2 machine transport lift 2.

First drive a forklift directly into the base or under the bottom of the lower part of the shovel in the process, we must ensure that the forklift's two teeth are completely through the entire base or bottom row, the first slowly hold up to see if the balance, and then the machine, the carrying capacity should be > 2000Kg. The whole process to be light and smooth.

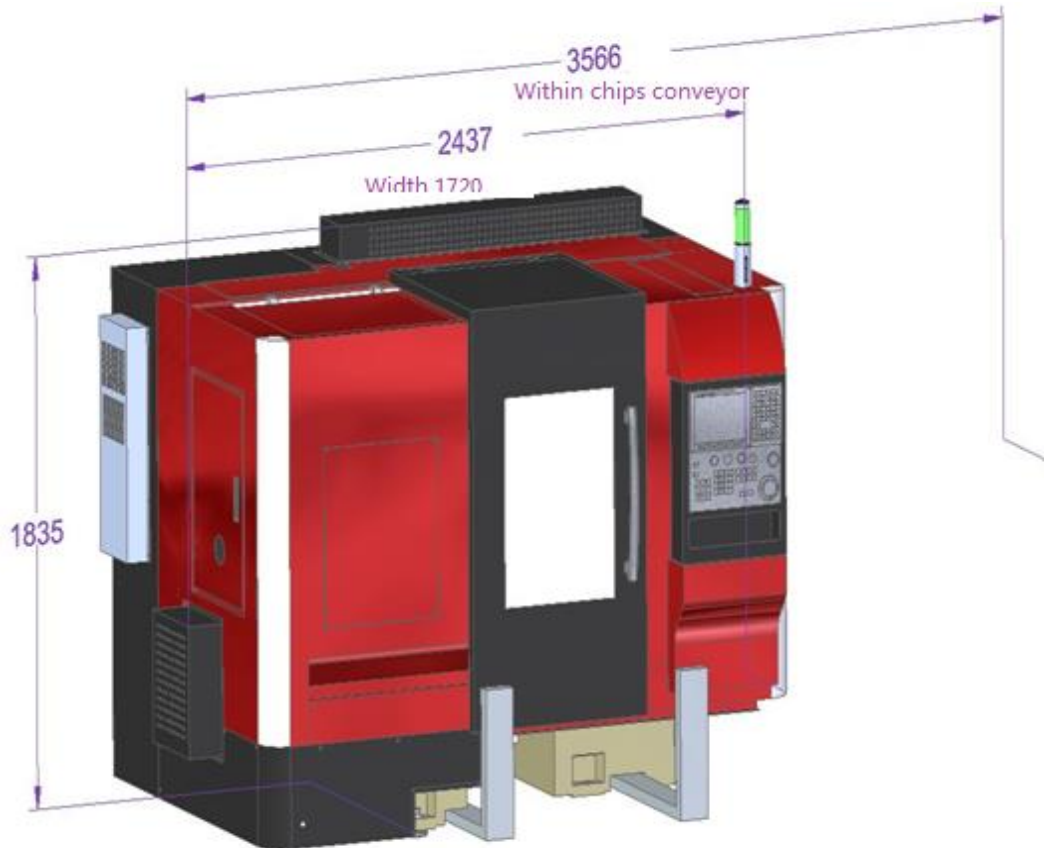


Figure 6.2 machine transport lift 2

### 3 Open the package

Before open the box checks the machine box in the transport, the external damage to the situation, and then use the nail from the above began to remove the box, you should first remove the lid, and then remove the side wall, and be careful not to cause damage to the machine.

After the completion of the box should be carefully checked whether the machine in the handling process is damaged. Unpack the box after lifting, should first remove the tank, and then remove the bottom row, after unpacking the machine should first check whether the appearance of intact.

According to the "packing list", check machine tool accessories and spare parts are complete and intact after unpacking.

After the machine is unpacked, apply kerosene to carefully remove and wash the surface with rust-proof grease, but should not touch the paint part. After cleaning the surface should be dry, coated with clean oil.

## Chapter 2 Installation and requirement of lathe

### 1 Installation requirement

In order to ensure the accuracy of the machine, the machine should be installed on a flat concrete foundation. Machine installation must be adjusted at the natural level of the machine, the level will be placed on the carriage, in the whole trip to move the carriage, level in the vertical and horizontal direction of the reading difference of not more than 0.04 / 1000.

There should be enough room around the machine to facilitate operation and overhaul. The size and depth of the foundation are shown in figure7. If the conditions permit, Machine should be installed on the basis of the surrounding dug with anti-vibration groove.

### 2 Installation of machine

Generally, there are two kinds of installation methods that do not have buried bolts (directly mounted on the damping horn) and are embedded in the ground bolts.

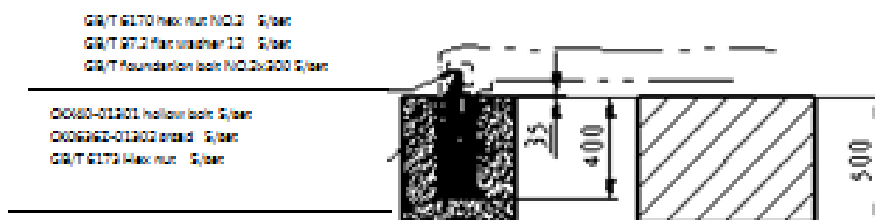
#### 2.1 Non-buried feet bolted installation

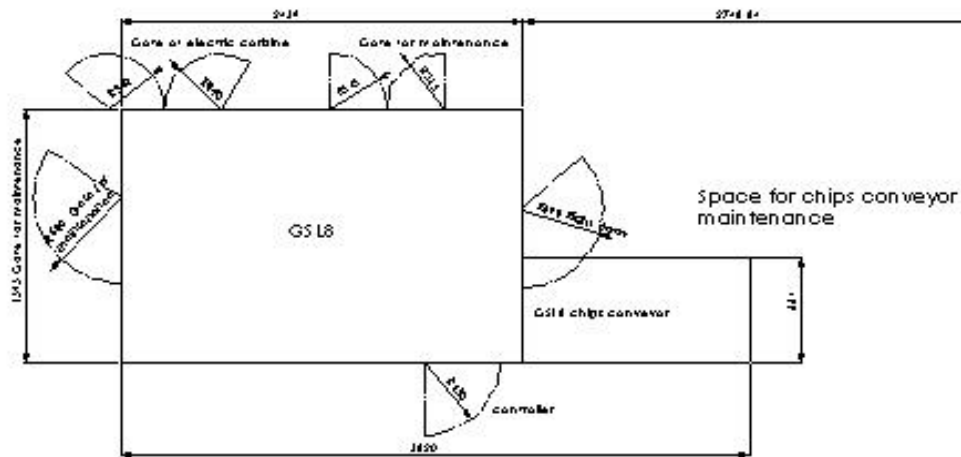
The machine is equipped with four adjustable horns, the installation of the horn placed in line with the requirements of the foundation, remove all moving parts of the transport fixtures, and then placed in the bed at the end of the bed, with a scale value of 0.02 / 1000 level, as shown in Figure 7, respectively, vertical and horizontal placed in the small pallet, the working speed of the vertical movement of the knife, in the two positions before and after the inspection, adjust the wedge, so that the level in the vertical and horizontal direction The reading difference of not more than 0.04 / 1000 leveling can be tight.

#### 2.2 Anchor bolts embedded installation

When bury the anchor bolts please install as shown in Figure 7 (when the parts need to be purchased separately, please contact with our sales), in accordance with the 2.1 method to find a good level, adjusted, evenly tighten the screws on the foot screw, then do the second grouting, fixed anchor bolts. And then fine-tuning again, fix the anchor bolts.

After installed the machine, the machine level will change due to the change of bearing capacity of foundation. So, when after operation for a certain time (about 6 months), need to check the level of machine again, adjust timely. Since then, depend on the specific conditions, check and adjust the level one or two times a year. Figure 7 Machine foundation, maintenance space and level adjustment chart





### Chapter 3 machine use environment

1. Machine should be use at environment temperature 5 - 40°C, it is best placed in a constant temperature environment.
2. Machine should be avoided other high heat radiation and vibration sources, no abnormal dust, no acid, corrosive gases and salt and so on. To avoid machine failure or loss of precision.
3. The relative humidity of the machine environment should be controlled below 75%, no condensation. When the maximum temperature up to 40°C, the relative humidity is not more than 50%, to prevent the electrical components, the detection of moisture affected components normal work.
4. Machines electrical, gas, liquid use requirements and instructions (wiring and take over the export location shown in Figure 7)
  - a) The machine power supply standard is 3 phases, AC380V, 50HZ, 6kVA (depending on the user configuration may be different), the voltage fluctuation should be controlled within  $\pm 10\%$ . If the use of regional voltage instability, the machine should be equipped with power supply to ensure the normal work of the machine.
  - b) Machine should have a reliable grounding, grounding resistance is less than 4Ω, ground wire diameter is not less than the power line diameter.
  - c) Into the machine air humidity less than 50%, flow 120 L/min, the pressure should be 0.5 ~ 0.8MPa.
  - d) In order to ensure the normal working performance of the machine, the cleanliness and dryness of the compressed air of the air supply have certain requirements: the filter precision is not less than 40μm and the dew point temperature is 10°C.

---

## Chapter 4 Package and storage of machine

### 1 Machine for long-term or long-distance transport need to be packaged well

- 1.1 Machine for long-term store or long-distance transport need to be seal up for safekeeping
- 1.2 Clean up the machine before packaging, coated rust protection oil on the processing surface. Put desiccant inside the cabinet (half a year to replace).
- 1.3 When packaging, the movable parts of the machine should be moved to the equilibrium position and fixed.
- 1.4 We attached user manual, certification and packing list for every machine.

### 2 Storage

- 2.1 Machine should be stored in a dry, well-ventilated, environmentally friendly warehouse ;
- 2.2 The product should be stored on a flat surface to prevent deformation and corrosion
- 2.3 To prevent rain, damp, rodents and other disasters;
- 2.4 For long term storage, should check the storage location of the environmental conditions and packaging status regularly, if any abnormal, should check immediately, repair and repackage.
- 2.5 If long term storage, need to operate the machine one time (about 5 hours) every two years, to restore the performance of electrolytic capacitors and other components, check the machine abnormalities.

