

JET

JUM-1649VXL Servo DRO

Milling Machine

Original:
GB
Operating Instructions



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Operating Instructions

Dear Customer,

Many thanks for the confidence you have shown in us with the purchase of your new JET-machine. This manual has been prepared for the owner and operators of a JET JUM-1649 VXL Servo DRO Milling Machine to promote safety during installation, operation and maintenance procedures. Please read and understand the information contained in these operating instructions and the accompanying documents. To obtain maximum life and efficiency from your machine, and to use the machine safely, read this manual thoroughly and follow instructions carefully.

1. Declaration of conformity

On our own responsibility we hereby declare that this product complies with the regulations* listed on page 2. Designed in consideration with the standards**.

2. Warranty

JPW Tool Group Hong Kong Limited guarantees that the supplied product(s) is/are free from material defects and manufacturing faults.

This warranty does not cover any defects which are caused, either directly or indirectly, by incorrect use, carelessness, damage due to accidents, repairs or inadequate maintenance or cleaning as well as normal wear and tear.

Further details on warranty (e.g. warranty period) can be found in the General Terms and Conditions (GTC) that are an integral part of the contract.

These GTC may be viewed on the website of your dealer or sent to you upon request.

JPW Tool Group Hong Kong Limited reserves the right to make changes to the product and accessories at any time.

3. Safety

3.1 Authorized use

This Milling Machine centre is designed for milling and drilling machinable metal and plastic materials only. Machining of other materials is not permitted and may be carried out in specific cases only after consulting with the manufacturer.

Never cut magnesium- high danger to fire!

The proper use also includes compliance with the operating and maintenance instructions given in this manual.

The machine must be operated only by persons familiar with its operation and maintenance and who are familiar with its hazards. The required minimum age must be observed.

The machine must only be used in a technically perfect condition. When working on the machine, all safety mechanisms and covers must be mounted.

In addition to the safety requirements contained in these operating instructions and your country's applicable regulations, you should observe the generally recognized technical rules concerning the operation of metalworking machines. Any other use exceeds authorization.

In the event of unauthorized use of the machine, the manufacturer renounces all liability and the responsibility is transferred exclusively to the operator.

3.2 General safety notes

Metalworking machines can be dangerous if not used properly. Therefore the appropriate general technical rules as well as the following notes must be observed.

Read and understand the entire instruction manual before attempting assembly or operation.

Keep this operating instruction close by the machine, protected from dirt and humidity, and pass it over to the new owner if you part with the tool.

No changes to the machine may be made.

Daily inspect the function and existence of the safety appliances before you start the machine.

Do not attempt operation in this case, protect the machine by unplugging the power cord.

Remove all loose clothing and confine long hair.

Before operating the machine, remove tie, rings, watches, other jewellery, and roll up sleeves above the elbows.

Wear safety shoes; never wear leisure shoes or sandals.

Always wear the approved working outfit.

Do **not** wear gloves.

Wear goggles when working

Install the machine so that there is sufficient space for safe operation and work piece handling.

Keep work area well lighted.

The machine is designed to operate in closed rooms and must be bolted to the cabinet stand or a solid work bench.

Make sure that the power cord does not impede work and cause people to trip.

Keep the floor around the machine clean and free of scrap material, oil and grease.

Stay alert!

Give your work undivided attention. Use common sense. Do not operate the machine when you are tired.

Do not operate the machine under the influence of drugs, alcohol or any medication. Be aware that medication can change your behaviour.

Never reach into the machine while it is operating or running down.

Never leave a running machine unattended. Before you leave the workplace switch off the machine.

Keep children and visitors a safe distance from the work area.

Do not operate the electric tool near inflammable liquids or gases.

Observe the fire fighting and fire alert options, for example the fire extinguisher operation and place.

Do not use the machine in a damp environment and do not expose it to rain.

Work only with well sharpened tools.

Always close the chuck guard and pulley cover before you start the machine.

Remove the chuck key and wrenches before machine operation.

Specifications regarding the maximum or minimum size of the work piece must be observed.

Do not remove chips and work piece parts until the machine is at a standstill.

Do not stand on the machine.

Connection and repair work on the electrical installation may be carried out by a qualified electrician only.

Have a damaged or worn power cord replaced immediately.

Never place your fingers in a position where they could contact any rotating tool, chuck or cutting chips.

Secure work piece against rotation. Use fixtures, clamps or a vice to hold the work piece.

Never hold the work piece with your hands alone.

When using a vice, always fasten it to the table.

Never do any works "freehand" (hand-holding the work piece rather than supporting it).

Never move the head while the machine is running.

If a work piece overhangs the table such that it will fall or tip if not held, clamp it to the table or provide auxiliary support.

Check the safe clamping of the work piece before starting the machine.

Remove cutting chips with the aid of an appropriate chip hook when the machine is at a standstill only.

Never stop the rotating chuck or tool with your hands.

Measurements and adjustments may be carried out when the machine is at a standstill only.

Setup work may only be carried out after the machine is protected against accidental starting by pressing the emergency stop button.

Maintenance and repair work may only be carried out after the machine is protected against accidental starting by pulling the mains plug.

Do not use wire wheels or grinding wheels on this machine.

To avoid injury from parts thrown by the spring, follow instructions exactly as given when adjusting the spring tension of the quill (see chapter 7.5)

3.3 Remaining hazards

When using the machine according to regulations some remaining hazards may still exist.

The rotating chuck, tool and cutting chips can cause injury.

Thrown and hot work pieces and cutting chips can lead to injury.

Chips, dust and noise can be health hazards. Be sure to wear personal protection gear such as safety goggles, dust mask and ear protection.

The use of incorrect mains supply or a damaged power cord can lead to injuries caused by electricity.

4. Machine Safety for JUM-1649 VXL Servo DRO

The JUM-1649 VXL Servo DRO milling machines are universal machines that are capable of diverse machining, like drilling, reaming, milling and boring.

Flat, slant, vertical surfaces cutting and slotting can be done with formed cutter or face mill. With the spindle center line rotating at any angle in the first half hemisphere of the rotary head, it has a diverse cutting capacity.

The machines have a wide application for single-piece or small batch production in manufacturing, instruments, construction, maintenance and repair workshops and so like industries.

Featuring optimum structure, easy operation and less maintenance, the machine can also be equipped with DRO system for higher positioning and efficiency in batch production.

Marks / Tokens:

★: "**RISKY**" for a potentially instant risky status to be avoided. Fatal death or severe injury may occur.

▲: "**WARNING**" for a potential risk. Injury to personnel or damage to machine may occur.

△: "**CAUTIONS**" for extra attention.

1. Installation

△**CAUTIONS**: Understand fully of the requirement and procedures of machine installation listed in the *Operation Manual*.

△**CAUTIONS**: Coordinate and cooperate with each other with clear communication.

▲**WARNING**: Check slings, tools and make sure they are qualified as per safety criterions.

2. Power

△**CAUTIONS**: Make sure the electric cabinet door is appropriately closed.

▲**WARNING**: When machine stops suddenly due to cutoff of power, turn off the main power switch.

3. Idle Running

▲**WARNING**: Run the machine idly to warm it up before machining.

▲**WARNING**: During idle running, check for proper functioning of each component: Check whether all the handles run smoothly and all the clamping bolts and pads are released. Check for proper feeding direction, quiet machine sound and proper functioning of electrical parts. Open the electric cabinet door to check for loose components and wires and tighten them if so. Check for damaged components and change them. If everything is OK, close the electrical door and turn on the main power switch. Run the machine when obstacles around are cleared properly.

▲ **WARNING:** Do NOT press buttons wrong. Check illustrative lamp on operation panel.

★ **RISKY:** Stop the machine fully during loading and unloading.

4. Auxiliary Facilities

▲ **WARNING:** Check the setup values and status of moving components.

★ **RISKY:** Use the hoist equipment, cranes or help from others to move heavy articles.

▲ **WARNING:** Do NOT touch the work lamp as it will be hot after being on for a long time.

▲ **WARNING:** Be cautious for slippery floor with coolant that may fall when the table moves to its longitudinal limit.

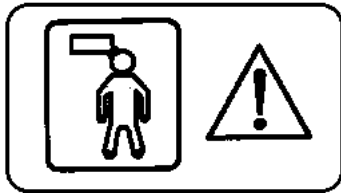
★ **RISKY:** Do NOT touch rotating parts when the machine is running.

▲ **WARNING:** Loose the clamping bolts gently to avoid damage of the threads.

▲ **WARNING:** Clamp the workpiece and cutting tools firmly and securely.

▲ **WARNING:** Do NOT put cutting tools or other articles on the operation panel or on the machine body.

▲ **WARNING:** Be cautious of projecting ram, operation panel or other components when passing by.



5. Automatic Running

★ **RISKY:** Do NOT lean against the machine when it is running.

▲ **WARNING:** Do NOT press buttons wrong. Check illustrative lamp on operation panel.

★ **RISKY:** Close all the safety doors before automatic running.

▲ **WARNING:** Do NOT touch any rotating components during automatic running. Stop the machine fully if so required.

▲ **WARNING:** Do NOT touch any switch during automatic running.

6. Machine Stop

★ **RISKY:** Press the *Emergency Stop* button in emergency.

▲ **WARNING:** Understand fully the machine status in difference stop conditions.

★ **RISKY:** Make sure the machine stops completely.

7. Complete of Machining and Power-Off

▲ **WARNING:** Clean inside of the machine.

▲ **WARNING:** Keep machine bodies in specific position (like X, Y, Z, spindle, etc.).

▲ **WARNING:** Turn off main power switch and get it interlocked when machining is completed. Remove secure key so that others will not start machine without attendance.

8. Check and Maintenance

▲ **WARNING:** Identify the trouble as per description of the operator.

▲ **WARNING:** Formulate work procedures and scopes for check and maintenance.

★ **RISKY:** Place “Under Maintenance” signs around machine during maintenance.

★ **RISKY:** Turn off the main power switch to avoid sudden power-on. Place “DO NOT TURN IT ON” signs on the main power switch.

★ **RISKY:** Turn off the main power switch and place “DO NOT TURN IT ON” signs on the main power switch when working inside the machine.

★ **RISKY:** Do NOT touch electric cables, electrics and switches with wet hand.

★ **RISKY:** Use ladders or other safety apparatus when climbing high.

▲ **WARNING:** With standard or specific tools only.

▲ **WARNING:** Do NOT put cutting tools or clothes on the moving components.

★ **RISKY:** Use properly checked and qualified slings, hooks and chain wheels for lifting.

▲: Use specified spares for changes ONLY.

Contact us promptly with reference of machine serial number and delivery date for appropriate support whenever it is needed.

5. PERFORMANCE AND APPLICATION

The JUM-1649 VXL Servo DRO milling machines are universal machines that are capable of diverse machining, like drilling, reaming, milling and boring.

Flat, slant, vertical surfaces cutting and slotting can be done with formed cutter or face mill. Cutting of circular slots and curves can be done with rotary dividing table.

The machines have a wide application for single-piece or small batch production in manufacturing, instruments, construction, maintenance and repair workshops and so like industries.

Featuring optimum structure, easy operation and less maintenance, the machine can also be equipped with DRO system for higher positioning and efficiency in batch production.

Features:

★ Fine elaborate workmanship and neat appearance with perfect paint finish.

★ **High Rigidity:** Robust & rugged machine body made of high grade casting assuring superb stability and long lasting life.

★ **Bigger Travels:** Ram stroke for extended cross feed length and wider cutting scope.

★ **High Versatility:** Universal milling head with 2 x 45° swivel shells that swivels 360° left to right and 0-90° up to down for high versatile vertical, horizontal and universal machining in a semi-sphere scope.

★ Universal milling head firmly fixed on ram for robust cutting performance.

★ Motor coupled directly into the gear transmission for extraordinary heavy cutting.

★ Wide speed ranges of the milling spindle for enhanced cutting on different material.

★ Automatic feeding on 3 axes, ie. X, Y, Z axes. Boring function can be done.

★ **High Precision:** Servo motor and ballscrew drive with gear speed reduction for precision variable speed feeding.

★ Rapid traverse function on 3 axes for easier operation and high machining efficiency.

★ Turcite-B coating on guide ways for smooth stroke with low friction.

- ★ Compulsory lubrication on main transmission gears for efficient cooling.
- ★ Centralized automatic lubricator unit equipped for rated lubrication on ballscrews and guide ways for smooth stroke and longer machine life.
- ★ Modular design with wide options for diverse needs: 2-axis DRO unit, 3-axis DRO unit, table guards, indexing dividing heads, various clamping kits, vices, tool holders, etc.

★ Working Ranges:

Swivel of universal milling head	360°
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★ Axis Movement:

	Auto feed	Rapid traverse	Remarks
X axis	Yes	Yes	
Y axis	Yes	Yes	
Z axis	Yes	Yes	

Working Conditions:

- a). Power supply: 400V ±10%, 50Hz ±1Hz, 3Ph
- b). Ambient temperature: 0°C - 40°C
- c). Relative humidity: 30% - 85% (at 20°C)
- d). Atmospheric pressure: 86 – 106kPa
- e). Dust density: ≤10mg/m³
- f). Environment: clean from harmful / corrosive / explosive gas, acid, alkali, liquids, etc
- g). Foundation: solid, flat, clean, well-lightened, clear from vibration, thermal sources

6.MACHINE STRUCTURE

The machine consists of column, main transmission mechanism, base, column, knee, table, ram, universal head as well as coolant system, lubrication system and electrical system.

The column is fixed on the base. The ram is placed on top of the column. Ram moves forward or backward on the column top.

Main transmission mechanism is installed in the ram. Main motor is mounted at the end of the ram. It is mounted directly to the shaft with a flexible coupling unit and provides power via gears and shafts to the spindle. The spindle is with an ISO 50, 7:24 taper and is compatible for end-mill or horizontal mill arbor.

Universal milling head is mounted on the front side of the ram. It has two shells with 45° angle on the coupling surfaces. Two pairs of helix bevel gears are integrated inside with one of 45° angle and the other 135° angle. The front shell swivels along the ring type T-slot on the rear shell. The rear shell swivels along the ring type T-slot on the flange that fixed on the ram. With the compound rotation of the front and rear shells, the universal head can swivel to different angle in a semi-sphere scope. Loose the locking pins, the head can swivel 360° left to right and 0-90° up to down. After rotate to the required angle, insert the pins to lock the universal head.

The knee with table on the top is mounted along guide ways of the column. The table moves longitudinally along guide ways of the knee. The table and knee feeding mechanism is fitted inside the knee. A servo feeding motor is fitted on the left side of the knee. The power is transmitted via gear speed reduction mechanism to the knee lifting ballscrew to drive it up and down. A servo feeding motor is fitted on the right side of the knee. The power is

transmitted via gear speed reduction mechanism to the table longitudinal ballscrew to drive it left and right. A guide rod with a lock lever is equipped under the knee for high precision stroke with alignment.