### 3 Other issues



*Attention:*

- Product box cannot be stacked;*
- Can't climb, stand or put heavy stuff on the package;*
- Keep the package away from damp, exposure and rainy.*

## Part 6 Maintenance and service manual

### Chapter 1 Normal faults and trouble shooting



*Warning:*

*Before adjustment and service, please read and follow related safety information of chapter1. Maintenance and service need done by professional; non-professional personal shall not adjust or service this machine, if lead to damage or accident, we can only assist to solve problem.*

1. Maintenance, service and normal faults see maintenance service manual
2. Normal and simple faults need done by professional, if it is complicated problem, connect to

us.

### 3. Normal faults:

Table 8: normal faults

No.	Faults	Reasons
1	Spindle not rotate	M-code is incorrect, emergency alarm, lubrication pump not work, oil pump not work, liquid level alarm
2	Headstock temperature rise	Preload of bearing is inappropriate, lubrication is not normal
3	Coolant not come out	M-code is incorrect, low liquid level, coolant pump protection is work
4	Machine not work normally	NC is alarming, check all electrical connection, feedback component
5	Reposition accuracy is bed	Check installation of ball screw, lubrication of linear guide (box way), coupling
6	Appear taper in finishing machining	Gap in linear guide is too big, tailstock and headstock are not homocentric, perpendicularity of spindle and feed shaft
7	Tailstock cannot move	M-code is incorrect, hydraulic (pneumatic) line is blocked or leaking, pressure is not suitable.
8	Alarm during X/Z axis is moving	Coupling is loose, guide is wearing, lubrication is not suitable
9	Alarm lubrication system	Oil line is blocked, low oil level
10	Clamping force less	Fixture is not clean, lubrication in jaws, length of pull tube, pipeline leak
11	NC system alarm	See electrical system user manual

## Chapter2 Mechanical part

### 1 Maintenance warning

This machine be design and manufacture meticulously, delivery after inspection, but good maintenance and service is guarantee of efficiency, so please follow this manual to maintenance and service.

### 2 Safety announcements

See chapter 1.3

### 3 Machine main parts structure and adjustment

#### 3.1 Body and driver of vertical movement

Body and driver of vertical movement (see figure 8.1, 8.2)

This machine body is high strength mono-black body, the linear guide ways are 45°slanting (linear motion guide way). The body are distributed by main bed frame, linear guide way, vertical driver unit (motor, ball screw, bearings, coupling), kinds of support.



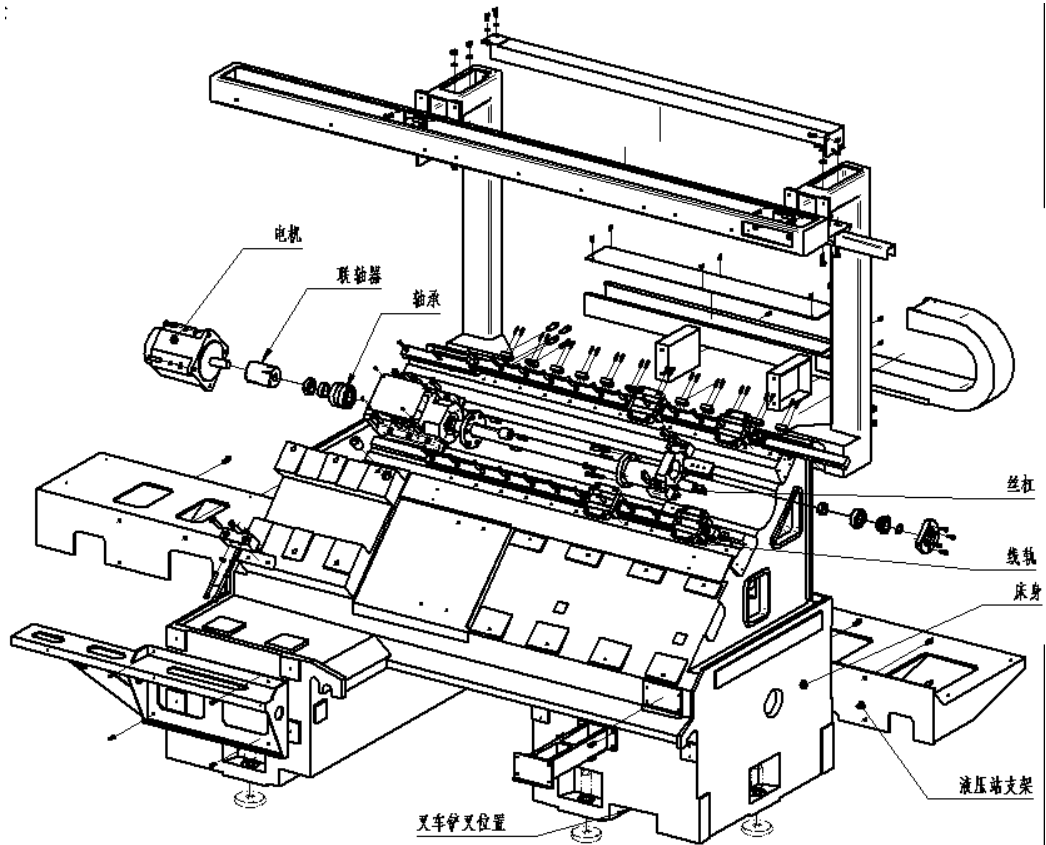


Figure 8.1

Carriage vertical move source is AC servo motor, through elastic coupling and ball screw to let the carriage to move. the AC servo motor installed a encode, it will feedback the angle signal of ball screw to the controller. The maximum speed of AC servo motor is 3000r/min, speed limit 2400r/min, the lead of ball screw is 10mm, they can let the carriage move at 24m/min.

Angle connect thrust ball bearing, ball bearing and lock nut on the both end of ball screw, adjust the lock nut to adjust the gap of ball screw.

Ball screw and linear guide will be lubricated automatically.

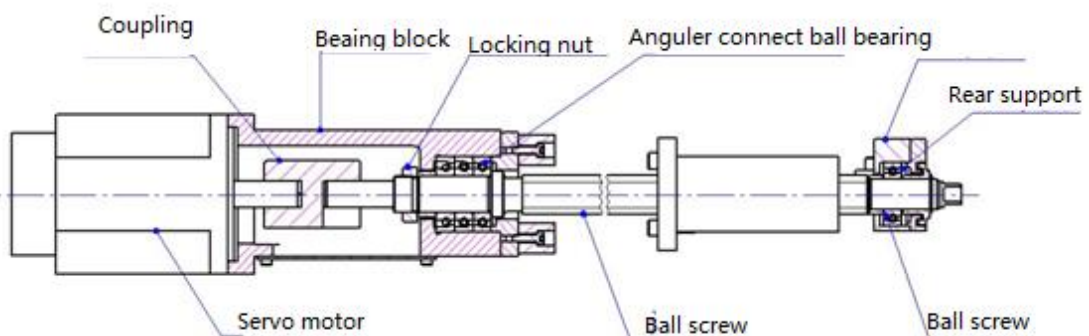


Figure 8.2 Structure of carriage driver unit

### 3.2 Headstock and encode

#### 3.2.1 Headstock (standard)

This machine uses high performance servo motor driver, thought a pair of belts to connect motor and spindle, the speed of spindle will be reduced (1:1.5), top speed is 4500r/min. The

spindle be supported by angle connect ball bearings, this bearing can take the load of radial direction. Normally the temperature rising of spindle cannot exceed  $35^{\circ}\text{C}$ , the maximum temperature can't exceed  $70^{\circ}\text{C}$ .

The bearing doesn't need lubrication.

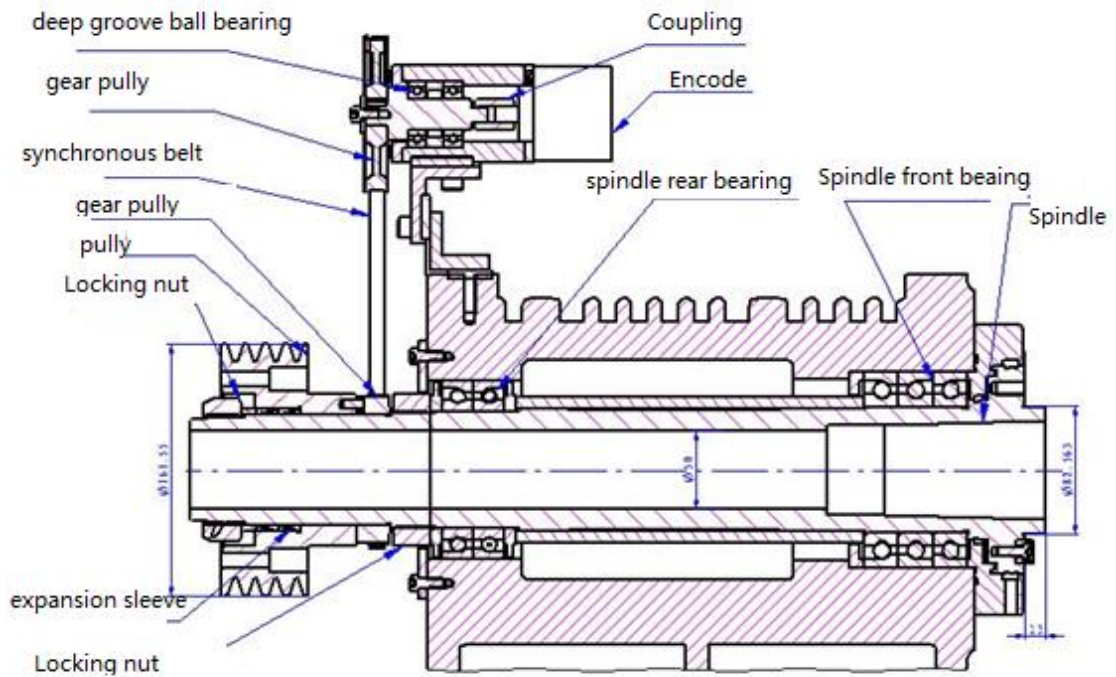


Figure 9 Headstock and encode

Spindle and encode install synchronous pulleys, pulleys axial position must be the same, otherwise synchronous belt will beat and reduce the use life. The synchronous pulley of spindle is fixed, so just need to adjust the one on encode.

### 3.3 Spindle break system

This device normally be used on spindle orientation in a specified phase, when spindle stopped rotating, give the spindle a clamping force that prevents it from turning. It consists of an oil pressure butterfly brake and a brake disc.

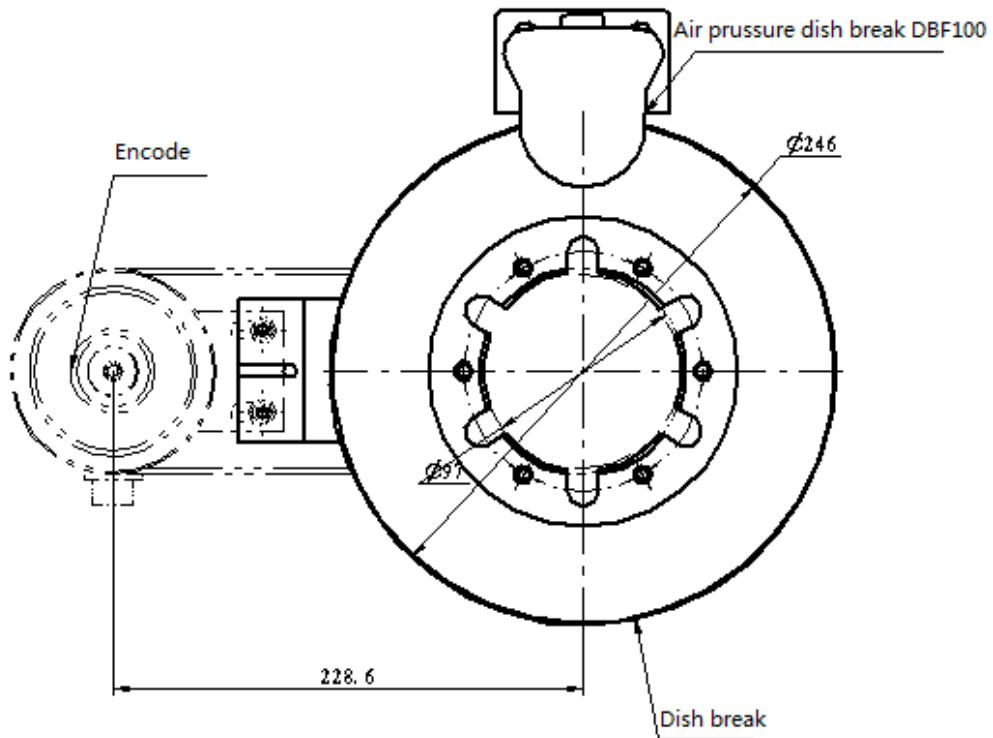


Figure 10 Spindle break device

Attention 1: This device can only be used when the spindle is stopped. 2, the position of encode is changed while adding this spindle breaking device

### 3.4 Clamping device

The structure of clamping device see figure 11.1 and figure 11.2.

Clamping device is positioned and fixed on end of spindle flange, oil cylinder is connected to rear spindle through flange. Chuck and collet chuck connect oil cylinder by push tube.

To replace chuck or oil cylinder, remove the bolts of pulley first.

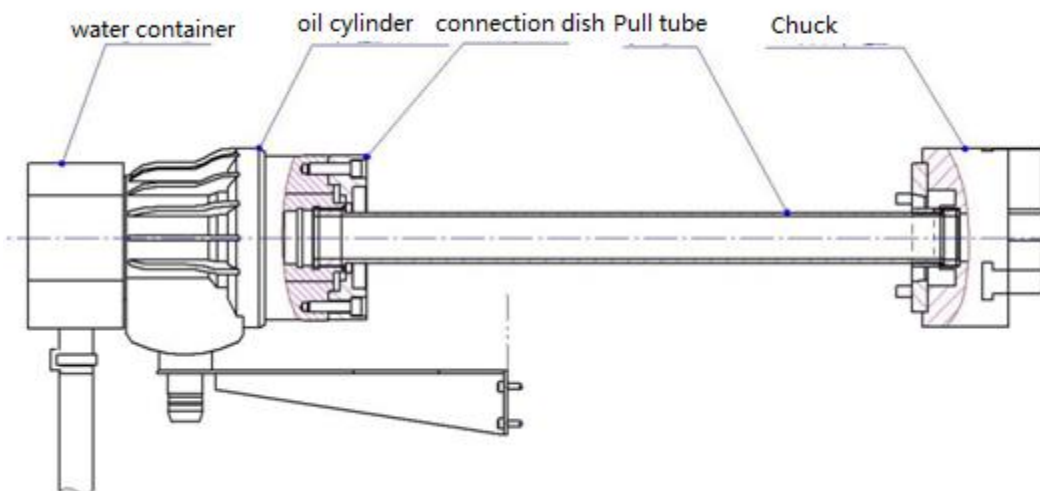


Figure 11.1 Clamping (chuck)

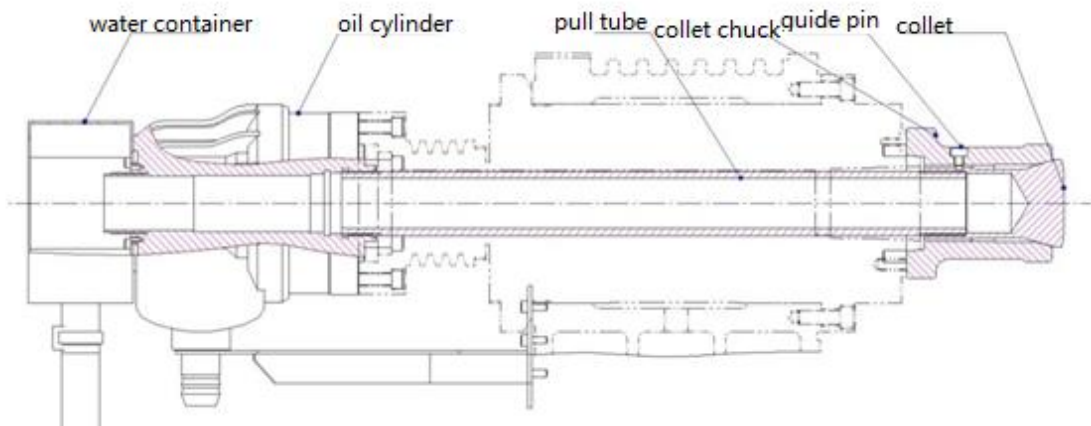


Figure 11.2 Clamping (Collet chuck)

Clamping device be installed on encode, if the synchronous belt is loose, it will affect signal feedback of encode, and effect machine accuracy(threading). To tension the belt, need loose the bolts of encode holder, rotate bolt of tightness device clockwise, then lock the bolt of encode holder.

### 3.5 Main power transmission (Motor device)

Main power transmission structure see figure 12.1, 12.2.

This machine adopted high performance frequency motor (or AC servo motor) to be the main power source, high speed rang, vary usage. motor transmit power through motor pulley, belt, spindle pulley, until spindle.

After long time usage, main belt will be aging, loose, it will need replace or tension. To tension belt, loose the locking bolt on motor holder first, rotate adjust bolt clockwise, then lock the bolt on motor holder; to replace belt. loose the locking bolt on motor holder first, rotate adjust bolt anticlockwise, then lock the bolt on motor holder.

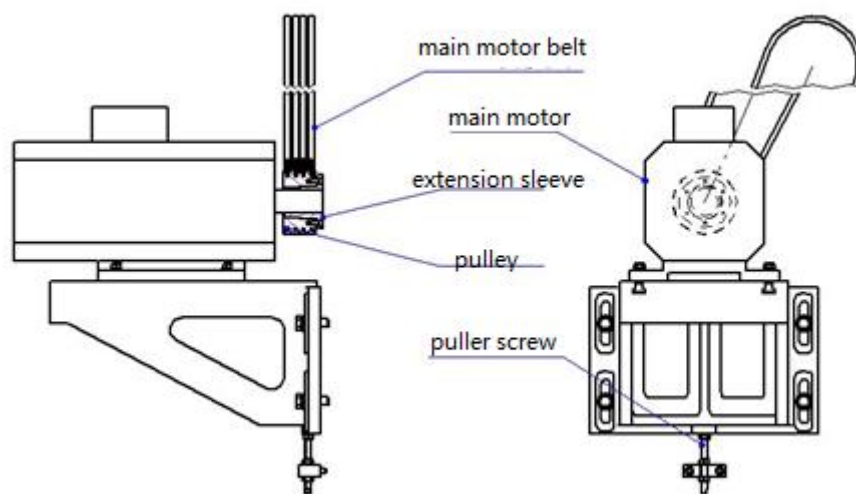


Figure 12.1 Main transmission

#### 1 Tension of belt

Note: in different condition, the tension require is different, this information of this chapter is

for reference only

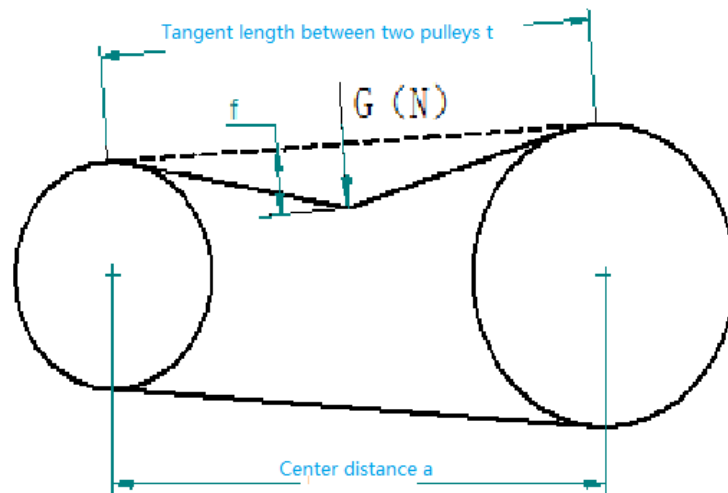


Figure 12.2 Belt tension analyzes

The pretension of belt can be test by vertical force on middle point; normally load the force  $G$ , let 100mm span get displacement  $f$  is 1.6mm:

$$F=0.016t$$

Table9 preload vertical force  $G$  and displacement  $f$

Check item	$G$ (N/belt)	$t$ (mm)	$a$ (mm)	$f$ (mm)
Data	25	497	497	7.9

2 Pulleys need balance

Corresponding V-slot of pulleys should be coinciding, the tolerance should less 20'. If need balance, loose bolts between motor and connection broad and axial move motor and pulley, le t pulleys coincide, then lock the bolt.