Compulsory lubrication on gears, shafts and bearings in the ram and knee is done with separate pumps. Lubrication of ram stroke transmission mechanism is through a pipe and pumps oil from the oil reservoir on the machine base. Lubrication of ballscrews and guide ways is done with a centralized automatic oil lubricator.

Coolant pump is mounted on the base and provide coolant to the cutting tool and work-piece through a hose.

Electrics are inside a cabinet on the column that is well sealed and easy for check and maintenance.

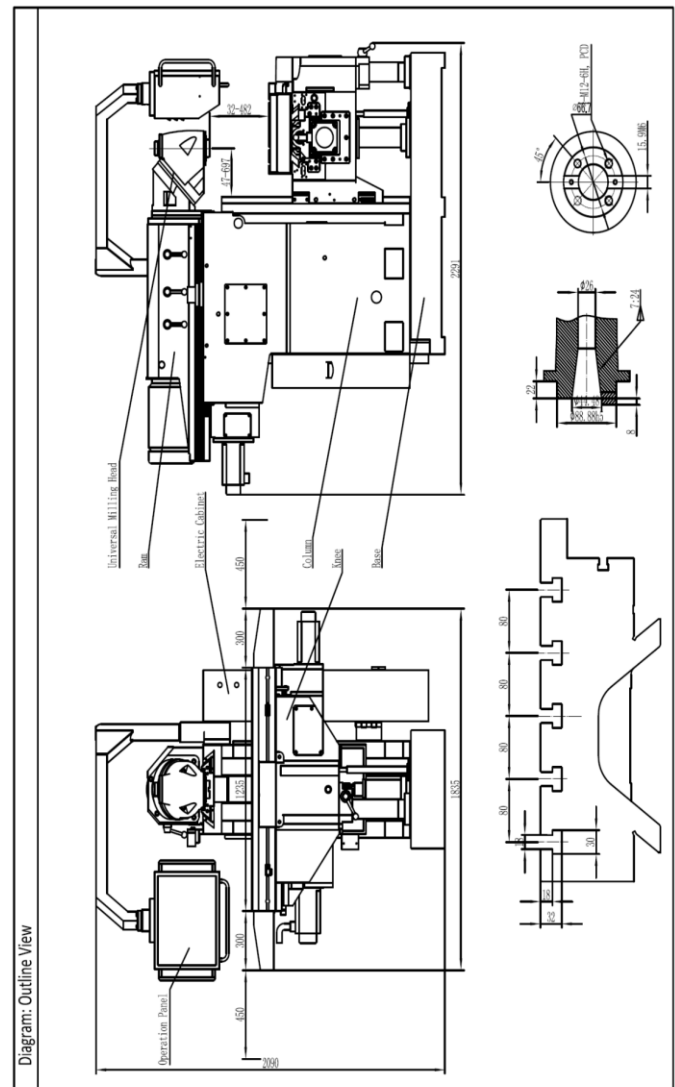


Diagram – Outline View

7.PARAMETERS

No.	Items	JUM-1649 VXL Servo DRO
1	Table size	460x1235
2	Max. table load capacity	800
3	T-slots (number x width x pitch)	5 x 18 x 80 mm
4	X axis travel (longitudinal)	900 mm
5	Y axis travel (cross)	650 mm
6	Z axis travel (vertical)	450 mm

7	Distance between spindle end and table top	58 – 508 mm
8	Distance between spindle center and column ways	20 – 670 mm
9	Swivel of universal milling head	360°
10	Feed rate of X axis	10-1000 mm/min., variable
11	Feed rate of Y axis	10-1000 mm/min., variable
12	Feed rate of Z axis	5-500 mm/min., variable
13	Universal milling head spindle taper	ISO 50, 7:24
14	Universal milling head spindle speed	(27 steps) 30 – 2050 rpm
15	Torque of feed motor, X axis	18 Nm, servo motor
16	Torque of feed motor, Y axis	18 Nm, servo motor
17	Torque of feed motor, Z axis	27 Nm, servo motor with brake
18	Power of universal milling head motor	5.5 kW
19	Machine dimension (approximate)	2570 x 2035 x 1990mm
20	Machine weight (approximate)	3600 kg

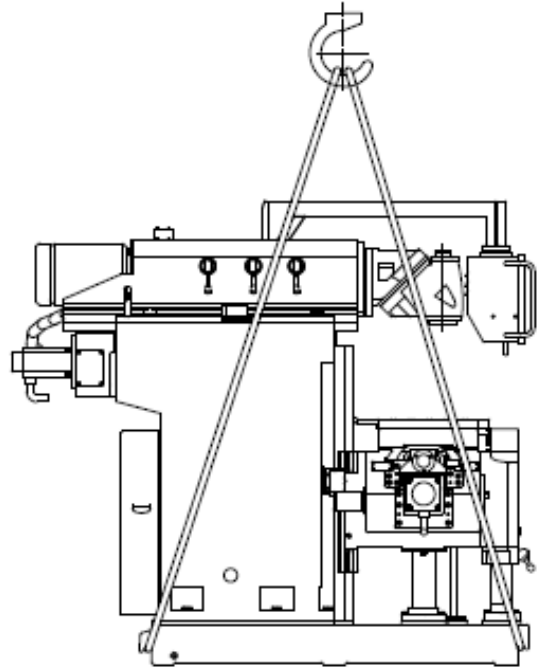


Diagram – Machine Lifting

8. UN-PACKING AND INSTALLATION

1. Transportation and Handling

Place the machine on flat surface and secure it firmly for transportation in a smooth and vibration-proof manner.

Lift the machine as per diagram shown. Put a solid steel rod of 35-45 mm diameter and 900 mm length through the hole on the machine. Use a sling of minimum 4 tons load capacity to lift the machine.

Cautions:

- ★ **Lift the machine ONLY with qualified slings.**
- ★ **Keep the slings away from machine surfaces, levers and handles.**
- ★ **Put wooden block (100 x 100 x 200 mm) or soft mattress on the contacting surfaces to avoid damage to the painting.**
- ★ **Move the ram backward on the column to keep the machine in balance.**
- ★ **Do not lift the machine too high and move it slowly to avoid any accident.**

2. Un-packing

Un-pack the machine properly to avoid damages to the machine and its components. Contact the transportation company, the insurance company and us promptly if any damages occur.

3. Cleaning

Clean the machine thoroughly and remove the anti-rust oil and grease with proper solvent. Do NOT run the table and knee without proper clean and lubrication. Contacting surfaces under the table and knee should also be cleaned and lubricated properly. Loose locking bolts on the machine, move it forward or backward to clean and lubricate the contacting surfaces. *Note: Do NOT use petrol or other flammable solvent for cleaning.*

4. Installation

Keep the floor flat with fine concrete. Steel plates can be used to keep rough floor flat if the machine is to be placed on the floor. (However, it is recommended to grout the machine to avoid movement or inclination of the machine due to un-even load.) Make sure machine base contacts the floor firmly before tightening the foundation bolts to avoid inclination or deformation of the machine. Level the machine in both horizontal and cross directions. The tolerance is 0.04/1000mm. After leveling, grout the anchor bolts into pits with fine concrete. When the concrete becomes solid, tighten the anchor bolts and level the machine again for check. Handles / levers may be removed for easier transportation. Fit them back when the machine is installed.

Cautions:

- ★ **Prepare the foundation with a depth of minimum 400 mm.**
- ★ **Concrete should be grade no.150 or above.**
- ★ **Grout the anchor bolts and tighten them ONLY after the concrete becomes solid.**

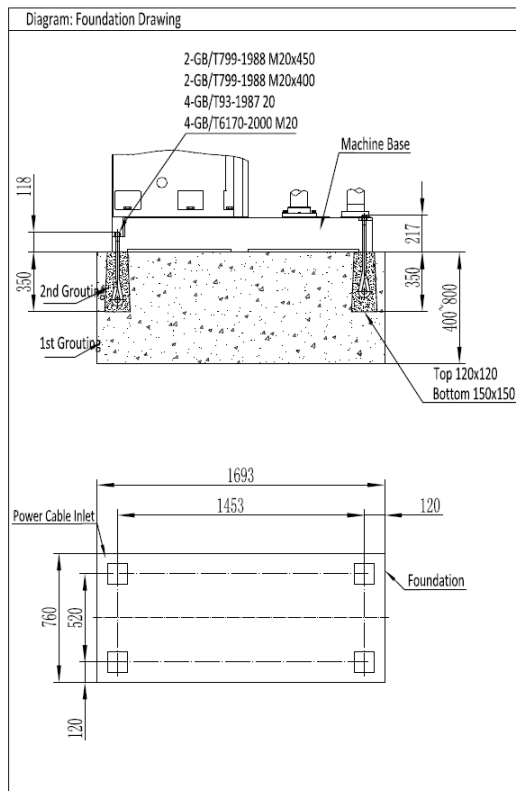


Diagram – Foundation Drawing

5. Alignment of Machine

Align the machine with a precision leveling gauge longitudinally and cross on the table. The allowance is 0.04 / 1000mm. After the alignment, move down knee.

6. Wiring of Power

Wire the power by a qualified electrician as per procedures below:
 (1) Make sure the power input is proper for the machine.
 (2) Wire the power cable as per local safety rules and regulations.
 (3) Make sure the spindle rotates in the correct direction. Viewing from the top, the spindle should rotate clock wisely at high speed.

9. MACHINE TRANSMISSION SYSTEM

1. Spindle Transmission System

The transmission system is installed inside the ram. It is driven by a 5.5 kW (or 7.5kw) motor via gears and shafts. The motor is mounted directly to the shaft with a flexible coupling unit into the transmission system. 9 speeds are generated via 2 sets of triple-gears. 3 more gear engaging positions are achieved with a double-gear clutch. Thus, 27 different speeds (30-2050 rpm) can be generated by shifting gears via 3 handles on the column. 2 pairs of helix bevel gears are integrated inside the universal milling head to transmit the power further to the spindle.

2. X Axis Feed Mechanism

A servo feeding motor is fitted on the right side of the knee. The power is transmitted via gear speed reduction mechanism to the table longitudinal ballscrew to drive it left and right.

3. Y Axis Feed Mechanism

A servo feeding motor is fitted at the back side of the column. The power is transmitted via gear speed reduction mechanism to the ram ballscrew to drive it backward and forward.

4. Z Axis Feed Mechanism

A servo feeding motor is fitted on the left side of the knee. The power is transmitted via gear speed reduction mechanism to the knee lifting ballscrew to drive it up and down.

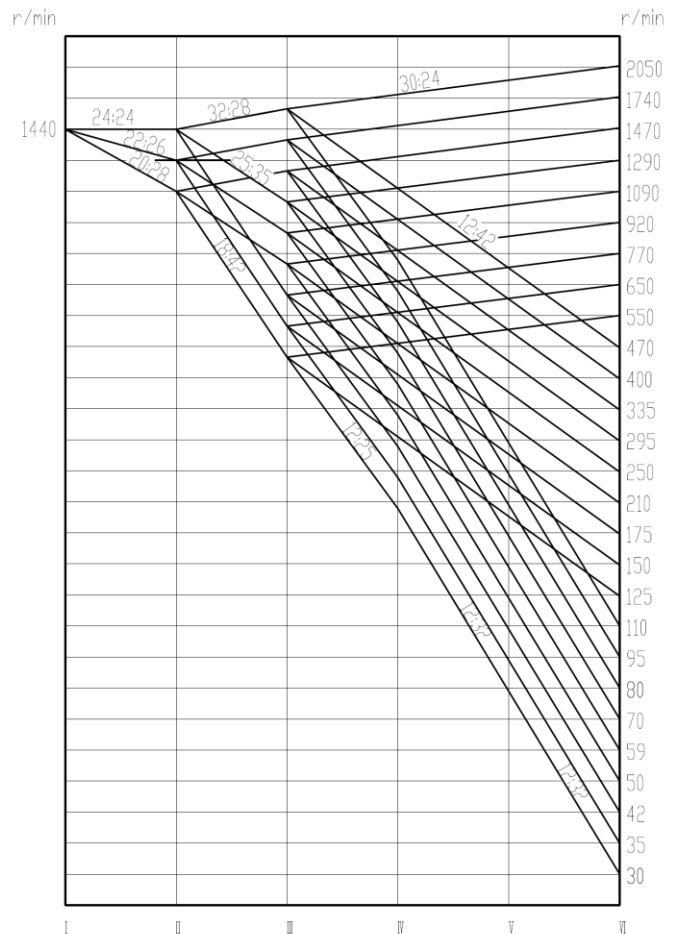
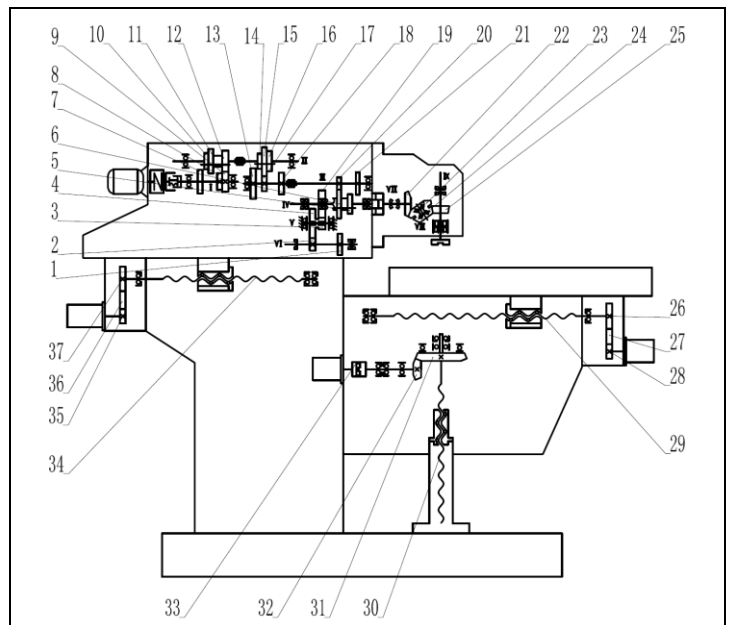


Diagram – Transmission System



Part List in the Transmission System:

Part No.	Item	Teeth	Module
1	Gear	18	3
2	Gear	12	4
3	Gear	12	5
4	Gear	33	4
5	Gear	33	3
6	Gear	42	4
7	Gear	18	4
8	Gear	20	3
9	Gear	22	3
10	Gear	18	4
11	Gear	18	4
12	Gear	28	3
13	Gear	33	5
14	Gear	18	3
15	Gear	32	3
16	Gear	25	3
17	Gear	12	4
18	Gear	41	3
19	Gear	33	5
20	Gear	12	4
21	Gear	41	3
22	Helix gear	30	4
23	Helix gear	35	4
24	Helix gear	30	4
25	Helix gear	30	4
26	Gear	40	2.5
27	Gear	20	2.5
28	Gear	36	2.5
29	Gear	24	2.5
30	X axis ballscrew	6	
31	Z axis ballscrew	6	
32	Conical gear	30	4
33	Conical gear	15	4
34	Gear	20	2.5
35	Gear	40	2.5
36	Gear	36	2.5
37	Gear	24	2.5
38	Y axis ballscrew	6	
39	Gear	30	2.5
40	Double-gear	30	2.5
41	Double-gear	20	2.5
42	Gear	36	2.5
43	Gear	24	2.5
44	Gear	40	2.5

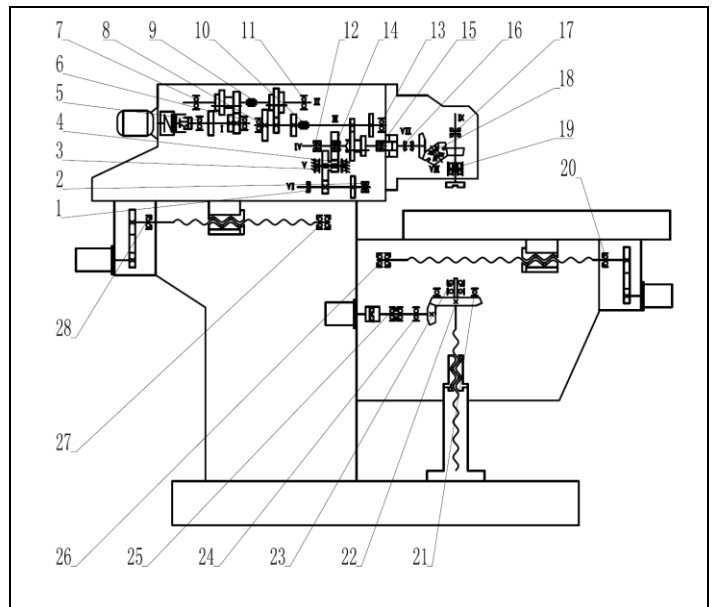


Diagram – Bearing

List of Bearings:

No.	Item	Model	Size	Qty.
1	Single row taper roller bearing	30205	25x52x15	1
2	Single row taper roller bearing	30205	25x52x15	1
3	Thrust ball bearing	51105	25x42x11	2
4	Needle bearing	943/25	25x32x25	2
5	Deep groove ball bearing	6207	35x72x17	2
6	Deep groove ball bearing	6206	30x62x16	1
7	Deep groove ball bearing	6205	25x52x15	1
8	Deep groove ball bearing	6206	30x62x16	1
9	Deep groove ball bearing	6009	45x75x16	1
10	Deep groove ball bearing	6008	40x68x15	1
11	Deep groove ball bearing	6206	30x62x16	1
12	Taper roller bearing	32207	35x72x23	1
13	Taper roller bearing	30208	40x80x18	2
14	Thrust ball bearing	51105	25x42x11	2
15	Deep groove ball bearing	6306	30x72x19	1
16	Taper roller bearing	32211	55x100x25	1
17	Angular contact ball bearing	7009AC	45x75x16	2
18	Taper roller bearing	30210/P5	50x90x21.75	1
19	Taper roller bearing	32007	35x62x18	2
20	Double row cylindrical roller bearing	NN3018K/P5	90x140x37	1

21	Angular contact ball bearing	7207AC	35x72x17	1
22	Round head needle	2.5x16	GB309	56
23	Thrust cylindrical roller bearing	81117/P5	85x110x19	1
24	Deep groove ball bearing	16009	45x75x10	1
25	Angular contact ball bearing	7009AC	45x75x16	
26	Deep groove ball bearing	6207	35x72x17	1
27	Deep groove ball bearing	6205	25x52x15	1
28	Angular contact ball bearing	36208C/DB	40x80x36	1
29	Deep groove ball bearing	6205	25x52x15	1
30	Angular contact ball bearing	7206AC/DF	30x62x32	1
31	Angular contact ball bearing	7205AC/DF	25x52x30	1
32	Deep groove ball bearing	6205	25x52x15	1
33	Round head needle	2.5x16	GB309	56
34	Deep groove ball bearing	6205	25x52x15	1
35	Angular contact ball bearing	7207AC	35x72x17	1

10. LUBRICATION SYSTEM

Timely proper lubrication will maintain a long machine life.

1. Lubricate the machine as per instruction with clean and clear N46 machine oil.
2. Gears and bearings in the spindle transmission mechanism are compulsorily lubricated with a pump that gets oil from the oil reservoir inside the ram. A proper level of oil is necessary for a smooth running. An oil level indicator is provided on the ram. The oil should be changed in the first 3 months and once every 6 months afterwards.
3. Gears and bearings in the knee are compulsorily lubricated with a pump that gets oil from the oil reservoir inside the knee. A proper level of oil is necessary for a smooth running. An oil level indicator is provided on the knee. The oil should be changed in the first 3 months and once every 6 months afterwards.
4. Gears and bearings in the ram stroke transmission mechanism are compulsorily lubricated with a pump that gets oil from the oil reservoir inside the machine base. The oil flows back to the machine base after lubrication. A proper level of oil is necessary for a smooth running. An oil level indicator is provided on the knee. The oil should be changed in the first 3 months and once every 6 months afterwards.
5. A centralized automatic oil lubricator is equipped at back of the machine to lubricate guide ways, X and Y axes ballscrews and certain bearings. Oil volume of each feed is rated. Oil feed interval time can be set. When an alarm for low oil level is given, feed oil to the lubricator tank promptly.

6. Lubrication of the Z axis ballscrews and guide ways should be done per working shift with HJ-20 oil via oil piston guns.

7. All the oil reservoirs should be cleaned in a timely manner. Clean them and change with new oil once in the first 3 months and then clean them once every 6 months.

8. Lubrication of gears inside the universal milling head is with lithium grease. Feed the grease inside the head every 3 months.

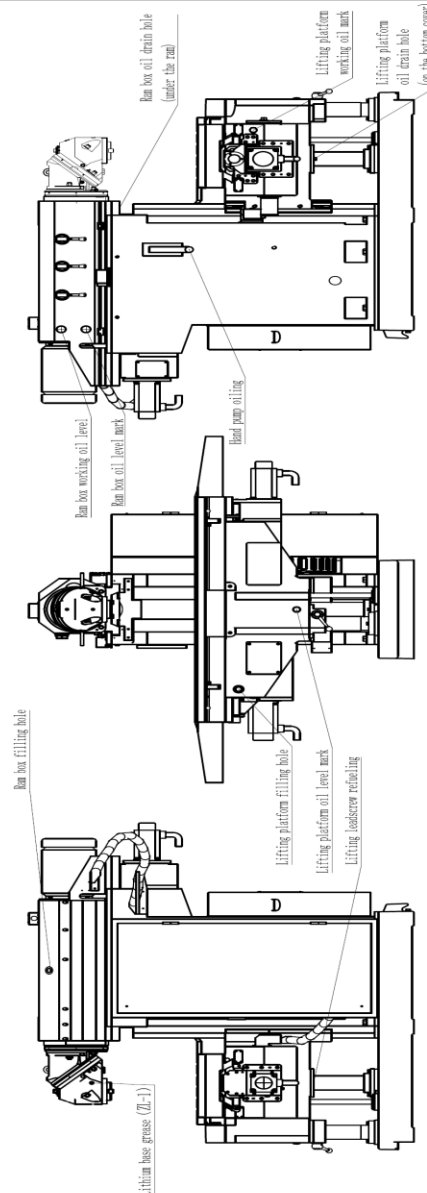


Diagram – Lubrication system

11. COOLANT SYSTEM

General emulsified coolant mixture can be used for cooling of the cutting tools. Different coolant can be used for different material. The coolant pump is installed and is compatible with different coolant for different cutting tools. Coolant is stored in the machine base reservoir and pumped to the nozzle via hose. The nozzle can be adjusted to different angle as per needs. Coolant flows back to the reservoir through T slots on the table, hose and filter net.

A switch is installed on the operation panel. Turn it on and the pump will work. To change the coolant, pull the plug on the machine base and drain the coolant. Feed new coolant through the filter net.

12. ELECTRIC SYSTEM

1. The machine is suitable for 400V, 3Ph, 50Hz power supply. Make sure motor rotates as per the direction sign on it. Electric components are clearly indicated with labels. Refer to the *Electric Schematic Diagram* and *List of Electric Components* for repair.
2. The machine should be properly earthed for safety.
3. Before start of the machine, make sure the electric cabinet door is securely closed. Release the Emergency Stop button and turn on the main power switch. Shift the direction switch for spindle to CW or CCW direction, press the START button (green), the spindle will run accordingly. Press the STOP button (red), the motor will stop.
4. Keep clean of the electrics. Clean them periodically.
5. Pressing the red Emergency Stop button in emergency will cut off the machine. Release the button to re-start the machine.

13. OPERATION

- 1). Read the *Operation Manual* carefully before starting the machine. The operator should be familiar with the machine structure, functions of handles, knobs, coolant system, lubrication system, electric systems, switches, etc.
- 2). Before starting the machine, make sure the locking mechanism locks firmly and wire connection and earth leads are properly connected.
- 3). After powering on the machine, check functioning of the switches and buttons. Make sure they work properly. Check feed directions and spindle rotation directions and make sure they act as per signs. Otherwise, change the electric phase for correct direction.
- 4). Move X / Y / Z axes at low speed and check whether they stops by the travel limit dog blocks. Otherwise, adjust the travel limit dog blocks. The travel limit dog blocks should be placed at two sides of the limit switch.
- 5). Start the spindle and axes at their lowest speeds and increase gradually. A dry run without load on the spindle should be done for 2 hours for testing. Run the machine at low speed in the first 100 hours. Do NOT run the spindle at 1080rpm or above in the first 100 hours.
- 6). X / Y / Z axes can be locked with lock bolts. When the axis is locked, do NOT run it in auto feed mode.
- 7). A guide rod is provided under the knee to increase the machine rigidity. When the guide rod is locked, do NOT run it in auto feed mode.

Cautions:

- ★ *Loose the locking levers before any movement. After movement, lock the levers again to boost rigidity of the machine.*
- ★ *When using the feed override switch for movement of the*

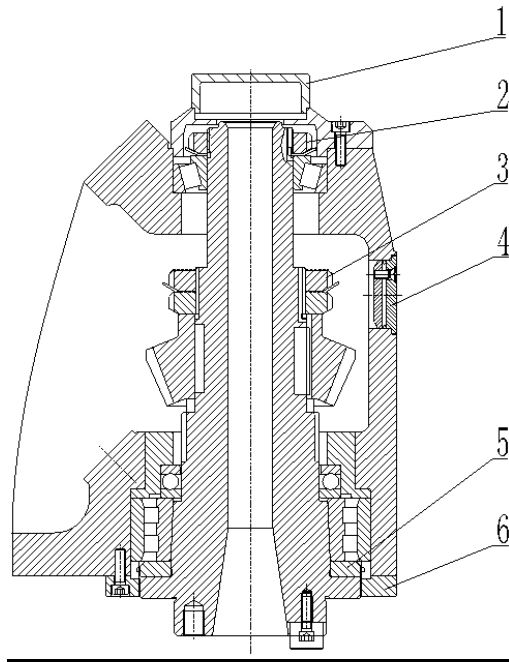
table in X / Y / Z axes, start it from low speed gradually to higher speed. Do NOT turn it to a sharp high speed to avoid damages or injuries.

- ★ *When DRO units are installed, care should be taken to avoid damage of the DRO rulers when the table moves to the spindle end, or the limit blocks fitted on the column.*
- ★ *When using the universal head for horizontal milling, move the table to the column and move the ram backwards for more rigidity.*
- ★ *Mount the milling tool in the inner side of the arbor.*

NO	Symbol	Symbol Meaning	Remarks
		Total stop	
		Power start	
		Power indicator	
		Cooling	
		Lubricating	
		Spindle forward	
		Spindle reverse	
		Infinitely variable speed	
		Stop	
		Jog	Only when pressing down
		Spindle clamp	
		Spindle unclamp	
		Positive or negative direction moving	+ Positive - negative
		Rapid moving	
		Choose X-axis, Y-axis or Z-axis	

14. ADJUSTMENT AND TEST RUNNING

- 1). Adjustment of Spindle Bearing
 - a). remove the cover at the end (#1) and the flange (#6),
 - b). Loose the lock screw on the plug and take out the plug,
 - c). Loose the two nuts (#3),
 - d). Loose nut (#2) and move the spindle downward,
 - e). Loose lock screws on the two half ring adjustable washer (#5) and take out the washer,
 - f). As the taper of the spindle nose is 1:12, to reduce a axial clearance of 0.01mm, it has to reduce thickness of the adjustable washer (#5) by 0.12mm.
 - g). After the adjustment, fit back all the parts.



2). Alignment of Universal Milling Head

a). Horizontal and Vertical Positions of the Universal Milling Head Spindle

- ① When the front and rear shells are at 0° position, the spindle is in horizontal position.
- ② When the front shell rotate 180°, the spindle is in vertical position.
- ③ When the spindle is in horizontal position, rotating the rear shell 180° will move the spindle to a upper position for enlarged machining scope.

Cautions: To maintain a proper parallelism and perpendicularity of the spindle against the table, taper pins are provided for precision positioning of the front and rear shells. The taper pin is specific for particular holes. Do NOT mismatch or knock the taper pin into the holes by force.

b). Left and Right Set-off of the Universal Milling Head Spindle
Rotating the rear shell 90° clock-wise or counter-clock-wise will set off the spindle to the left or right side to increase the cut scope horizontally.

Cautions: Do NOT loose all the tightening bolts while rotating the universal milling head to avoid sudden falling down of the head due to gravity that may damage the table or the work-pieces.

c). Rotating Adjustment of the Universal Milling Head Spindle in Horizontal Plane

When the arbor supporting bracket is mounted, the spindle can be adjusted in horizontal plane to increase the rigidity (especially for left / right spiral milling). Rotating the front and rear shells in different directions will get the spindle in specific angles.

A chart is listed below for easy check.