### 3.6 Carriage and tool post

See Figure 13 and Figure 14.1 for structure

#### 3.6.1 Carriage

Carriage move follow the linear guide way. Vertical AC servo motor through coupling drive the ball screw to realize the vertical movement; Horizontal AC servo motor thought coupling drive ball screw to move the carriage horizontally.

The AC servo motor with maximum speed is 3000rpm, limited speed to be 2400 rpm, the lead of ball screw is 10mm, the carriage can move 24m/min.

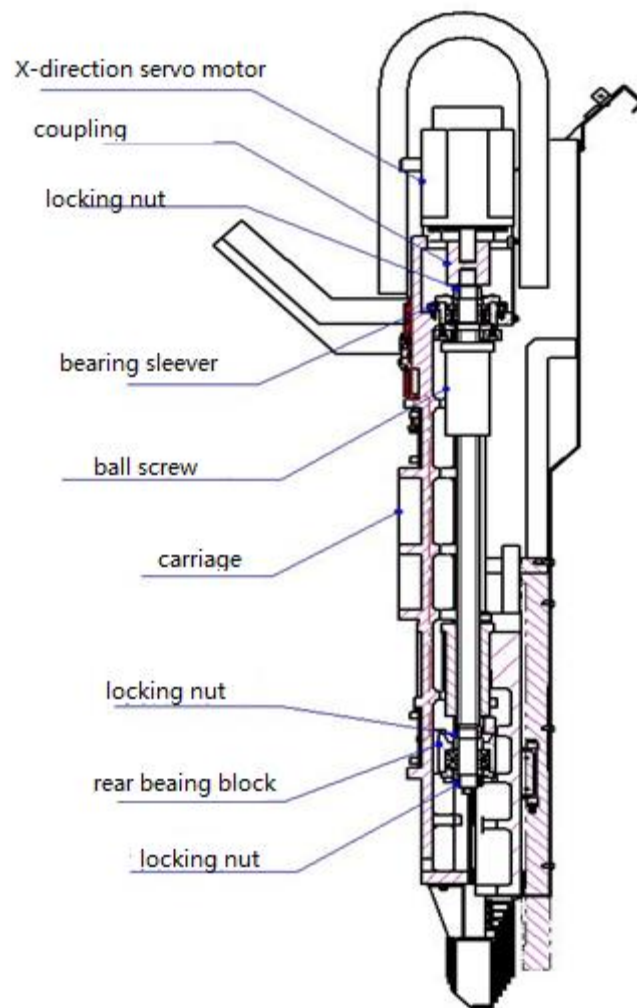


Figure 13 Carriage

By adjust the lock nuts of ball screw to adjust the gap of axis, to ensure the accuracy. There are oil points on carriage, the lubrication oil pump will supply oil automatically.

Cross slide can install the turret.

### 3.6.2 Turret

As the Figure 14.1, this machine can choose 8T-63 servo turret (or other turret), it can carry 8 OD tools, and 4 boring tool post with turret; OD tool size is 20×20mm, the boring tool size is  $\varnothing 25\text{mm}$ .

When install the tools, it must be confirmed it is not interference between workpiece, tool and clamping device.

See the user manual of turret before use it.

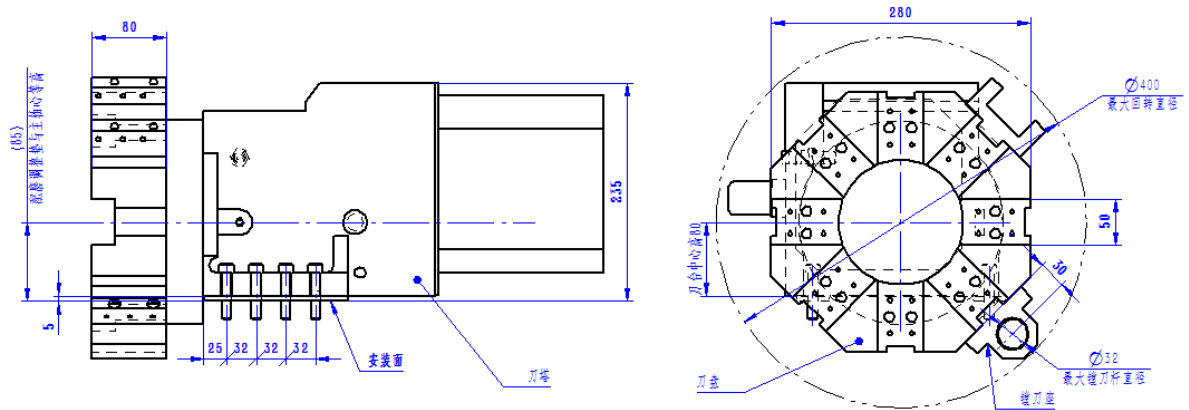


Figure 14.1 Turret 8T-80

### 3.7 Tailstock

The structure of the tailstock (see Figure 14.2).

The tailstock adopts a hydraulic tailstock live top structure, the tailstock sleeve stroke is 80, and the sleeve taper is Mohs 4. The extension and retraction of the sleeve are controlled by buttons on the control panel and can also be controlled by a foot switch.

When adjusting the center of the tailstock and the center of the spindle, first loosen the locking screws of the straight insert, then adjust the insert screws so that the center of the tailstock coincides with the center of the spindle or 0.02 mm above the center of the spindle. Then tighten the screws.

When moving the tailstock, first loosen the two locking screws on the tailstock to disengage the pressure plate from the tailstock rail, then push the tailstock to the desired position, and then evenly lock the screw, then you can Working normally.

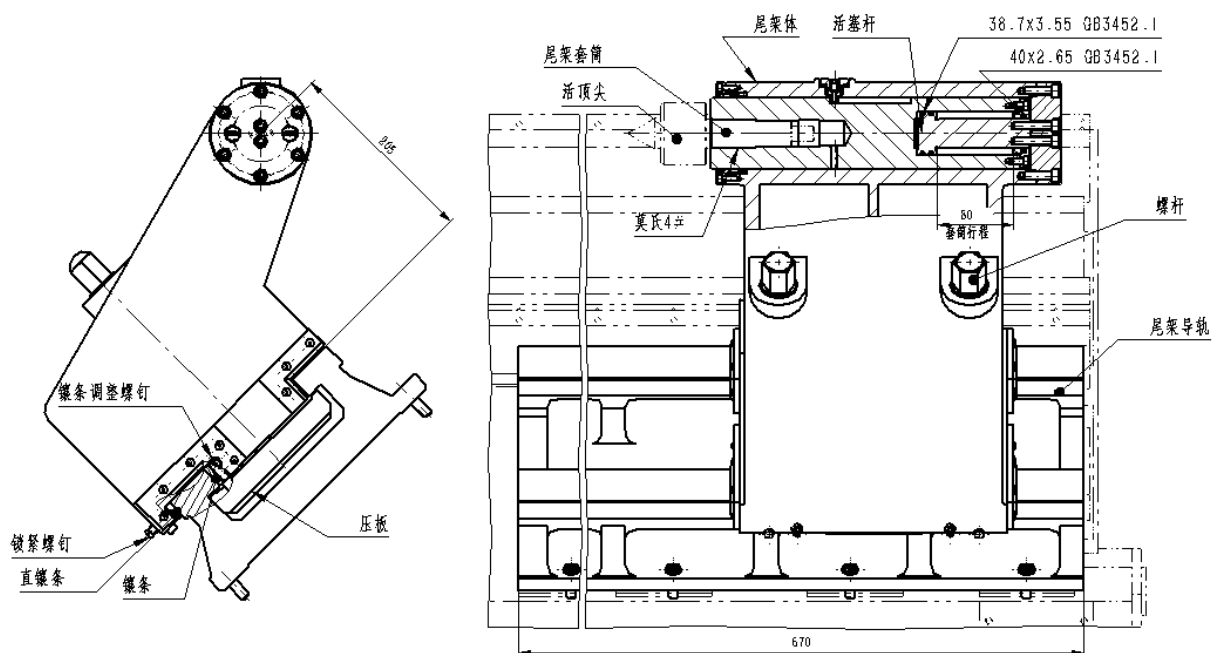


Figure 14.2



### 3.8 Cooling and chips remove device

See Figure 15.1 15.2 15.3



Note: Never start pump without water; Check the water level every day.

#### 1. Cooling system

Cooling device is mainly composed of the cooling water tank(105L), water pump, water pipe, outlet, etc.; the cooling system is mainly used for machining the workpiece, cooling tool and flushing iron chips.

Centralized cooling system cooling, cooling fluid stored in the water tank of machine for recycling use, by the cooling pump suck up cooling fluid, the cooling fluid through the overflow valve, cooling pipe to outlets of machine tool. This machine adopts the base-tank separate structure (standard), easy to move, clean up. Water tank is equipped with observation of water level gauge, when the water level in the low level, please added coolant, ensure the water pump flow.

Cooling water nozzles is equipped above spindle and near tool rest, aim the nozzle tip when parts processing can achieve the best cooling effect, reduce the tool wear. To adjust nozzle, loosen the pressure pin first, then touch water mouth nozzle to adjust direction. Using the cooling boring tool (optional), should make the cutting tool overhanging short as far as possible, boring tool holder within the cold plate (optional), cooling water led to the boring tool can be the backend inlet; when installation tool, press tool backend, make it stick on the cover plate then lock screw press tool on the face.

#### 2. Coolant selection and maintenance

We suggest that: according workpiece to use different coolant. Consider the workpiece surface quality, tool wear, machine maintenance · safety issue, environment protection to selecting suitable coolant. In general, copper and aluminum use oil type coolant to prevent rust and reusable; steel use emulsion to reduce the temperature, prolong tool lift; cleaning of dirt and chip in box regularly, coolant should be replaced periodically, avoid using coolant that can corrupt machine and pollute environment.

#### 3. Chip removes

This machine adopts manual chip remove at the back. Chip box at the bottom of the machine, top surface of bed. In the water tank inlet filter can filter the larger chips from the coolant, but small iron after a long period of time will accumulate in the bottom of the tank or stick in the filter to plug coolant flow, so to the cooling tank and filter cleaning on a regular period. On water tank back the right side, there is a drain, usually with a screw to plug, when need to clear the water tank drain, remove the screw, after drainage should be blocked again.