The formula is:

$$\cos\beta = 2\cos\theta - 1$$

$$\operatorname{tg}\alpha = \sqrt{2} \operatorname{tg}(\beta/2)$$

θ – angle between spindle center line and table cross movement

β – angle of front shell

α – angle of rear shell

For example,

① For 45° left spiral milling

Rear shell: 24° 28'11" (counter-clock-wise)

Front shell: 65° 31'49" (clock-wise)

② For 30° left spiral milling

Rear shell: 15° 32'32" (clock-wise)

Front shell: 42° 56'29" (counter-clock-wise)

Angle Chart

Spindle Angle θ	Front Shell Angle β	Rear Shell Angle α
1°	1° 24'51"	0° 30'00"
2°	2° 49'43"	1° 00'00"
3°	4° 14'35"	1° 30'02"
4°	5° 39'29"	2° 00'05"
5°	7° 04'24"	2° 30'09"
6°	8° 29'21"	3° 00'15"
7°	9° 54'20"	3° 30'24"
8°	11° 19'22"	4° 00'35"
9°	12° 44'28"	4° 30'50"
10°	14° 09'37"	5° 01'09"
11°	15° 35'50"	5° 31'32"
12°	17° 00'08"	6° 01'59"
13°	18° 25'28"	6° 32'32"
14°	19° 50'56"	7° 03'10"
15°	21° 16'29"	7° 33'54"
16°	22° 42'08"	8° 04'45"
17°	24° 07'54"	8° 35'42"
18°	25° 33'46"	9° 06'47"
19°	26° 59'46"	9° 38'00"
20°	28° 25'54"	10° 09'21"
21°	29° 52'11"	10° 40'51"
22°	31° 18'36"	11° 12'31"
23°	32° 45'12"	11° 44'20"
24°	34° 11'56"	12° 18'20"
25°	35° 38'52"	12° 48'31"
26°	37° 05'58"	13° 20'53"
27°	38° 33'17"	13° 53'28"
28°	40° 00'48"	14° 26'15"
29°	41° 28'32"	14° 59'17"
30°	42° 56'29"	15° 32'32"
31°	44° 24'41"	16° 06'02"
32°	45° 53'07"	16° 39'48"
33°	47° 21'50"	17° 13'49"
34°	48° 50'48"	17° 48'08"
35°	50° 20'04"	18° 22'44"
36°	51° 49'38"	18° 57'38"
37°	53° 19'31"	19° 32'52"
38°	54° 49'44"	20° 08'27"
39°	56° 20'17"	20° 44'22"
40°	57° 51'12"	21° 20'39"
41°	59° 22'30"	21° 57'20"
42°	60° 54'10"	22° 34'23"
43°	62° 54'10"	23° 11'52"
44°	63° 58'50"	23° 49'48"
45°	65° 31'49"	24° 28'11"
46°	67° 05'17"	25° 07'03"

47°	68° 39'15"	25° 46'24"
48°	70° 13'44"	26° 26'17"
49°	71° 48'47"	27° 06'42"
50°	73° 24'24"	27° 47'42"
51°	75° 00'38"	28° 28'17"
52°	76° 37'30"	29° 11'30"
53°	78° 15'02"	29° 54'22"
54°	79° 53'17"	30° 37'56"
55°	81° 32'17"	31° 22'13"
56°	83° 12'04"	32° 07'16"
57°	84° 52'40"	32° 53'06"
58°	86° 34'10"	33° 39'47"
59°	88° 16'35"	34° 27'22"
60°	90°	35° 15'51.8"
61°	91° 44'28"	36° 05'21"
62°	93° 30'02"	36° 55'54"
63°	95° 17'47"	37° 47'33"
64°	97° 04'48"	38° 40'21"
65°	98° 54'11"	39° 34'25"
66°	100° 45'01"	40° 29'49"
67°	102° 07'23"	41° 26'38"
68°	104° 31'26"	42° 24'57"
69°	106° 27'18"	43° 24'55"
70°	108° 25'08"	44° 26'37"
71°	110° 25'04"	45° 30'13"
72°	112° 27'20"	46° 35'50"
73°	114° 32'08"	47° 43'41"
74°	116° 39'43"	48° 53'57"
75°	118° 30'23"	50° 05'52"
76°	121° 04'29"	51° 22'41"
77°	123° 22'25"	52° 41'47"
78°	125° 44'42"	54° 04'30"
79°	128° 44'53"	55° 31'17"
80°	130° 44'45"	57° 02'43"
81°	133° 24'12"	58° 39'30"
82°	136° 11'28"	60° 22'33"
83°	139° 08'09"	62° 13'04"
84°	142° 16'26"	64° 12'40"
85°	145° 39'30"	66° 23'44"
86°	149° 22'17"	68° 49'50"
87°	153° 33'02"	71° 36'58"
88°	158° 27'58"	74° 56'51"
89°	164° 49'02"	79° 49'34"
90°	180°	90°

3). Trial run

- Before the trial run, loose the locking bolts on all three directions.
- Remove antirust oil all parts of the machine. Do NOT use harsh tools which may scratch the surfaces. After cleaning the surface, paste it with a thin layer of lubricant oil.
- Add oil into the tank as per instructions. Lubricate every point and check.
- Check every handles and levers whether they are smooth and reliable.
- After connecting to the power, check the spindle rotate direction, table feed and knee lifting direction and find out whether the directions are the same with signs marked.
- To run the machine, use JOG firstly to check for proper functioning of limit switches of the longitudinal, cross and vertical

axes. Check speeds by shifting gears and trial run the machine for at least 2 hours at lowest speed and then increase the speed gradually to test speeds. Make sure that the gear shifting functions properly and reliably.

15. MAINTENANCE

1. Instructions:

Clean lubrication oil should be provided through the lubrication points.

Lack of lubrication oil may cause vibration or extra heat. Prompt feed of clean lubrication oil is needed. Stop the machine and remove the plug to feed oil.

Lubrication oil should be drained out and changed with new one periodically. Gears should be cleaned at the meantime.

Do NOT change speeds or rotation direction of the spindle unless the machine is stopped.

Check wiring of the electric system and bearing of the motor every 6 months. Grease of the bearing should be replaced at the meantime. Power the machine off before checking the wiring. Clean the dust or dirt from the wires with dry cloth and hand fan. Do NOT clean them with petrol or diesel in case of damage to the sealing and further accident.

Charts for periodical check should be formulated and followed.

Daily Check Chart:

No .	Location	Items	Remark
1	Lubrication oil	<ul style="list-style-type: none"> ● Check for sufficient oil ● Check for clean oil 	Feed or change
2	Coolant	<ul style="list-style-type: none"> ● Check for sufficient coolant ● Check for clean coolant 	Feed or change
3	Guide ways	<ul style="list-style-type: none"> ● Check for proper lubrication ● No damage on wipers 	
4	Pipes	<ul style="list-style-type: none"> ● No oil leakage ● No coolant leakage 	
5	Motor, gears and other rotary parts	<ul style="list-style-type: none"> ● No abnormal noise or vibration ● No abnormal heat 	
6	Movable parts	<ul style="list-style-type: none"> ● No abnormal noise or vibration ● Check for smooth running 	
7	Operation panel	<ul style="list-style-type: none"> ● Check for proper functioning ● No alarm 	
8	Safety device	<ul style="list-style-type: none"> ● Check for proper functioning 	
9	Coolant unit	<ul style="list-style-type: none"> ● Check for proper functioning 	
10	Cables, wires	<ul style="list-style-type: none"> ● No breakage ● No damage on sheath 	
11	Table and base	<ul style="list-style-type: none"> ● Cleanness 	Remove chips

Periodical Check Chart:

No.	Location	Items	Remarks
1	Compulsory lubrication system	Oil	Change periodically
2	Oil reservoir in machine base	Oil	Change periodically
3	Lubrication oil in ram	Oil	Change in first 3 months and every 6 months afterwards
4	Centralized oil lubricator	Oil	Feed oil when an alarm is given
5	Coolant system	Coolant and filter	Clean filter

To adjust clearance among the table, saddle and knee, rotate the screw on the jib strip to drive the latter for proper clearance.

To adjust clearance between the knee and the column, insert a feeler gauge to check the clearance. Take off the clamping pads and hand-scrap or grind them so to reduce the clearance.

2. Adjustment:

3. Trouble shooting: Refer to the following procedures for general troubles:

Observation	Possible Reasons	Solution
Abnormal of spindle brake	Worn-out of braking disc	Replace the disc
Abnormal rotation of the spindle	1. Switch is broken 2. Loose V-belt 3. Motor is broken	1. Check the switch 2. Adjust or replace 3. Repair or replace
Wrong rotation direction	Wrong lever position	Put the lever in the correct position
Big run-out of horizontal spindle	Worn-out of bearing or loose locking nut	Tighten the nut, and adjust the clearance of the bearing
Abnormal feed of three axes	1. Gib strip is too tight 2. Clearance in the bolt and nut is not proper 3. Lack of lubrication oil	1. Replace the gib strip 2. Adjust the clearance 3. Add more oil
Vibration of the machine	1. Foundation is not solid enough 2. Abnormal cutting conditions	1. Tighten the grouting bolts 2. Use proper setting of cutting rates, material and cutting tools.
Motor not running after power on	1. Incorrect power source 2. Incorrect connection Wire 3. Terminal block loose	1. Input correct power 2. Check correct connection 3. Tighten the terminal block
Failure of spindle running	1. Main transmission speed change gear grade shift not in the position 2. Cutting overload 3. Motor broken 4. Spindle mechanical part damage	1. Check main transmission speed change box 2. Use the machine according to the cutting rule 3. Check the motor 4. Check the mechanical part manual
High temperature of spindle	1. Bearing damage 2. Lock nut too tight	1. Change bearing 2. Adjust lock nut
Spindle accuracy not good	1. bearing damage or adjusting not so well 2. spindle inner hole wear 3. spindle temperature too high cause heat deformation 4. lock nut get loose	1. change bearing or adjusting 2. change spindle 3. adjusting bearing 4. tighten lock nut
No gear change for spindle speed change	Spindle motor impulse line contact failure	Check electrical wire, adjusting impulse shaft tail end bolts, reach the impulse contact.
Feed box high noise	1. Transmission gear not in the position or loose 2. Motor noise	1. Check every transmission gear 2. Check motor
Feed box no feed movement	1. Feed motor not connecting with power or damage 2. Feed electrical clutch does not function	Check electrical part wire connection and electrical unit failure and exclude
Abnormal movement part sound	1. Articles fall inside 2. Screw and nut connecting part loose	1. Clean the foreign matter 2. Tighten the bolts
Axial movement of moving parts	1. Screw and nut connection loose 2. Screw bearing bracket loose. 3. Screw and nut space too large.	1. Tighten the loosen bolts 2. Tighten bearing bracket 3. Adjusting the screw and nut space.
Crawl movement of moving parts	1. Guideway not be fully lubricated 2. No lubrication	1. Check the pipe jam or not, oil distributor damage, lubrication system abnormal 2. Lubricate the machine as operation manual.
Motor broken	1. Water or oil into the electrical wire, circuit gets short-	1. Contact with manufacture.

	circuit. 2. Wire damage cause short circuit.	2. Eliminate the problem and change the motor.
Abnormal noise	1. Transmission gear loose 2. Foreign matter fall into the machine	1. Retighten the loosen gear 2. Clean foreign matter
Quick consumption of lubrication oil	1. Oil pipe damage 2. Oil distributor damage	1. Change oil pipe 2. Change oil distributor
Insufficient lubrication or no lubrication of guide ways and leadscrews	1.Oil distributor damage or oil is not enough, 2. Lubrication break off or pipe block 3.No lubrication 4. Machine oil outlet block up	1. Change the lubrication pipe joint. 2. Change oil pipe. 3. Fill up the lubrication oil. 4. Repair the ou-let hole.
No coolant supply	1.Coolant liquid is too dirty coolant filter filter mesh block, 2. Coolant pipe leak or fold 3. Nozzle get block	1.Clean filter mesh and change clean coolant liquid 2. Change pipe 3. Clean nozzle.
Coolant pump fault	1.Longtime work, voltage too high 2.Coolant pump block up, motor too hot. 3.Coolant pump damage. 4.Thermal relay burn out 5.Wrong motor rotation direction. 6.No coolant liquid	1.Pull on thermal relay 2. Clean coolant pump, pull on thermal relay. 3.Change coolant pump motor. 4.Change thermal relay. 5. reconnection 6. Fill up the coolant liquid
Vibration when cutting	1. Cutting parameter is unreasonable 2. Spindle bearing loose. 3. Worn of gibs and big guide ways clearance 4. Workpiece is not be clamped tighten or unreasonable clamping method	1. Adjusting the cutting parameter 2. Repair the spindle box 3. Repair the gibs 4. Tighten the workpiece
Poor cutting finish	1. Workpiece is not be tighten clamped. 2. Transmission part have space or preload is insufficient 3. Cutting feed is not correct.	1. Tighten the workpiece 2. Adjust the guideway space 3. Change the cutting parameter.

EASY-WORN PARTS (available at extra charge)

	Drawing No.	Item	Qty.
1	Oil frame seal	FB 30 x 47 x 7	2 pieces
2	Oil frame seal	FB 70 x 90 x 10	2 pieces
3	Ring seal	16mm inner dia. x 1.8mm section	3 pieces

14. Environmental protection

Protect the environment.

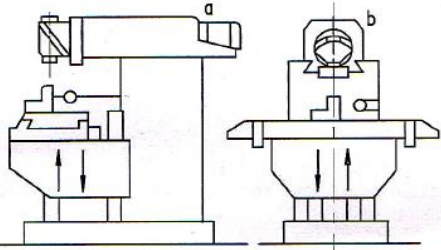
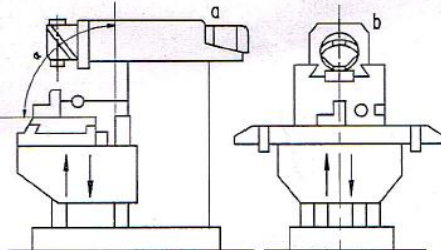
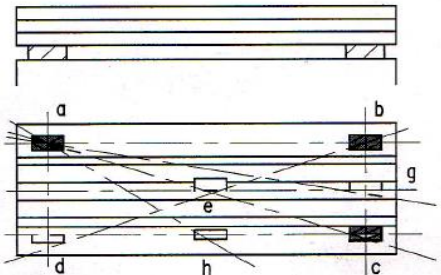
Your appliance contains valuable materials which can be recovered or recycled. Please leave it at a specialized institution.

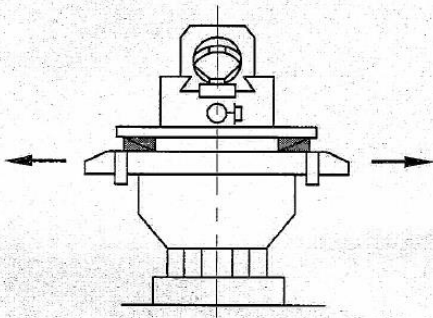
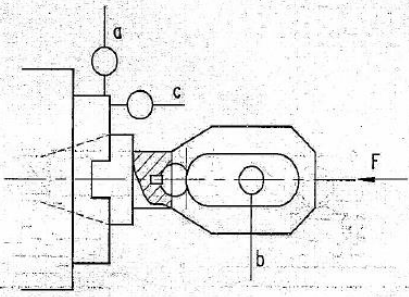
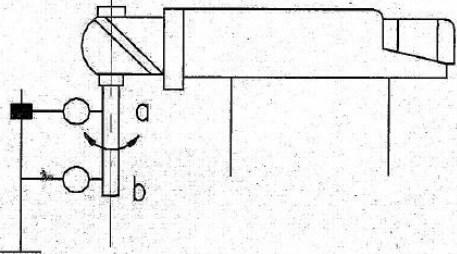


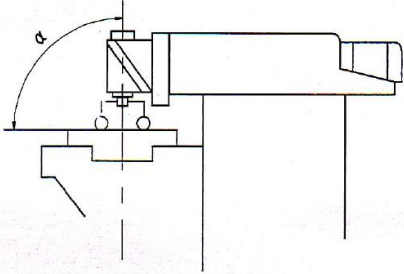
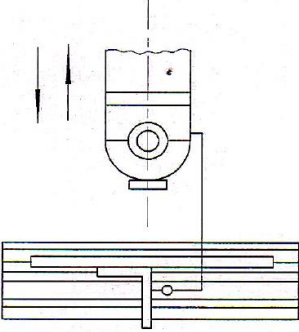
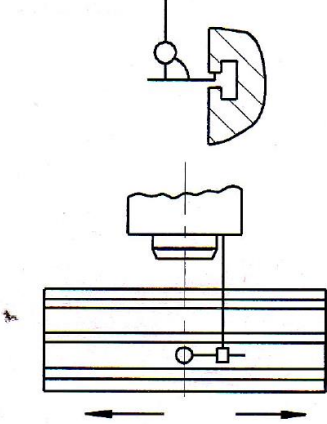
15. Available accessories

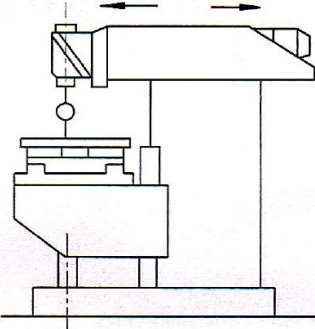
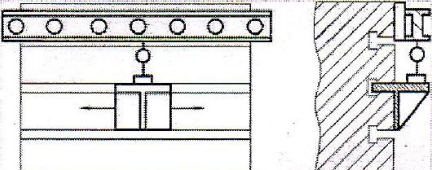
Refer to the JET-Price-list

INSPECTING

No.	Inspecting items		tolerance	actually
G1	<p>Straightness of knee vertical stroke:</p> <p>a: In cross plane b: In horizontal plane</p>		<p>a: 0.025/300</p> <p>b: 0.025/300</p>	
G2	<p>Verticality of table surface and column vertical guideways (measure at top, middle and bottom position of the vertical guideways)</p> <p>a: In cross plane b: In horizontal plane</p>		<p>a: 0.025/300 $\alpha \leq 90^\circ$</p> <p>b: 0.025/300</p>	
G3	<p>Flatness of table surface</p>		<p>In a length of 1000mm: 0.040</p> <p>Local tolerance: at a random length of 300mm: 0.020</p>	

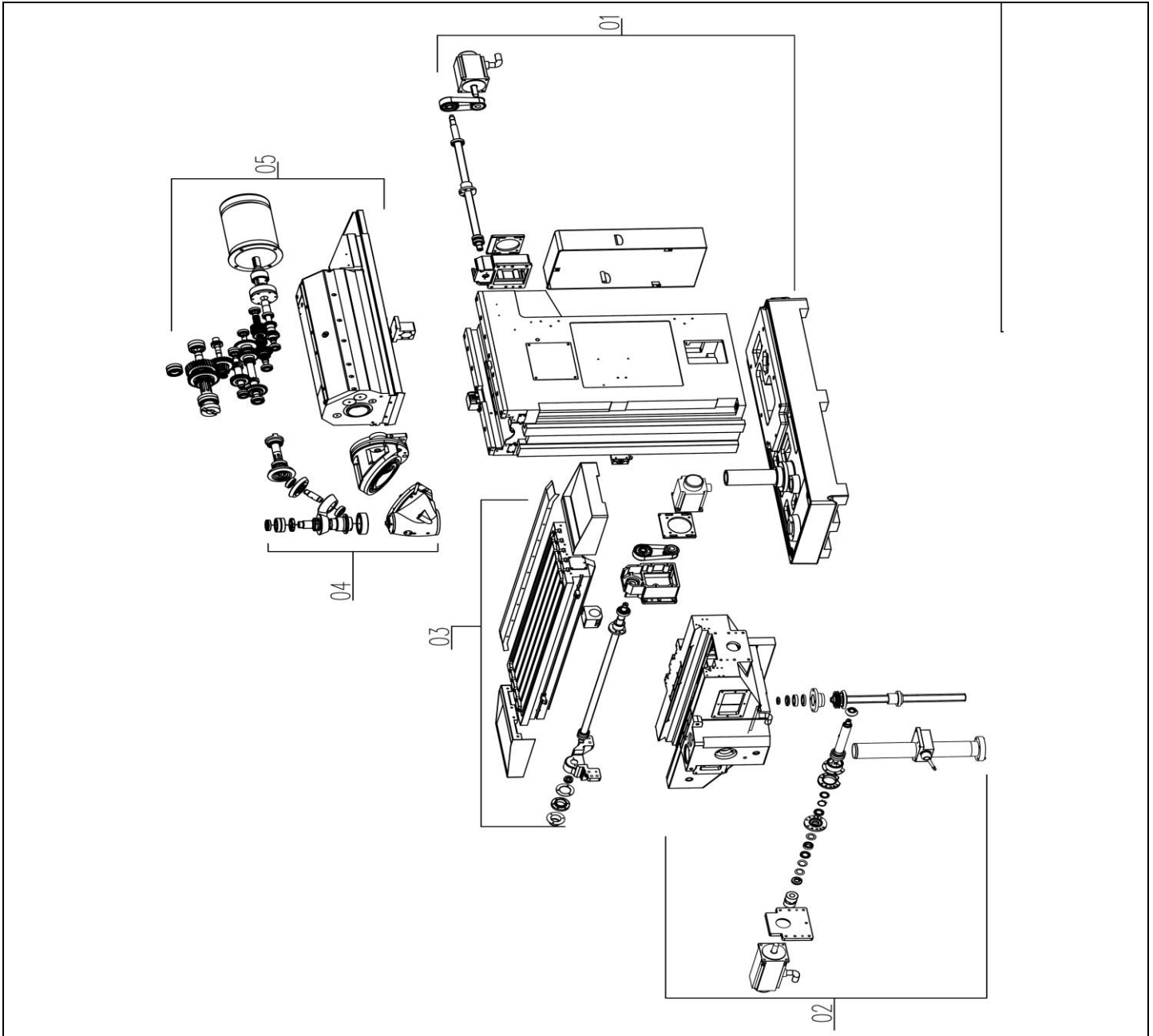
No.	Inspecting items	tolerance	actually
G4	Parallelism of table longitudinal stroke and table surface	 0.025/300 Max.tolerance: 0.050	
G5	Run-out of spindle end a、 Radial run-out of spindle centering nose b、 Axial run-out of spindle c、 Run-out of spindle neck supporting surfaces	 a: 0.010 b: 0.010 c: 0.020	
G6	Radial run-out of axial line of spindle taper a、 Near spindle end b、 At a distance of 300mm from spindle end	 a: 0.010 b: 0.020	

No.	Inspecting items	tolerance	actually
G7	Straightness of spindle axial line and table surface a: In cross plane b: In horizontal plane	 a: 0.025/300 $\alpha \leq 90^\circ$ b: 0.025/300	
G8	Straightness of ram cross stroke and table horizontal stroke	 0.025/300	
G9	Parallelism of table longitudinal stroke and the central or datum table T-slot	 0.015/300 Max. 0.04	

No.	Inspecting items	tolerance	actually	
G10	Parallelism of ram cross stroke and table surface		<p>0.025/300</p> <p>Max. tolerance: 0.050</p>	
G11	Straightness of the central or datum table T-slot		<p>0.010/500</p> <p>Max. 0.03</p>	
G12	<p>Parallelism of horizontal spindle rotation axis and ram movement</p> <p>a. In Y and Z plane</p> <p>b. In X and Y plane</p>	<p>a. 0.025/300</p> <p>(concave only)</p> <p>b. 0.025/300</p>		
G13	Parallelism of horizontal spindle rotation axis and table surface	<p>0.025/300</p> <p>(concave only)</p>		
G14	Perpendicularity of horizontal spindle rotation axis and central T-slot on table	<p>0.020/300</p>		

16. Exploded View & Part List

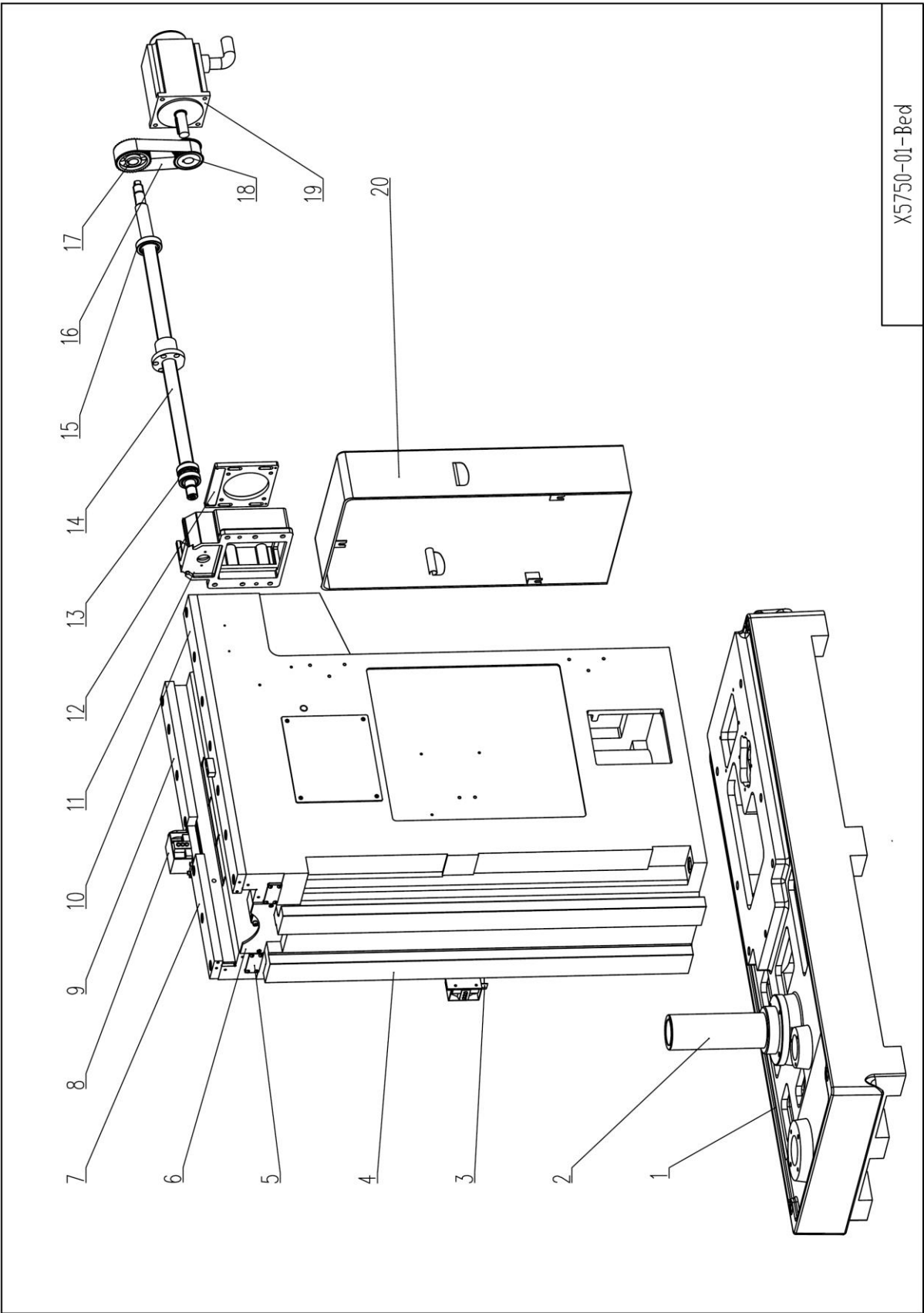
Exploded View for JUM-1649 Servo DRO Milling Machine –OVERVIEW



JUM-1649VXL Servo DRO-OVERVIEW

Index No.	Part No.	Description	Size	Qty
1	JUM1649VXL-01	Bed Part		1
2	JUM1649VXL-02	Knee Part		1
3	JUM1649VXL-03	Table Part		1
4	JUM1649VXL-04	Head Part		1
5	JUM1649VXL-05	Ram Part		1