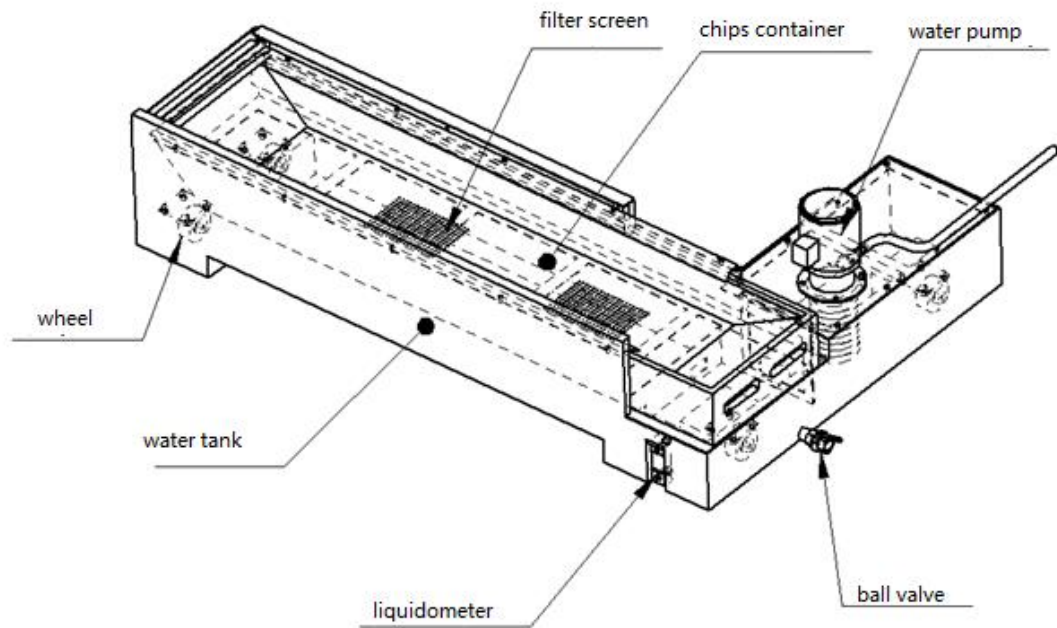


Figure 15.1 cooling and chips remove device 1

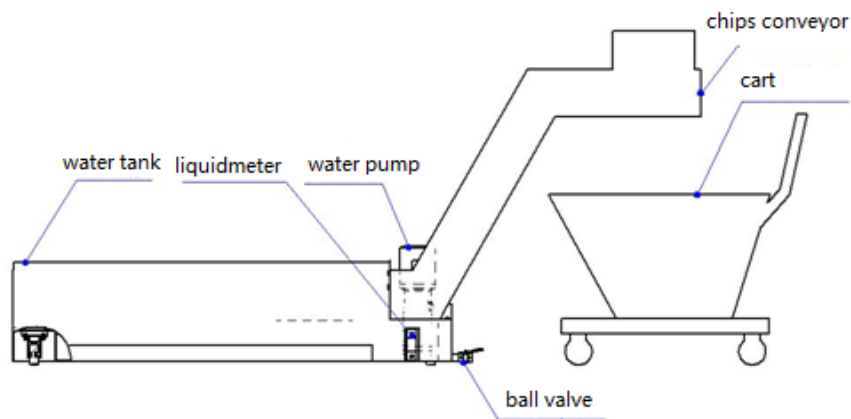


Figure 15.2 Cooling and chips remove device2 (optional)

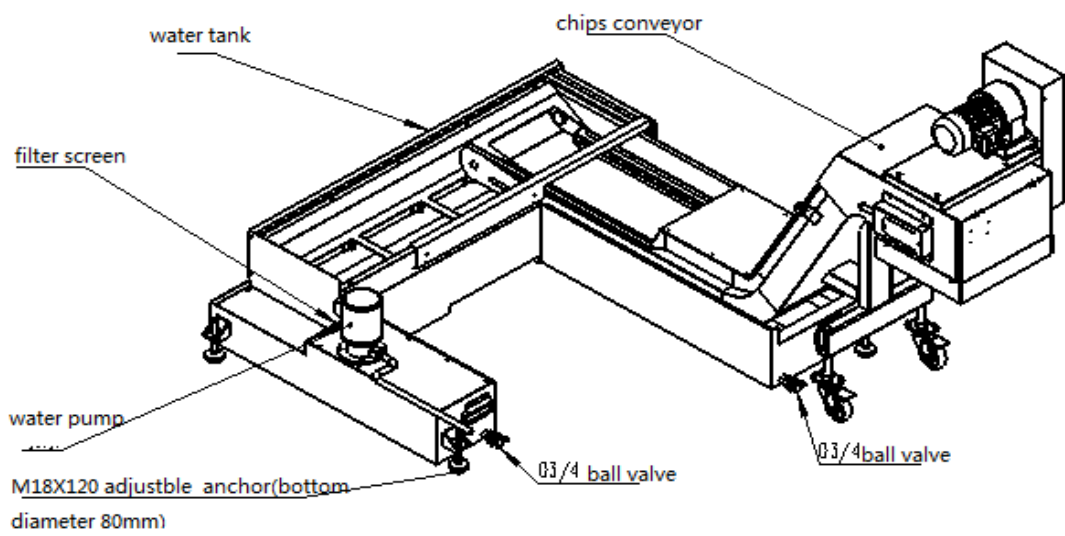


Figure 15.3 Cooling and chips remove device 3

### 3.8 Lubrication device

See Figure 16 for lubrication destruction diagram.

#### 3.8.1 Lubrication system

The lubrication oil of this machine, we suggest using 32-68# lubrication oil.

This machine adopts the automatic centralized lubrication system for machine tool lubrication. Lubrication system by the automatic centralized lubrication pump to supply oil to each guide way and ball screw, guarantee the normal work of relative motion parts. Lubrication pump installed in front of the machine on left, only 2 oil blocks piled up beneath the carriage near to the servo motor.

The machine lubrication system is volumetric lubrication system, lubricating system consists of automatic lubricating pump, oil filter, oil pipe, oil distributor (measurement), tubing connectors, terminal connector, and pipeline, etc. Automatic centralized lubrication pump station oil tank capacity of 1.5 liters, the flow rate of oil pump is 200 ml/min, oil injection pressure is 1.8 ~ 2.0 MPa. Lubrication system can quantitative filling into all lubricating points regularly, there are 10 lubrication points on the carriage, the sliding body and ball screw, each lubrication point by an oil distribution component (quantitative lubricator) to control the flow rate of the oil. Filling time interval can be set in the system.

Attention: if use chuck, lubricate jaws each day by oil gun.

#### 3.8.2 Spindle bearing lubrication

Spindle bearing and ball screw bearings adopt the same grease as SKF, LGMT2/1, the loading degree is 1/3~1/2 of bearing gap; the grease has been filled before factor, it doesn't need to refill; but if do heavy maintenance, the bearings need to clean and fill grease.

#### 3.8.3 Maintenance

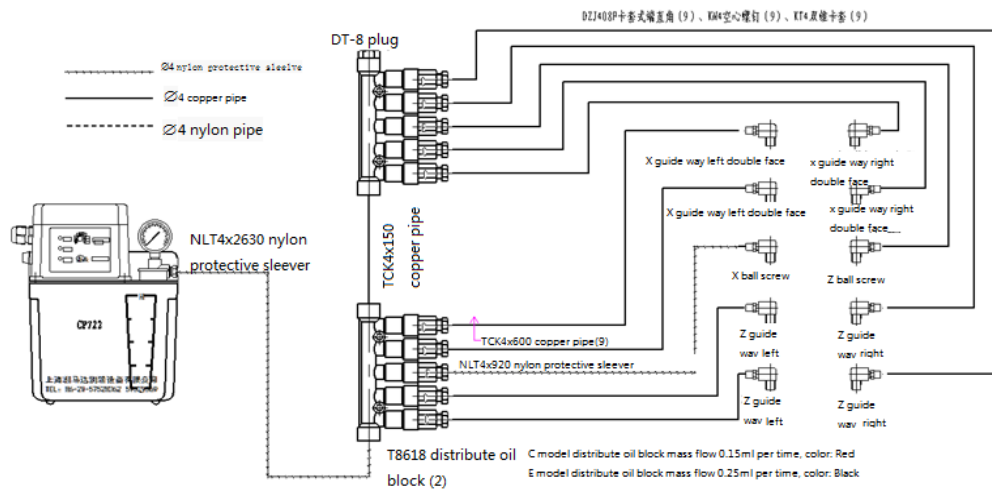
When machine first start or stop for a long time need to start again, please manually fill each oil lubrication pipe and lubrication points. Lubrication pump is equipped with liquid level testing switch, it will alarm when oil level low. remind users refueling timely. Also, according to need optional pressure detection switch can be added to monitor lubricating system. Check the oil level and pressure when pump oil, refill oil on time.

See the change of gauge pressure to detect the work status of lubrication system, pump oil pressure gauge pointer should be able to reach a rating and keep at least 5 s, stop the pump oil, the pointer should quickly return to zero, if not zero shows higher back pressure relief has a problem, need cleaning system.

Please protect the pipeline, and regularly check the pipes are damaged or locked. Because every time the oil injection quantity is limited, slightly leaking lubricating points for not oiling, machine motion pair of rapid wear or damage. If found damaged should be timely repair or replacement.

Keep oil clean, otherwise the distributor measurement will be jammed, it will lead to failure. Lubrication pump should pay attention to refueling and check the oil regularly, replace oil pipe or joint when necessary, to guarantee the normal work of the machine lubrication system.

To add oil, it must be the same oil as in oil tank (oil quality must be guaranteed); and use the filter precision is higher than 120 $\mu$ m to filter the oil form the top hold.



### 3.9 Pneumatic device

This machine can choose different pneumatic function parts according to customer's requirement, it mainly used for clamp, feed and draw raw parts, auto door checking or cleaning.

Attention: this part is belonging to optional part. Pneumatic part sees operation manual (pneumatic part).

When use pneumatic device, check and observer pneumatic system and pressure meter, adjust the position of closing switch to light the clamping switch (if this light is off, this spindle cannot rotate), see chapter of maintenance.