Exploded View for JUM-1469VXL Servo DRO Milling Machine –Bed Assembly 01

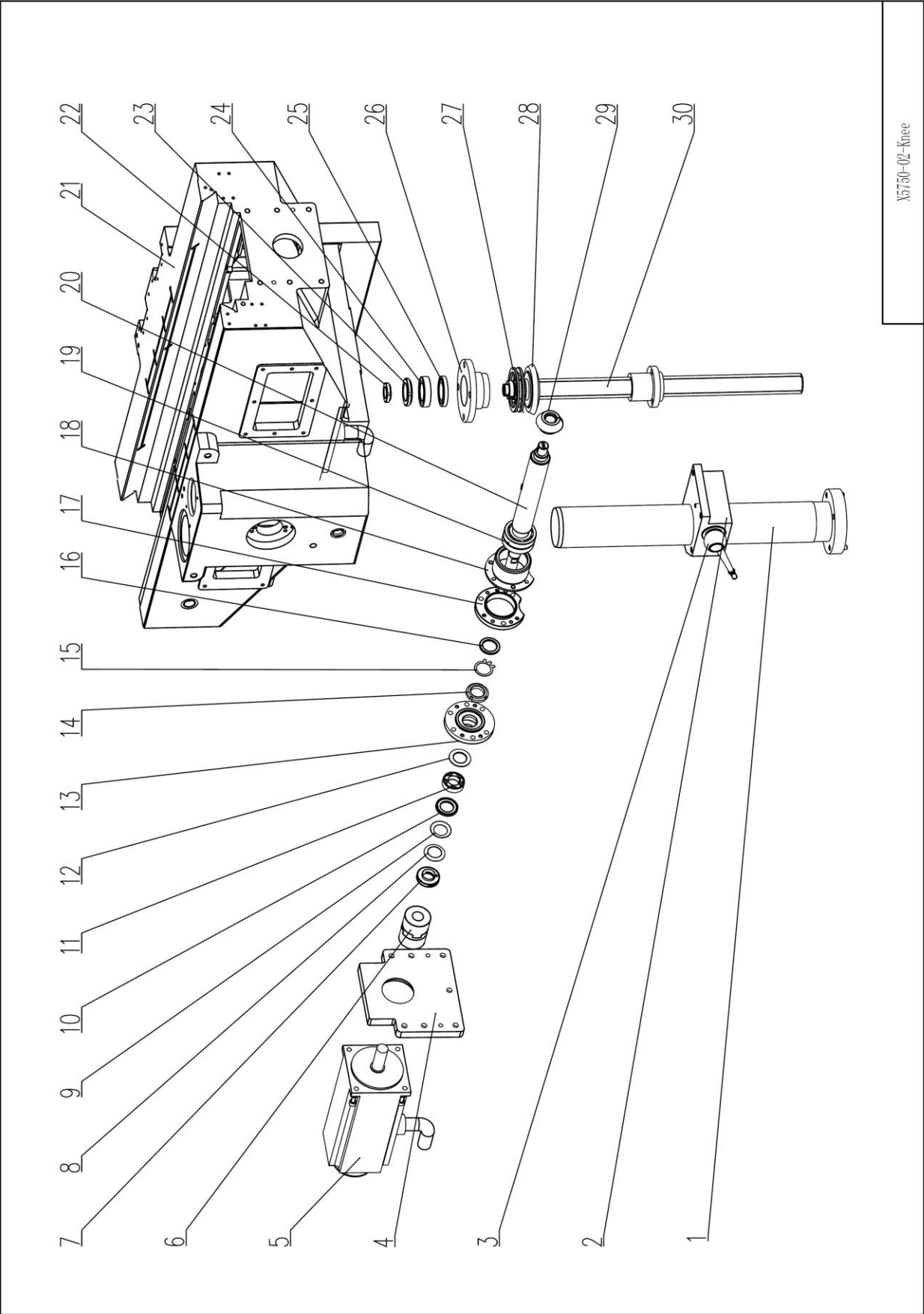


X5750-01-Bed

Part List for JUM-1469VXL Servo DRO Milling Machine – Bed Assembly 01

Index No.	Part No.	Description	Size	Qty
1	JUM1649-01-01	base		1
2	JUM1649-01-02	support		1
3	JUM1649-01-03	cover		1
4	JUM1649-01-04	bed		1
5	JUM1649-01-05	Oil plate		1
6	JUM1649-01-06	guard		1
7	JUM1649-01-07	platen		1
8	JUM1649-01-08	cover		1
9	JUM1649-01-09	platen		1
10	JUM1649-01-10	platen		1
11	JUM1649-01-11	box		1
12	JUM1649-01-12	plate		1
13	JUM1649-01-13	bearing	7206AC GB/T292	2
14	JUM1649-01-14	screw		1
15	JUM1649-01-15	bearing	7207AC GB/T292	1
16	JUM1649-01-16	Synchronous belt		1
17	JUM1649-01-17	Synchronous pulley		1
18	JUM1649-01-18	Synchronous pulley		1
19	JUM1649-01-19	motor		1
20	JUM1649-01-20	cover		1

Exploded View for JUM-1469VXL Servo DRO Milling Machine –Knee Assembly 02

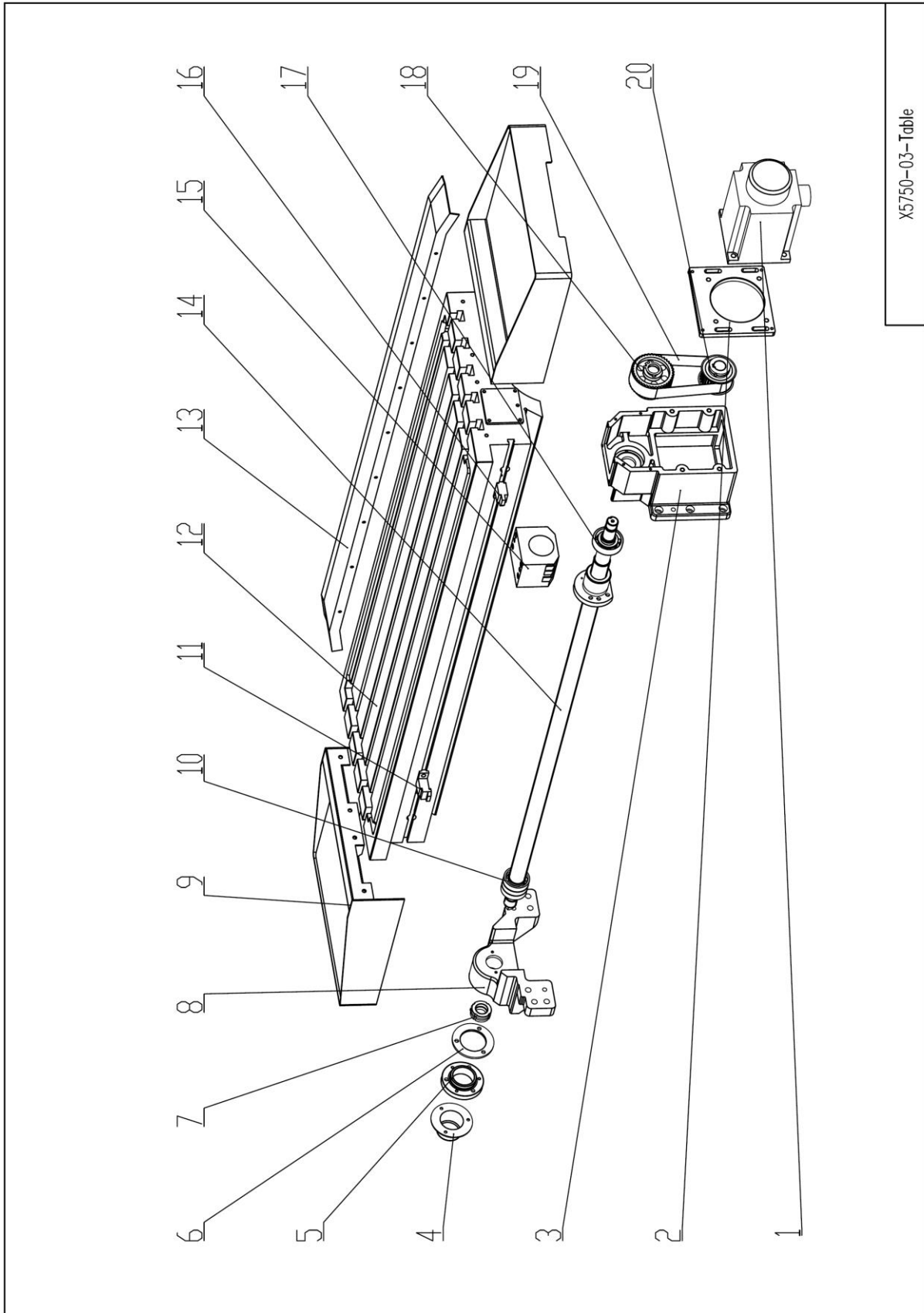


X5750-02-Knee

Part List for JUM-1649VXL Servo DRO Milling Machine – Knee Assembly 02

Index No.	Part No.	Description	Size	Qty
1	JUM1649-02-01	pillar		1
2	JUM1649-02-02	support		1
3	JUM1649-02-03	handle		1
4	JUM1649-02-04	Motor plate		2
5	JUM1649-02-05	motor		1
6	JUM1649-02-06	coupling		1
7	JUM1649-02-07	screw		1
8	JUM1649-02-08	Disc spring		1
9	JUM1649-02-09	Disc spring		1
10	JUM1649-02-10	pad		1
11	JUM1649-02-11	clutch		1
12	JUM1649-02-12	pad		1
13	JUM1649-02-13	cover		2
14	JUM1649-02-14	nut		1
15	JUM1649-02-15	washer		1
16	JUM1649-02-16	washer		1
17	JUM1649-02-17	Flange		1
18	JUM1649-02-18	Flange		1
19	JUM1649-02-19	bearing	7208C GB/T292	2
20	JUM1649-02-20	shaft		1
21	JUM1649-02-21	knee		1
22	JUM1649-02-22	nut		1
23	JUM1649-02-23	nut		1
24	JUM1649-02-24	bearing	7009AC	1
25	JUM1649-02-25	bearing	16009	1
26	JUM1649-02-26	flange		1
27	JUM1649-02-27	bearing	81117	1
28	JUM1649-02-28	gear		1
29	JUM1649-02-29	gear		1
30	JUM1649-02-30	screw		1

Exploded View for JUM-1469VXL Servo DRO Milling Machine –Table Assembly 03

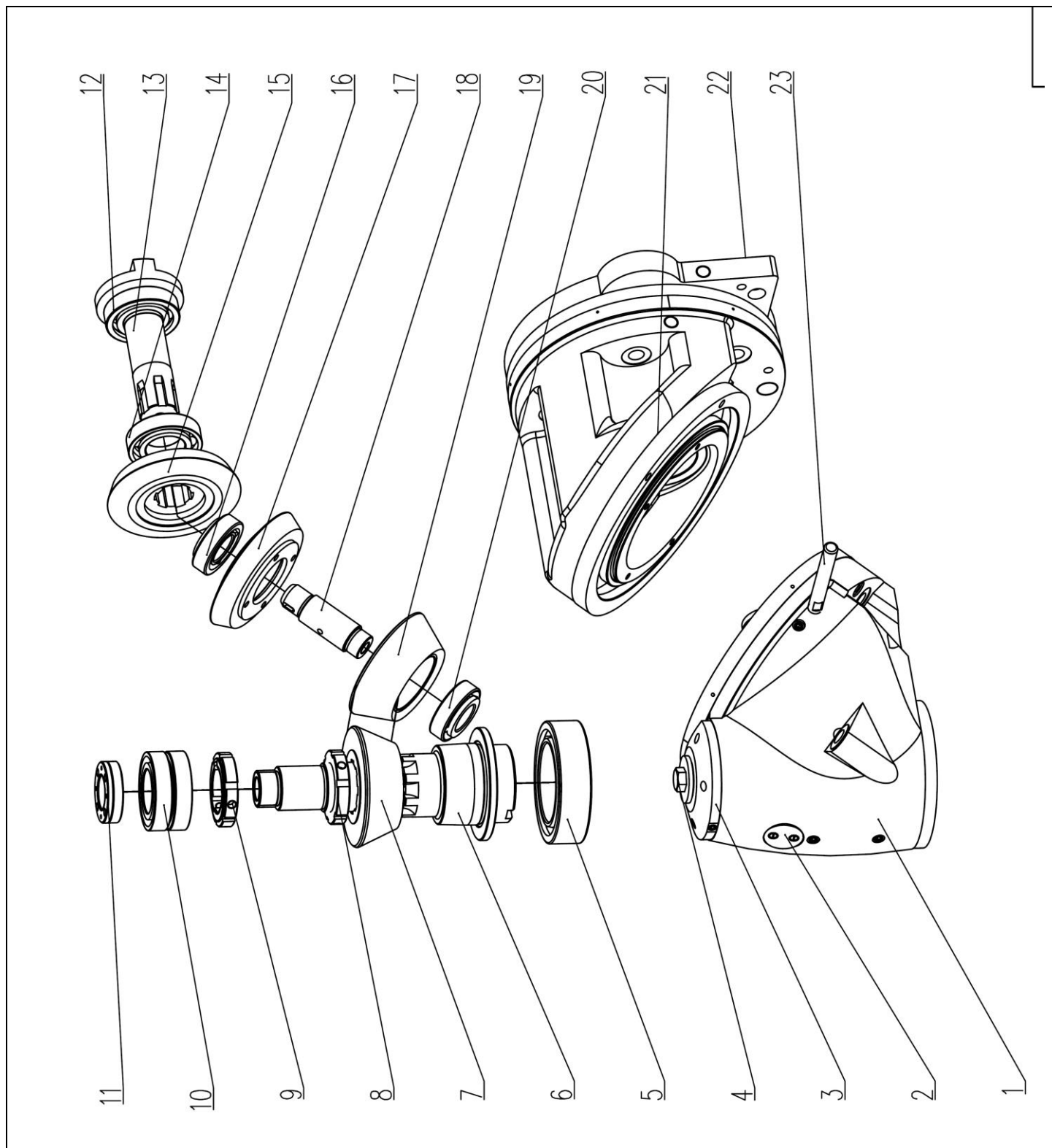


X5750-03-Table

Part List for JUM-1649VXL Servo DRO Milling Machine – Table Assembly 03

Index No.	Part No.	Description	Size	Qty
1	JUM1649-03-01	motor		1
2	JUM1649-03-02	plate		1
3	JUM1649-03-03	box		1
4	JUM1649-03-04	cover		1
5	JUM1649-03-05	flange		1
6	JUM1649-03-06	pad		1
7	JUM1649-03-07	nut		2
8	JUM1649-03-08	bracket		1
9	JUM1649-03-09	cover		2
10	JUM1649-03-10	bearing	7206 GB/T292	2
11	JUM1649-03-11	block		1
12	JUM1649-03-12	table		1
13	JUM1649-03-13B	cover		1
14	JUM1649-03-14	screw		1
15	JUM1649-03-15	Nut seat		1
16	JUM1649-03-16	block		1
17	JUM1649-03-17	bearing	7207B GB/T292	1
18	JUM1649-03-18	pulley		1
19	JUM1649-03-19	Synchronous belt		1
20	JUM1649-03-20	pulley		1

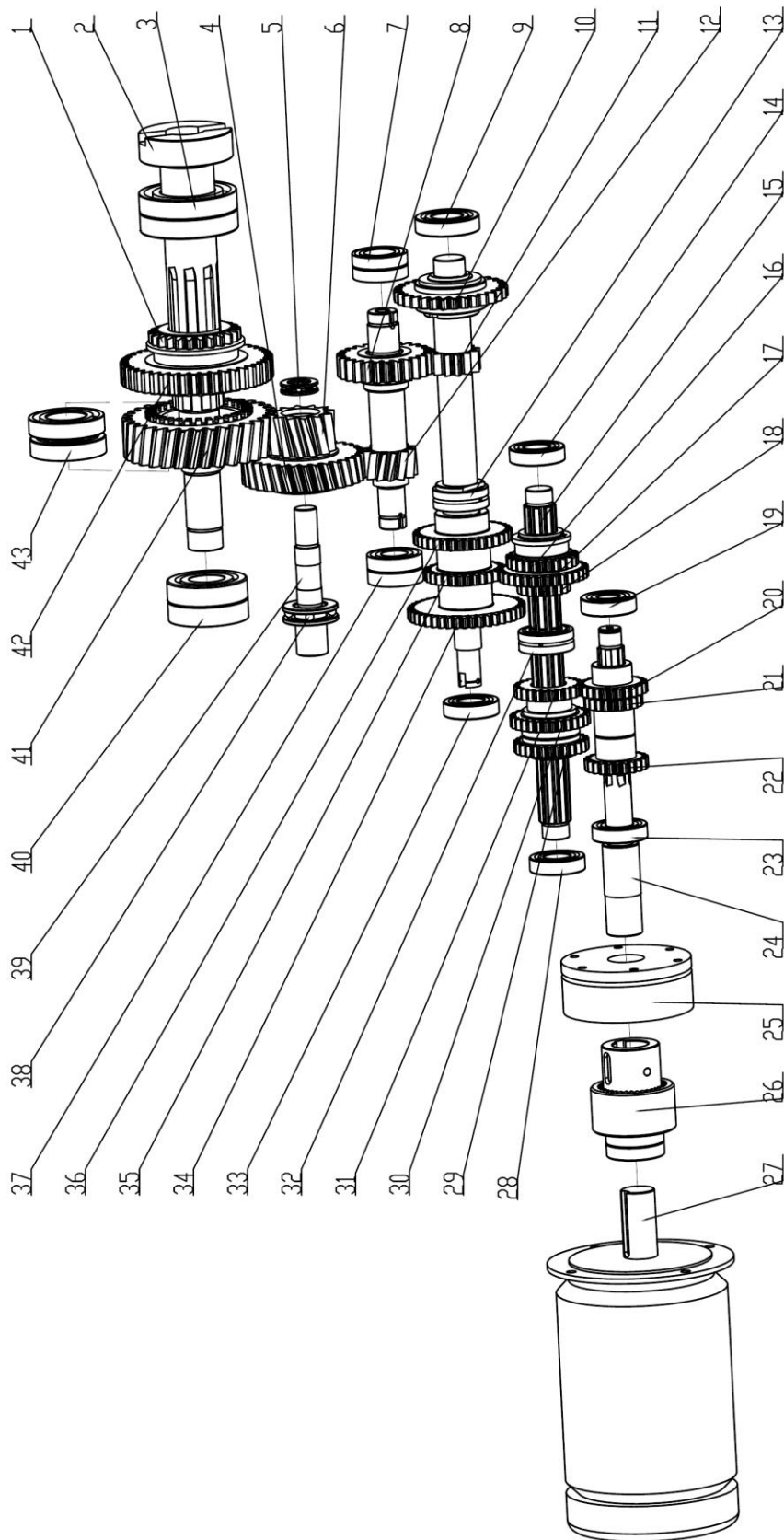
Exploded View for JUM-1649VXL Servo DRO Milling Machine –Head Assembly 04



Part List for JUM-1649VXL Servo DRO Milling Machine – Head Assembly 04

Index No.	Part No.	Description	Size	Qty
1	JUM1649-04-01	shell		1
2	JUM1649-04-02	plate		1
3	JUM1649-04-03	cover		1
4	JUM1649-04-04	drawbar		1
5	JUM1649-04-05	bearing	NN3018K/P5	1
6	JUM1649-04-06	spindle		1
7	JUM1649-04-07	gear		1
8	JUM1649-04-08	nut		1
9	JUM1649-04-09	nut		1
10	JUM1649-04-10	bearing		1
11	JUM1649-04-11	nut		1
12	JUM1649-04-12	bearing	7209AC	1
13	JUM1649-04-13	spindle		1
14	JUM1649-04-14	bearing	7209AC	1
15	JUM1649-04-15	gear		1
16	JUM1649-04-16	bearing	32207	1
17	JUM1649-04-17	Synchronous belt		1
18	JUM1649-04-18	shaft		1
19	JUM1649-04-19	gear		1
20	JUM1649-04-20	bearing		1
21	JUM1649-04-21	shell		1
22	JUM1649-04-22	plate		1
23	JUM1649-04-23	shell		1

Exploded View for UM-1649VXL Servo DRO Milling Machine –Ram Assembly 05

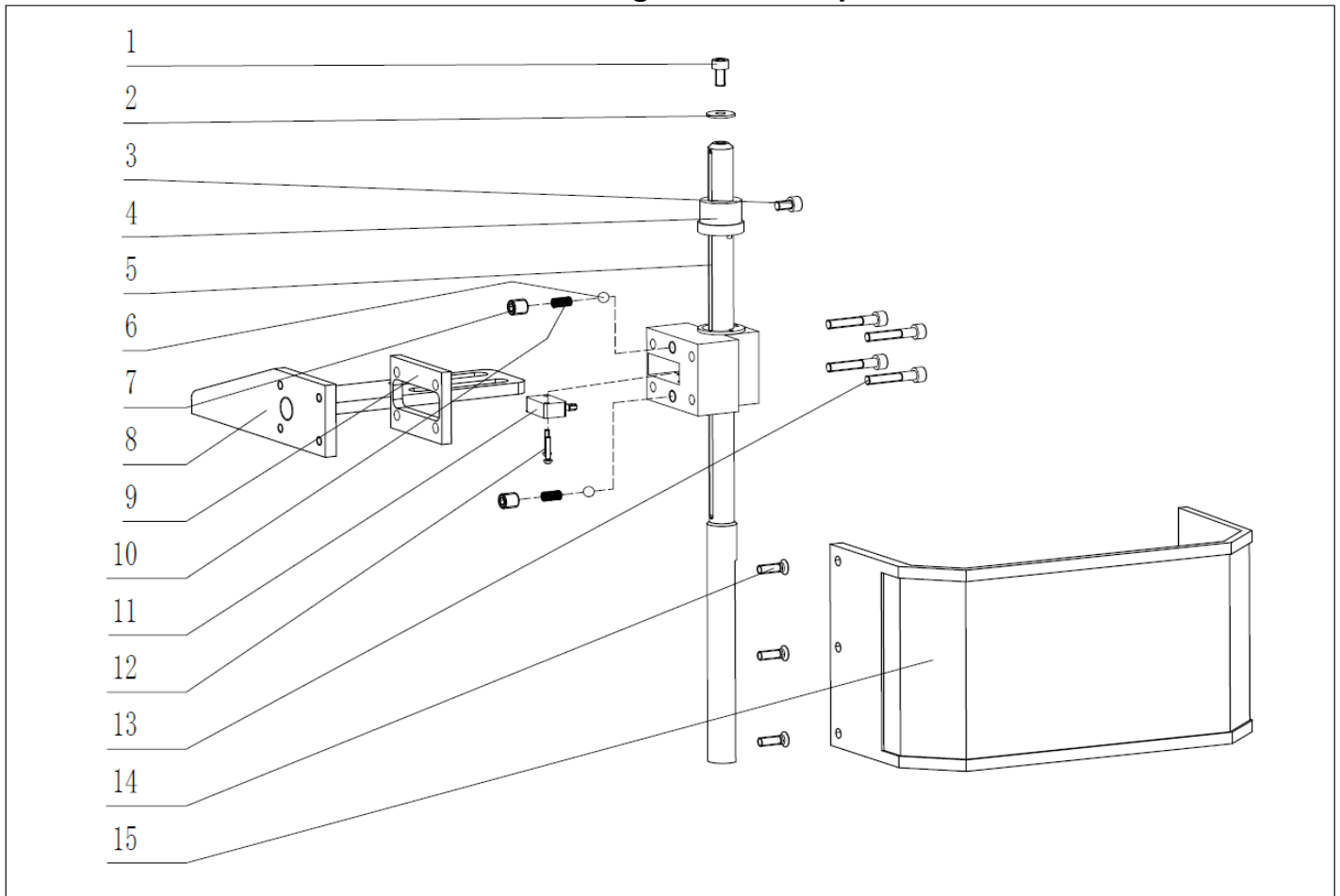


X5750-05-Ram

Part List for JUM-1649VXL Servo DRO Milling Machine – Ram Assembly 05

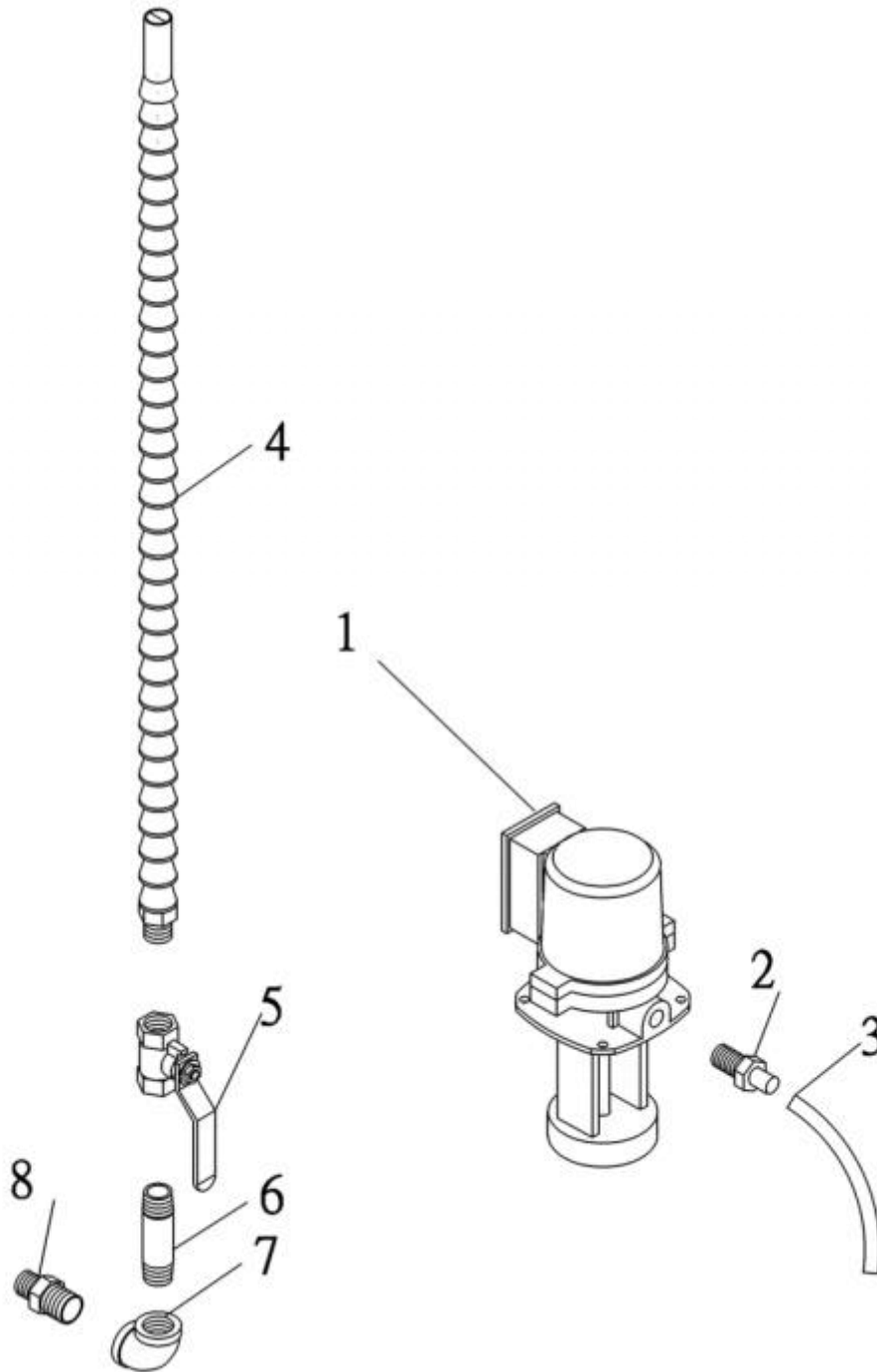
Index No.	Part No.	Description	Size	Qty
1	JUM1649-05-01	Gear		1
2	JUM1649-05-02	Shaft		1
3	JUM1649-05-03	Bearing	7212C	1
4	JUM1649-05-04	Gear		1
5	JUM1649-05-05	Bearing	51105	1
6	JUM1649-05-06	Gear		1
7	JUM1649-05-07	Bearing	7007C	1
8	JUM1649-05-08	Gear		1
9	JUM1649-05-09	Bearing	6207	1
10	JUM1649-05-10	Gear		1
11	JUM1649-05-11	Gear		1
12	JUM1649-05-12	Gear		1
13	JUM1649-05-13	Bearing	NA4908	1
14	JUM1649-05-14	Bearing	6206	1
15	JUM1649-05-15	shaft		1
16	JUM1649-05-16	Gear		1
17	JUM1649-05-17	Gear		1
18	JUM1649-05-18	Gear		1
19	JUM1649-05-19	Bearing	6305	1
20	JUM1649-05-20	Gear		1
21	JUM1649-05-21	Gear		1
22	JUM1649-05-22	Gear		1
23	JUM1649-05-23	Bearing	6206	1
24	JUM1649-05-24	shaft		1
25	JUM1649-05-25	Brake		1
26	JUM1649-05-26	coupling		1
27	JUM1649-05-27	motor		1
28	JUM1649-05-28	Bearing	6206	1
29	JUM1649-05-29	Gear		1
30	JUM1649-05-30	Gear		1
31	JUM1649-05-31	Gear		1
32	JUM1649-05-32	Bearing	RNA4908	1
33	JUM1649-05-33	Bearing	6206	1
34	JUM1649-05-34	Gear		1
35	JUM1649-05-35	Gear		1
36	JUM1649-05-36	Gear		1
37	JUM1649-05-37	Bearing	7206C	1
38	JUM1649-05-38	Bearing	51207	1
39	JUM1649-05-39	shaft		1
40	JUM1649-05-40	Bearing	7308B	1
41	JUM1649-05-41	Gear		1
42	JUM1649-05-42	Gear		1
43	JUM1649-05-43	Bearing	7209C	2