### 3.10 Hydraulic device

This machine adopts hydraulic clamping device, it mainly uses to be the power source of hydraulic chuck and collet. The hydraulic station be installed on the ground behind machine, connect to hydraulic cylinder by hydraulic pipe.

When use and maintenance, according workpiece and instruction to adjust the pressure, the maximum pressure cannot over the allowable of chuck.

Note1: see user manual (hydraulic part)

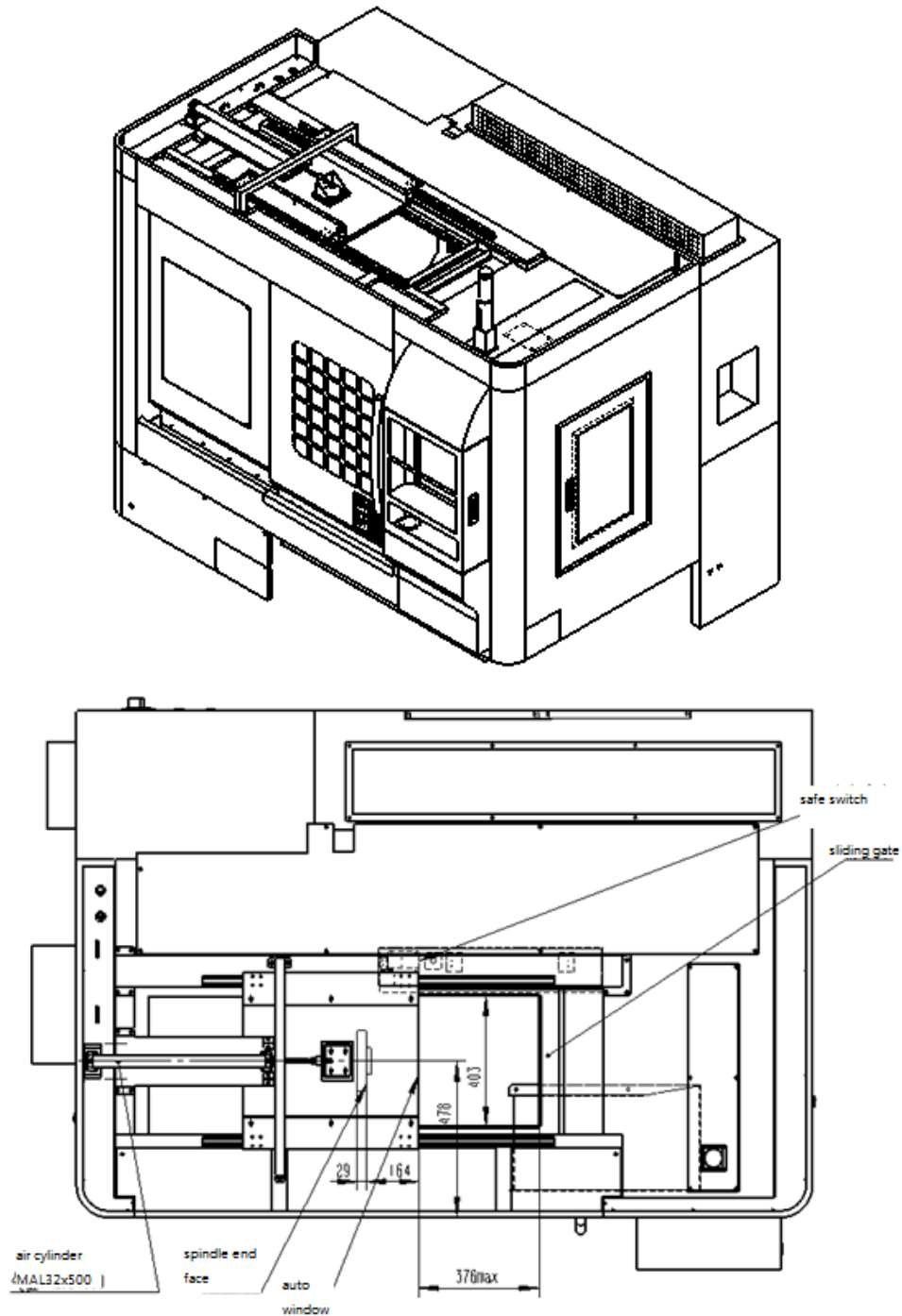
### 3.11 Normal optional parts

#### 3.11.1 Auto sky window

See Figure 17.1.

If choose gantry robot auto feed and draw, it can choose sky window and back-chips-conveyor. To open the sky window, through air cylinder which be controlled by controller.

Attention: Clean the window and guide way regularly.



### 3.11.2 Rotation parts catcher

See figure 17.2.

The rotation parts catcher mainly be used for auto drawing, normally it will be cooperated work to bar feeder, the rotation parts catcher can be used for  $\Phi 30 \times 80$  size parts. When machine is doing cutting work, parts catcher is in original position (close to access gate) and stand by, when cutting off the part, part catcher will be rotated under the part, after cutting off the part, the part catcher will roll back to original position and at same time the part will fall in the container.

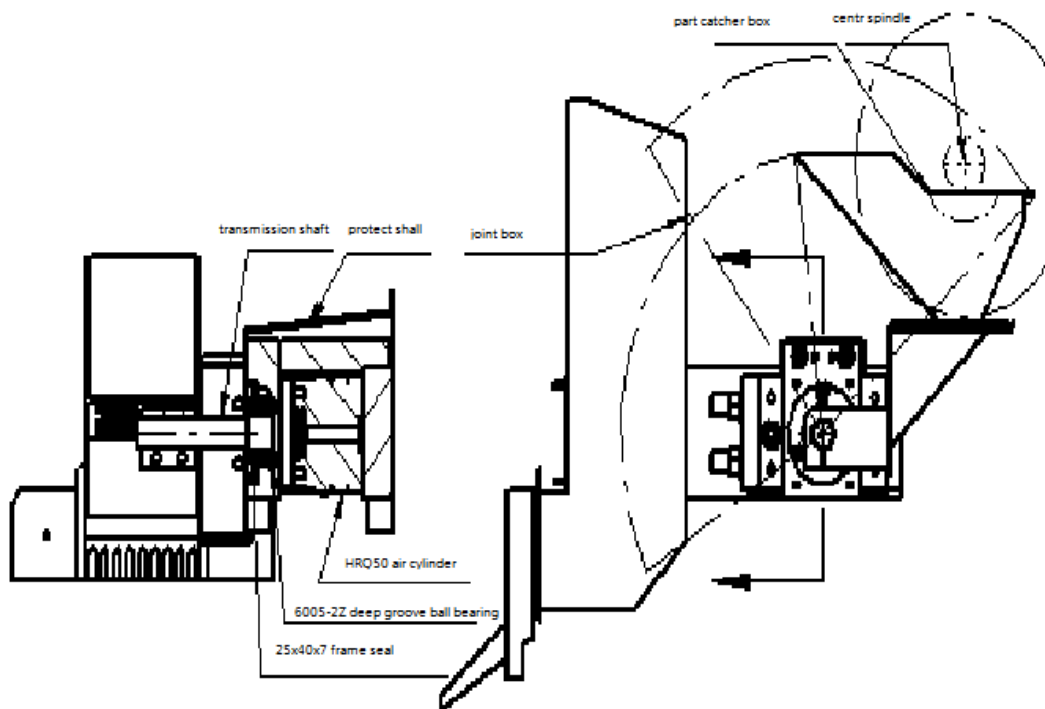


Figure 17.2 rotation parts catcher

Attention: When carriage install living tool or tool post on the bottom, it should be attended on the interference. When operation is done, before cut off, the carriage should move away on Z-direction( get more room for pars catcher), if not interference, parts catcher roll under the part, carriage move toward parts (Z-direction), then move on x-direction to cut off the part; when the parts fall in to the part catcher, move carriage away from part catcher, make sure not interference roll back the parts catcher.

### 3.11.3 Double shaft lifting type living tool

See figure 17.3

This is a living tool device with Y-axis (YB7X606000), it normally installs on X-direction. It can do drilling, tapping, milling function. it is including two power motor, two shaft and a slipway. One of motor connect two ER20 shaft by synchronize belt, another motor connects to slipway to realize Y-axis movement.

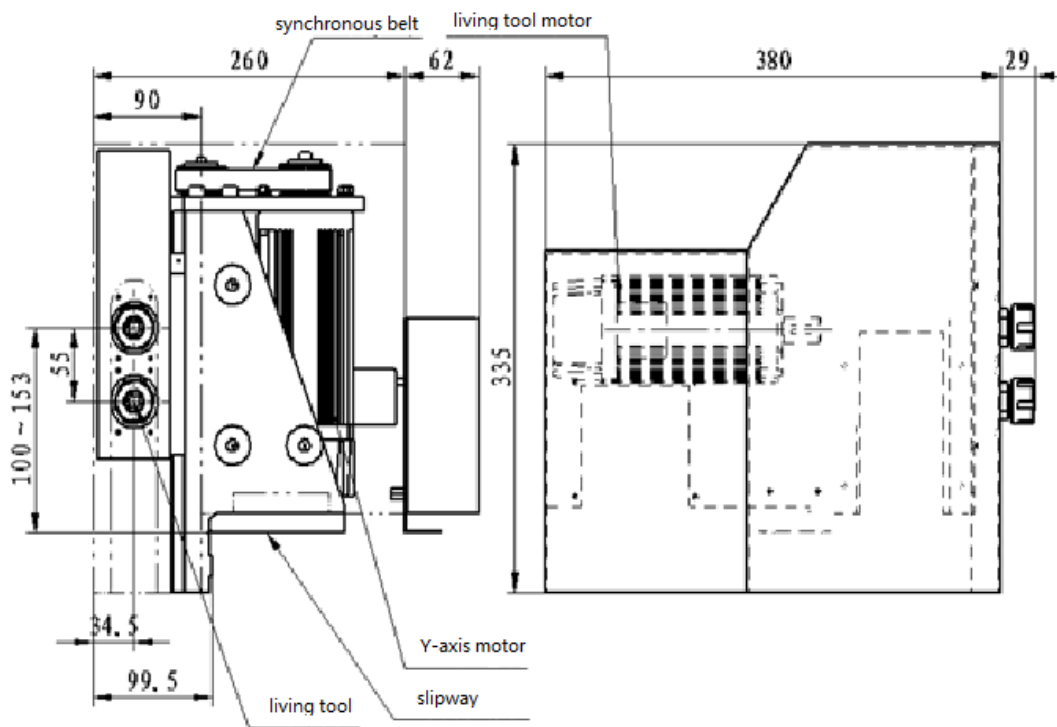


Figure 17.3 lifting living tool

Attention: this device be lubricated by center lubrication system, it should be checked on saturation of lubrication and protection of slipway, make sure no chips.

#### 3.11.4 Fixed type living tool

See figure 17.4

This is a gear transmission, can be two shaft or three shafts with ER20. it normally be installed on Z-direction of carriage. As powered tool, it can drill, tap and mill.

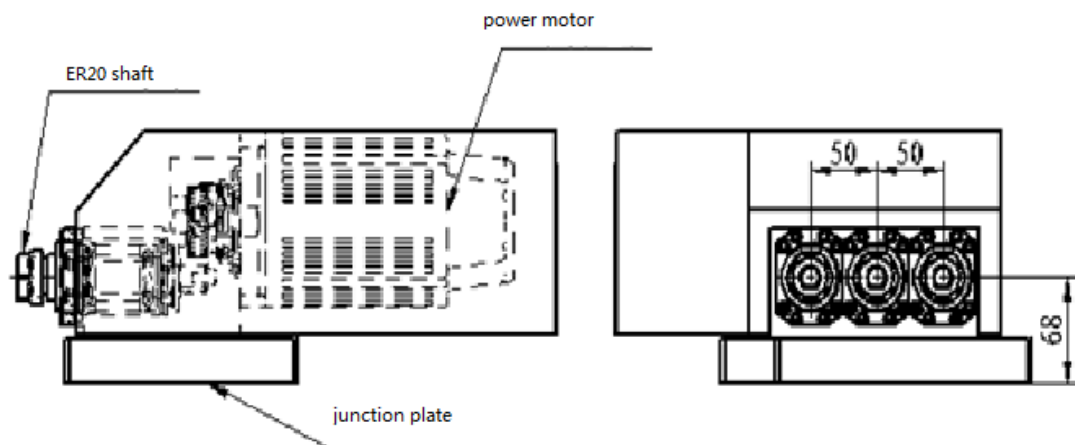


Figure 17.4 fixed type living tool

Attention: as the living tool is working in a high-speed condition, the gears inside must be lubricated. grease should be refill regularly. normally there are a lubrication oil (the protect shall can be removed, if necessary).

### 3.11.5 Multiple living tool system

See figure 17.5

This system is including a multiple living tool and a slipway, the multiple living tool is including 2ER20 shaft on X-direction and 2 ER20shaft on Z-direction; it can do X, Z and Y axis feed function.

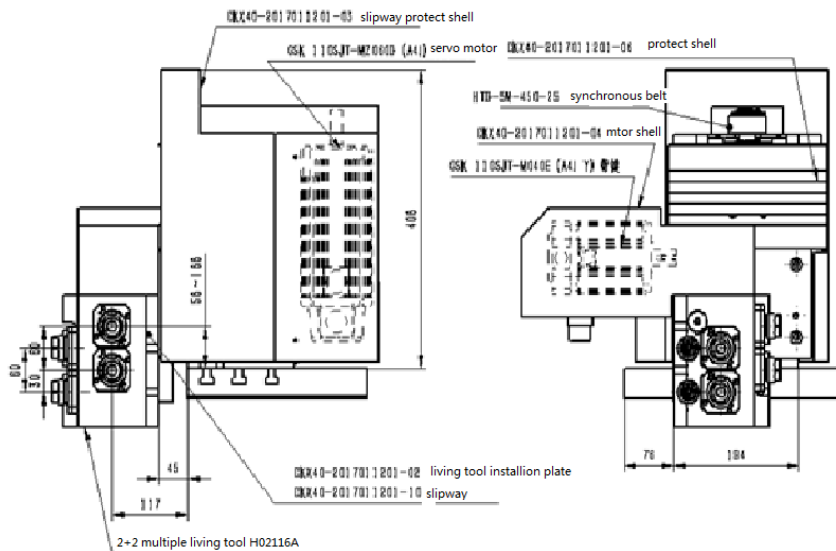


figure 17.5 multiple living tool system

Attention: 1 lubrication and protection. The lubricate grease should be refilled regularly inside of multiple living tool, the slipway is lubricated by centralized lubrication system. This system should keep clear and ensure the lubrication between parts.

## 4 Maintenance

Read previous chapter (transmission and machine structure)

Note: the maintenance period is normal suggestion, according to machine configuration, use environment and work, we suggest user maintain this machine rationalization.

### 4.1 Daily maintenance

#### 4.1.1 Lubrication system

Check the oil pressure is normal or not, check each oil points.

Check the oil level in lubrication oil tank, if it is low, refill.

Use oil gun to fill oil for each jaw on chuck.

Lubricate living tool regularly

#### 4.1.2 Cooling system

Check water level, refill it on time

#### 4.1.3 Pneumatic

Check pressure and pneumatic system (see user manual) and adjust it as requirement. Check all air filter, keep it clean and make sure air can go through. Air water filter with drainage, it may be jammed sometimes, check the water in cup, the water level can't above throttle valve.

#### 4.1.4 Movement parts

Check all moving part, any unmoral noise, vibration or heat.

#### 4.1.5 Pressure display

All pressure meter should be normal, and steady.

#### 4.1.6 Cooling

Power distribution cabinet and motor should keep cool, check the cooling fans in those positions

#### 4.1.7 Work precision

The work status whether normal, steady, accuracy of workpiece whether normal.

#### 4.1.8 Cleaning and maintenance

Clean work table, fixture and surface of guideway cover every day after work finish, and remove chips inside of chips container, also clean the workshop.

Note: not blow chips by air gun.

#### 4.1.9 Daily security check

Check and maintain the limited position switch and alarm daily.

### 4.2 Operator check items weekly

#### 4.2.1 Power distribution cabinet

The control system and electrical element in power distribution cabinet shout keep clean, not dust; at same time, check the work condition of fans and air filter to keep them in functional and clean.

#### 4.2.2 Sensor, switch ad motor

check sensors, switches and motors to keep them clean, make sure not dust, chips and oil with them.

#### 4.2.3 Cooling system

Check the supply of cooling system, cooling pump and motor.

Check the coolant, if the coolant is modification, change new coolant to avoid the damage to



machine

Clean filter, avoid jam, ensure chips can't go through pump to pipes.

Remove oil above coolant, also can choose oil-water separator.

#### 4.3 Operator check items monthly

##### 4.3.1 All axles, guide ways, ball screws, maintenance and clean

By the structure of guide way cover, chips and coolant are easy to go into the gap of cover and guide way after machine start; them should be cleaned up on time.

Open the covers of all axles, clean up the chips and coolant on bed, guide way, and ball screw. When clean the ball screw and guide way, don't damage the surface of them.

##### 4.3.2 Cooling system

Clean the water tank, and replace coolant, the dispose of used coolant should be environment-friendly.

##### 4.3.3 Electrical device

- a) Check all the electrical safety device (include lubrication system, pneumatic system alarm device, timer, pressure switch, travel switch and proximity switch).
- b) Check all the wires, pipes and circuits, make they are not damp, wear, loose connection and corroded terminal.
- c) Check the work condition and cleanness of transformer and motor.
- d) If find any problems, it should be fixed in time, and clean up the dust, chip and oil on it.

#### 4.4 Operator check items per quarter

##### 4.4.1 X, Z axis guide way

Check the work condition of guide way and dust scraper. If there are some scratches on surface of guide way, it means metal particle is in dust scraper. When metal particle is in dust scraper, material of dust scraper has been damaged, that dust scraper can't uniform contact with guide way. dust scraper will lose function. If that happed, need clean and fix. dismantle the dust scraper, clean the guide way and sliding block, and replace the dust scraper (if it is heavy damaged, dismantle the sliding block for cleaning or replacement), after replacement or cleaning, observe dust block by move sliding block, ensure it is back in functional.

##### 4.4.2 X, Z ball screw

Check the work condition of dust scrapers in ball screw. if there are some scratches on surface of ball screw, it means metal particle is in ball screw. When metal particle is in dust scraper, material of dust scraper has been damaged, that dust scraper can't contact ball screw. dust scraper will lose function. If that happed, need clean and fix. dismantle the dust scraper, clean the

ball screw and replace the dust scraper.

#### 4.4.3 X Z axle driver and support

Check the supporting bearing and locking nuts of X, Z axle.

Check the connection between X, Z motors and ball screw.

#### 4.4.4 Fixture maintenance

Fixture need to deeply clean regularly, check whether damage or wear on it.

### 4.5 Operator check item every half year

#### 4.5.1 Cooling system

Check all pipes and elements of cooling system, replace it when damage. Clean all pipes, water tank and filter every half year, also change coolant and filter.

#### 4.5.2 Warning sign

Check those warning signs at lease every half year, if that signs are deformed or damaged, fix it or change it.

If the new sign can't be arrived on time, use some replacement for temporary.

### 4.6 Profession check items annually.

#### 4.6.1 Check in mechanical part

a) Check all bearing, linear guide and ball screw, also the surface of linear guide.

b) Clean process

Use detergent to clean all bearing and ball screw, remove impurity inside.

After cleaning, use dry and clean air to blow, during blowing the rollers can't out of duct.

c) Attentions of re-installing

If there are gaps inside ball screw during long-time using, need to re-loading on ball screw (user can ask the ball screw company to do it).

d) The high-tensile bolts be adopted for linear guide, sliding block and holder of ball screw, user can't replace them by normal bolt. the suggest torque of bolts see table below:

Table 10 Bolt torque

Diameter of bolt (mm)	M6	M8	M10	M12	M14	M16	M20
Torque required (N.m)	9	20	45	78	105	130	255

e) Machine balance

Check the machine balance. set precision level on work table, adjust the anchor screw to let the read of level not exceed 0.04/1000.

#### 4.6.2 Check in motor

Test all motor without load. use ampere meter to measure the current value when the motor without load, compare the value with the label on motor. if the value is higher than the label, it needs further examination. If motor keep work with overload, overload protector will disconnect power supply.

#### 4.7 Maintenance and service period

Table 11 Machine maintenance period

Maintenance & service	Frequency						Type			
	Daily	Weekly	Monthly	Quarter	Half year	Year	Check	Adjustment & fix	Clean	Replacement
<b>Piston</b>										
<b>Lubrication system</b>										
Liquid surface in tank, pressure read	√						√			
X, Z ball screws and linear guide		√					√			
Oil filter				√					√	√
<b>Pneumatic system</b>										
Pressure read	√						√			
air source filter			√				√			
Liquid surface of oil cup			√				√			
Surface of air-water separator	√						√			
<b>Cooling system</b>										
Cooling tank and pipes					√				√	
Filter			√	√					√	√
Coolant	√	√	√		√		√		√	√
<b>Mechanical part</b>										
Protect cover of X, Z axle and ball screw linear guide			√	√		√	√		√	
Fixture	√			√					√	
Primary bearings linear guideway,			√			√	√		√	
Dust scraper of linear guideway and ball screw				√			√		√	√
Tool turret			√				√	√	√	
X, Z way ball screw supporting bearing				√			√	√		
Machine balance						√	√	√		
<b>Electric</b>										
All motors				√	√	√	√			
Electric elements (travel switch, proximity switch)			√				√	√	√	
Power distribution cabinet		√					√		√	
Safety protection	√		√				√			
Warning sign					√		√			

Note: maintenance detail of electrical and hydraulic elements sees <user manual (electrical part)>, hydraulic part

#### 4.8 Maintenance, service and inventory when machine layoff

4.8.1 Need reasonable cleaning and packing when machine layoff or shipping

4.8.2 Before packing, clean the machine, coat anti-rust oil, all moving part should be fixed, electrical cabinet equipped with desiccant

4.8.3 The user manual, qualification and packing list with machine

4.8.4 Machine should store in dry, well ventilated, stable environment condition

4.8.5 Machine should be stored on flat ground, to prevent deformation and corrosion

4.8.6 To prevent disasters by rain, wet and rat

4.8.7 Long-term storage, should check the environmental conditions of store location and packaging state, if there are any exception, should comprehensive repair and repackaging immediately

### **Chapter 3 Hydraulic and pneumatic part**

#### **1 Hydraulic (optional)**

##### 1.1 The use and adjustment of hydraulic system

###### 1.1.1 Eliminate air in the pump

After the machine and hydraulic piping are properly installed, inject the clean hydraulic oil into the tank. The pump after the first start or long-term stop should be released before the pump on the pump, and then the pump motor should be restarted until the pump is no noise.

###### 1.1.2 System pressure adjustment

After starting the machine, according to the provisions of the system pressure, and carefully check the various pressures, and adjust to the correct value (see the hydraulic schematic diagram), adjusted after the machine can carry out other work, the pressure values can be read by the pressure gauge.

Variable The flow adjustment screw on the vane pump is forbidden to adjust.

When disassemble and maintenance of the installation of one-way valve, one-way throttle valve should pay attention to the direction, according to the hydraulic schematic diagram shown in the direction of installation.

##### 1.2 Hydraulic system maintenance and common trouble shooting

###### 1.2.1 Maintenance of hydraulic oil

- a)** The use of the best temperature below 60°C;
- b)** To control pollution, because the oil pollutants will accelerate the oxidation of oil;
- c)** To avoid moisture mixed into the working oil, due to water will make the oil deterioration of emulsification;
- d)** Hydraulic oil to be replaced regularly (usually 3 to 6 months), different manufacturer of the same grade of hydraulic oil cannot be mixed;

## e) periodical inspection

## 1.2.2 Oil temperature is too high

Sheet 12 Oil temperature anomaly analysis table

Malfunction	Reason	Disposition
Oil temperature is high	The pressure of the pressure regulating valve is too high	Reduce the pressure
Significantly increased	The high pressure and high flow rate are discharged through the relief valve	Check the unloading oil path
	Low viscosity or large pump	Repair the pump or replace the hydraulic oil
	Lack of oil	Refuel or add cooler

## 1.2.3 Failure and Elimination of Hydraulic System

Sheet 13 Hydraulic fault analysis table

Malfunction	Reason	Disposition
The oil pump is not fueled, or the output oil is significantly reduced	The pump motor turns wrong	Replace the pump motor wiring
	The fuel in the tank is insufficient	Check the oil level
	The oil filter is clogged	Remove dirt
	Suction air in the suction pipe	Check the interface, exhaust
	Oil Pump is damaged	Check the oil pump
The system is under pressure	Cylinder, pipe, joints have a greater leakage	Timely repair replacement
	Oil pump with oil pan damage	
	pump pressure screw loose	
	The pump seal is damaged	
	The pressure valve is blocked by the damping hole	
The system has noise	Spool stuck	Cleaning tubing and oil filter
	The pump blade is jammed	
	The pump draws air	
	Suction tubing and oil filter are blocked	
The hydraulic drive unit is not moving or too slow	Valve shaking	Check the oil pump and valve
	The system has air pump damage	Repair circuit, replace the spring or solenoid slide valve
	Short of oil supply	
	Throttle clogged	
	Lubrication is not enough	
	Fuel tank is insufficient	
Pipeline leaks		

## 1.2.4 Hydraulic system regularly check points

### Sheet 14 Hydraulic system inspection and maintenance

Inspection area	Inspection items	Inspection time	Inspection method
Fuel tank (include working oil)	Leak	Every week	Visual
	Fuel capacity	Every week	Visual
Pump	Oil cleanliness and traits	3 months	Dependency analysis
	Oil temperature	Every week	Oil temperature meter or touch
	Displacement	3 months	Measure the speed of the drive
	pressure	3 months	pressure gage
	noise	3 months	Hearing or noise meter
	surface temperature	3 months	Thermometer or touch
	Oil seal seals are leaking or inhaled air	3 months	Visualize or check for bubble noise
Coupling	Loose, wear degree	1 year	visual
Pressure control valve	Set value and action status	3 months	Pressure gauge or drive condition
Flow control valve	Set value and action status	3 months	Measure the speed of the drive
Directional control valve	Action status	3 months	Drive inspect
	Internal leak	1 year	Test determination
	Coil insulation resistance	1 year	Measured with 500 mV
Filter	Cleanliness	3 months	Clean
	Cleanliness	1 month	Visual
cooler	Cooling power	3 months	Clean
	Leak water	3 months	Visual
Piping and pipe clamps (Steel pipe hose)	Leak oil	3 months	Visual
	Relaxation, vibration	Every week	Visual, touch or vibrator
Rotary hydraulic cylinder	Action time	Every week	Determine the action time
	Vibration, shock	Every week	Visual, touch or vibrator
	Oil leak	Every week	Visual
Hydraulic collet	Lubricant supply	1 day	Work immediately into the oil
	Clean	Half year	All decomposition cleaning

## 2 Pneumatic

### 2.1 Use and adjustment of pneumatic system

**2.1.1** Should be installed before the installation of compressed air blowing pipe; triple pieces to be installed vertically, and the cup, oil cup down; installation should pay attention to the direction of compressed air flow.

**2.1.2** According to the need for oil, adjust the three pieces of oil mist on the oil needle opening, the general rotation of 1 to 2 ring oil full open, through the oil window to observe the drip situation.

**2.1.3** In the ventilation before the first pull out the knob, counterclockwise rotation of the three pieces of the pressure relief valve hand wheel, so that the valve set the spring unloading, and then open the gas source clockwise direction gradually turn the hand wheel, the pressure gradually increased, Until the pressure gauge indicates the pressure to the required output pressure, and then push the knob to lock the set pressure. Adjust the pressure should be gradually evenly adjusted to the required pressure value, should not be adjusted in one step.

**2.1.4** The use of triple filter with manual drainage device should be regularly discharged, and the liquid level does not exceed the highest-level mark, turn left when the handle to open the handle to open the water valve, to be put away when the water should immediately turn off the water valve. When using the automatic discharge device, do not have to manually drain each class.

**2.1.5** Use the wrench to remove the triple oil on the oil mist oil cups, refueling oil surface shall not exceed the maximum oil level, when the oil level near the minimum oil level when the timely replenishment. Please do not go over the cup. The number 0 is the smallest oil, 9 is the largest oil. Since the 9-0 position cannot be rotated, it must be rotated clockwise.

## 2.2 Pneumatic system maintenance and common trouble shooting

**2.2.1** Filter and storage cup should be cleaned regularly, the filter should be placed in a neutral washing liquid cleaning, water cleaning, dry with clean air. Disassemble with a special wrench to remove the cup, and then unscrew the filter nut, and then remove the filter. Oil cup, water cup should be placed in a neutral washing liquid cleaning, rinse with water, dry, and to prevent the bumps hit the hair after the blurred line of sight.

**2.2.2** Adjust the pressure when the pressure cannot rise, check whether the spring break, should be replaced if fracture.

**2.2.3** Balance of the overflow port overflow, then (1) check the intake valve and the relief valve is dust, dust, then need to remove the cleaning, (2) check the diaphragm is damaged, such as diaphragm Damage should be replaced in time.

**2.2.4** Oil mist in the work of non-drip, you should check whether the air inlet flow is reduced, the minimum air flow should meet the minimum fogging requirements of the oil mist, oil needle is blocked by dust, found the problem to be dealt with in a timely manner.

**2.5** Oil mist liquid surface should be maintained between the upper and lower signs, oil is insufficient, it should be timely to add oil. Should use viscosity of 2.5 ~ 7 ° E of lubricating oil, the proposed use of ISO VG32 or similar oil.

**2.2.6** Cleaning metal parts with mineral oil, rubber pieces with soap, oil cups, cups should be placed in a neutral washing solution rinse, avoid in acetone, ethyl acetate, toluene and other chemical solution cleaning.

**2.2.7** Loading and unloading oil cups, cups to use a special wrench, all parts must be carefully disassembled to prevent knock injury hit the hair.

## **Part 7 Others**

1 Machine tool accessories and tools (see packing list)

2 Electrical instruction manuals (see electrical section), fixture, turret and other outsourcing function manual

3 Machine warranty service

Although the product design and manufacturing process in the strict implementation of the relevant standards, product performance, accuracy, etc. also meet the product factory inspection certificate requirements, but for the user rest assured that some of the major parts have a certain warranty period, please Contact after-sales service or marketing staff.

V. 1. 0

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