Part List for JUM-1649VXL Servo DRO Milling Machine – spindle cover E



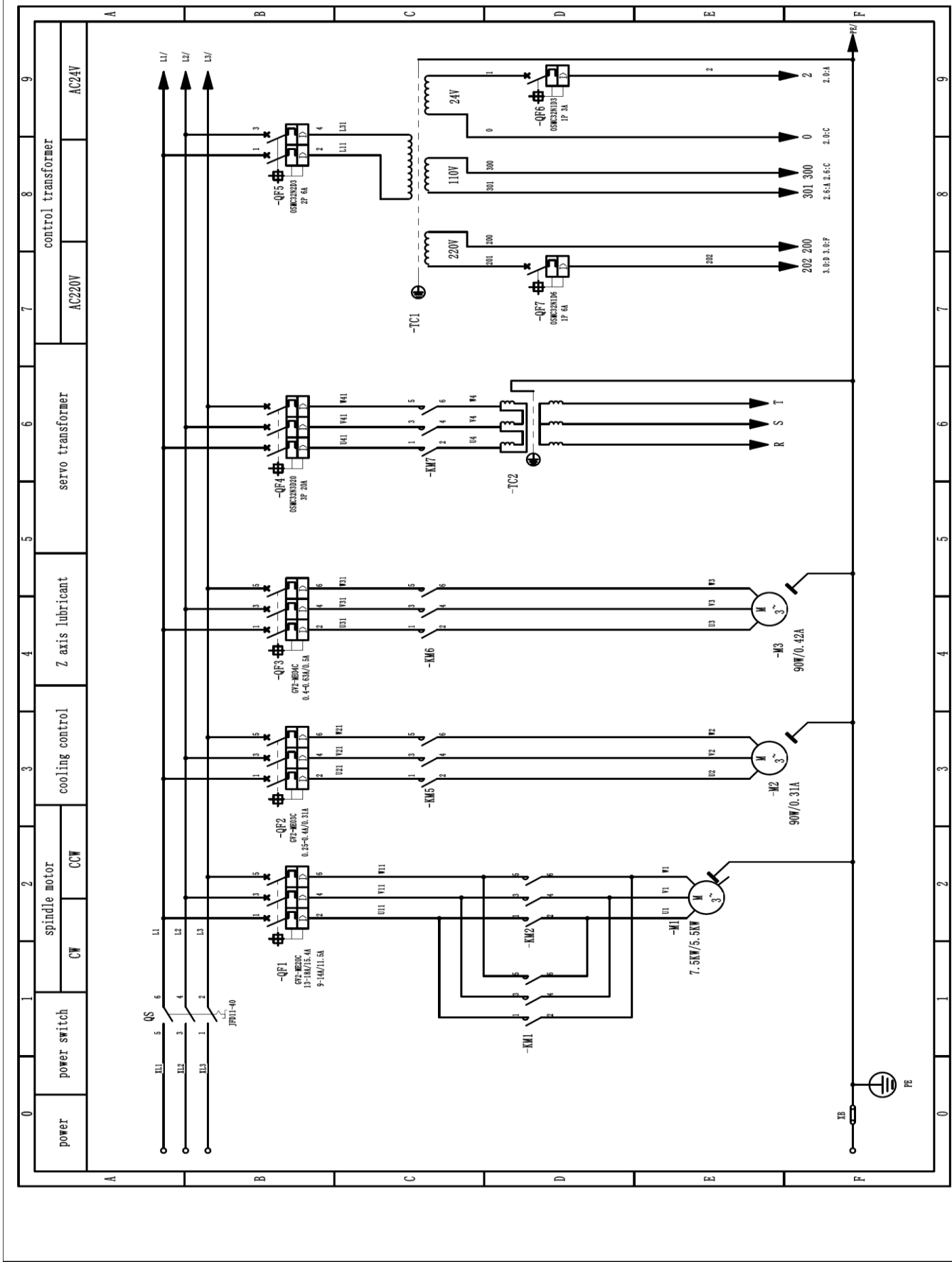
Index No.	Part No.	Description	Size	Qty.
01	JM125-D-001	hexagon socket head cap screws	M6*12	1
02	JM125-D-002	baffle		1
03	JM125-D-001	hexagon socket head cap screws	M6*12	1
04	JM125-D-004	set piece		1
05	JM125-D-005	Cover rod		1
06	JM125-D-006	steel ball	Φ 6	2
07	JM125-D-007	hexagon socket head cap screws	M10*10	2
08	JM125-D-008	Fixed bracket		1
09	JM125-D-009	Plate		1
10	JM125-D-010	Compression flat end spring	Φ0.5* φ 6*19	2
11	JM125-D-011	microswitch		1
12	JM125-D-012	pan head screws with cross recess	M3*16	2
13	JM125-D-013	hexagon socket head cap screws	M6*35	4
14	JM125-D-014	cross recessed countersunk flat head screws	M6*16	3
15	JM125-D-015	cover		1

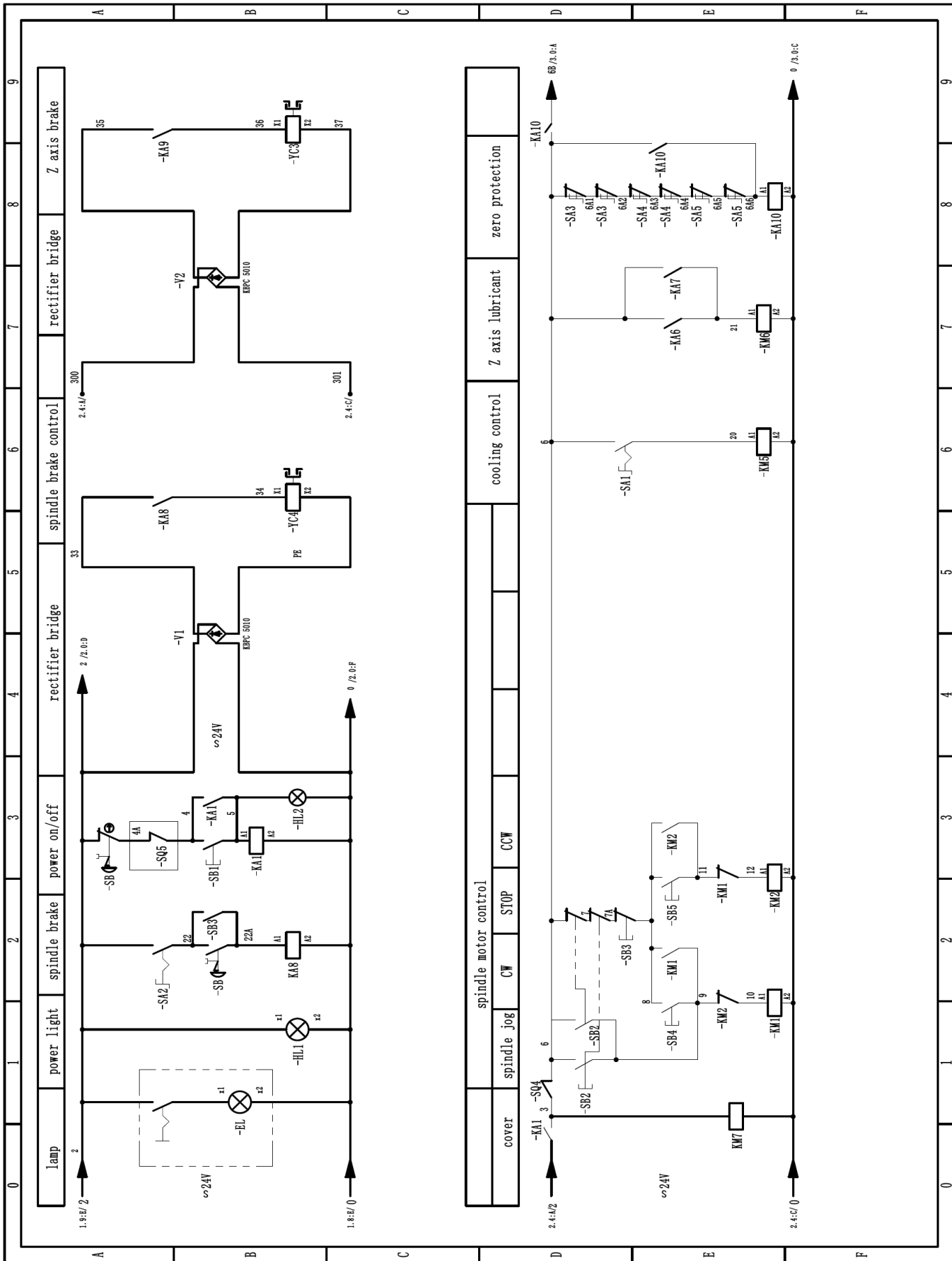
Part List for JUM-1469VXL Servo DRO Milling Machine – Coolant Pump Assembly G

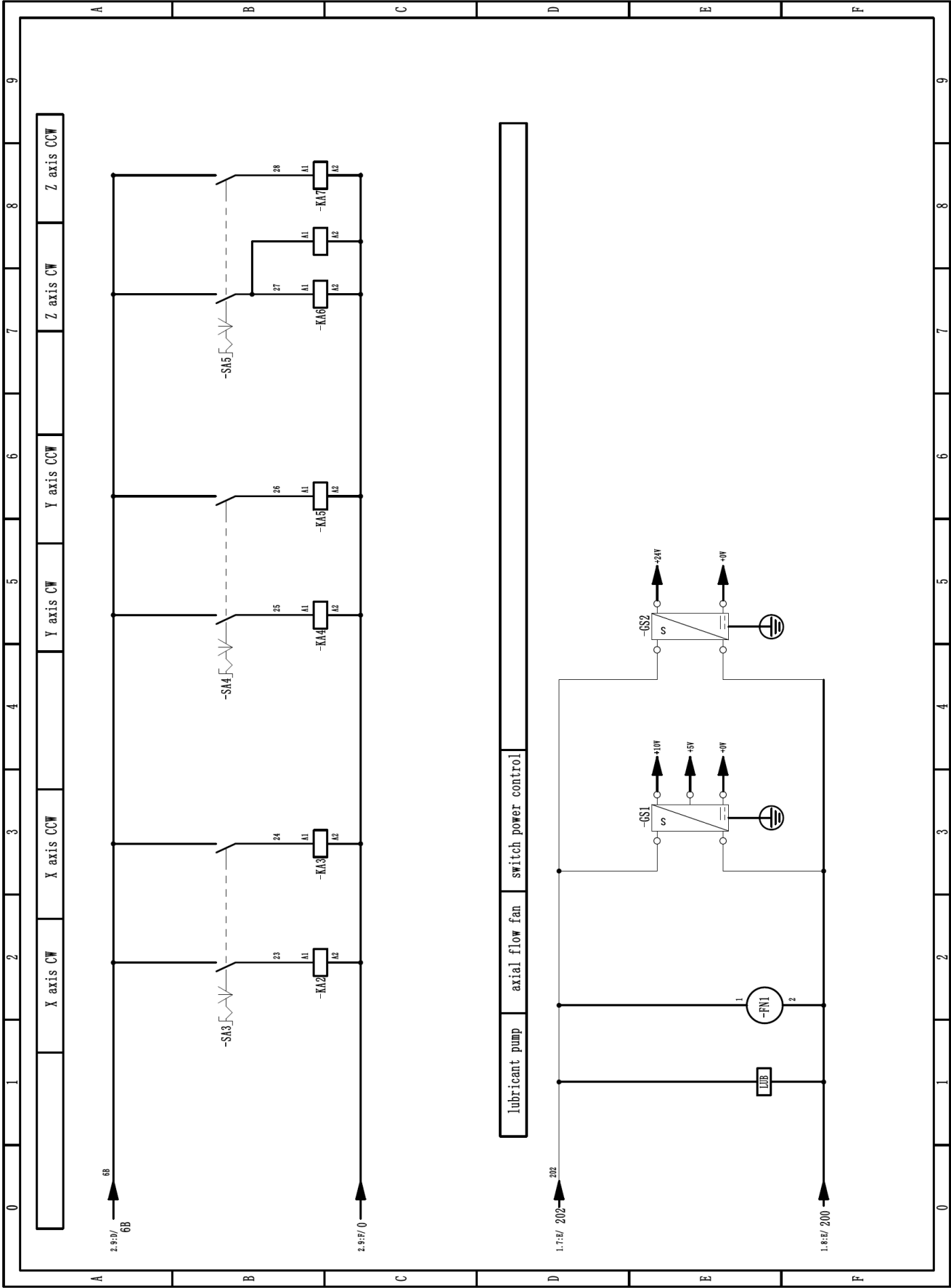


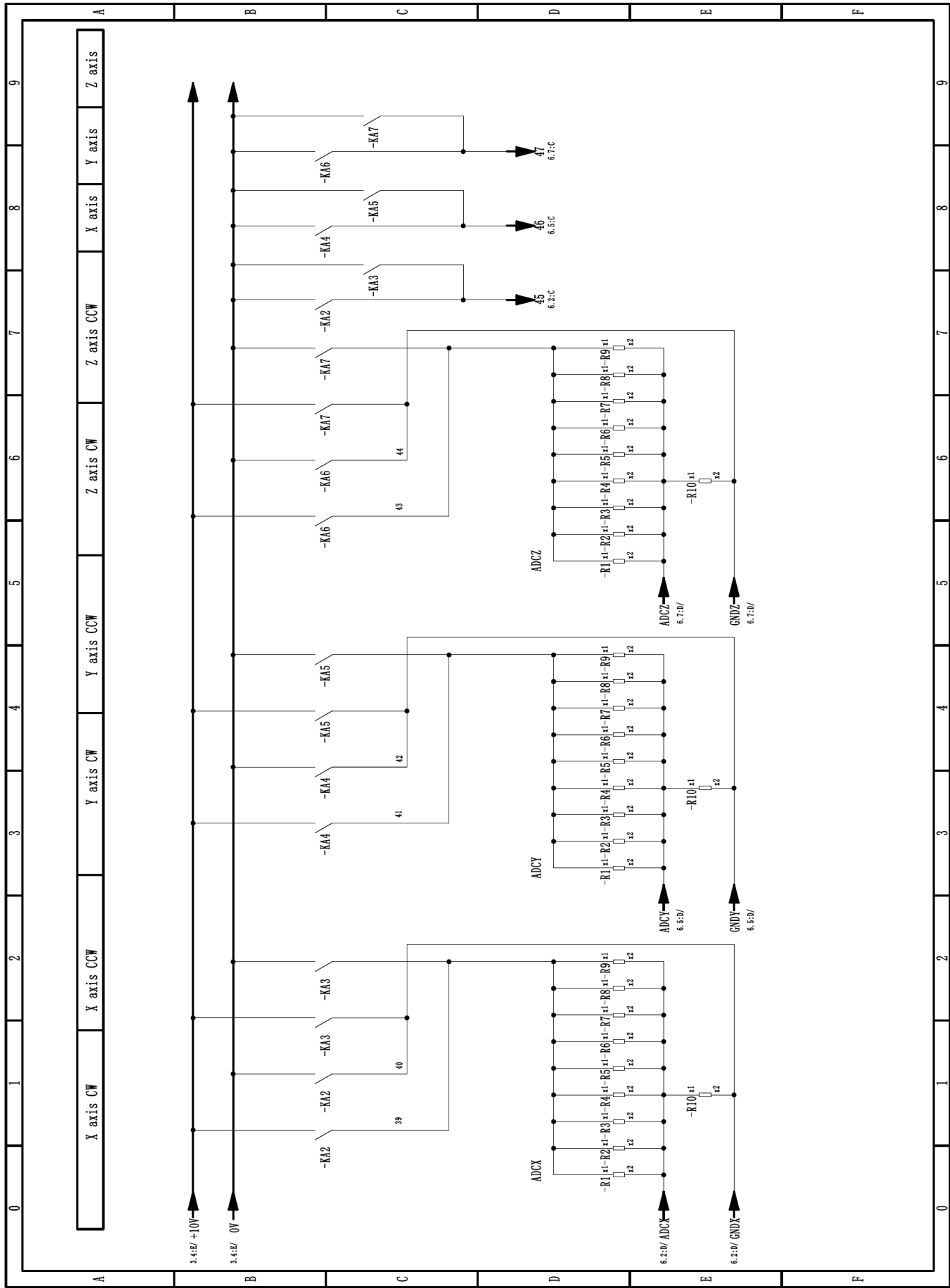
Index No.	Part No.	Description	Size	Qty.
01	JM125-F-001	Coolant pump	400V-50HZ-90W	1
02	JM125-F-002	Connect Elbow		1
03	JM125-F-001	Hose		1
04	JM125-F-004	Nozzle		1
05	JM125-F-005	Valve		1
06	JM125-F-006	Extend Elbow		2
07	JM125-F-007	90° Joint		2
08	JM125-F-008	Connect Elbow		1

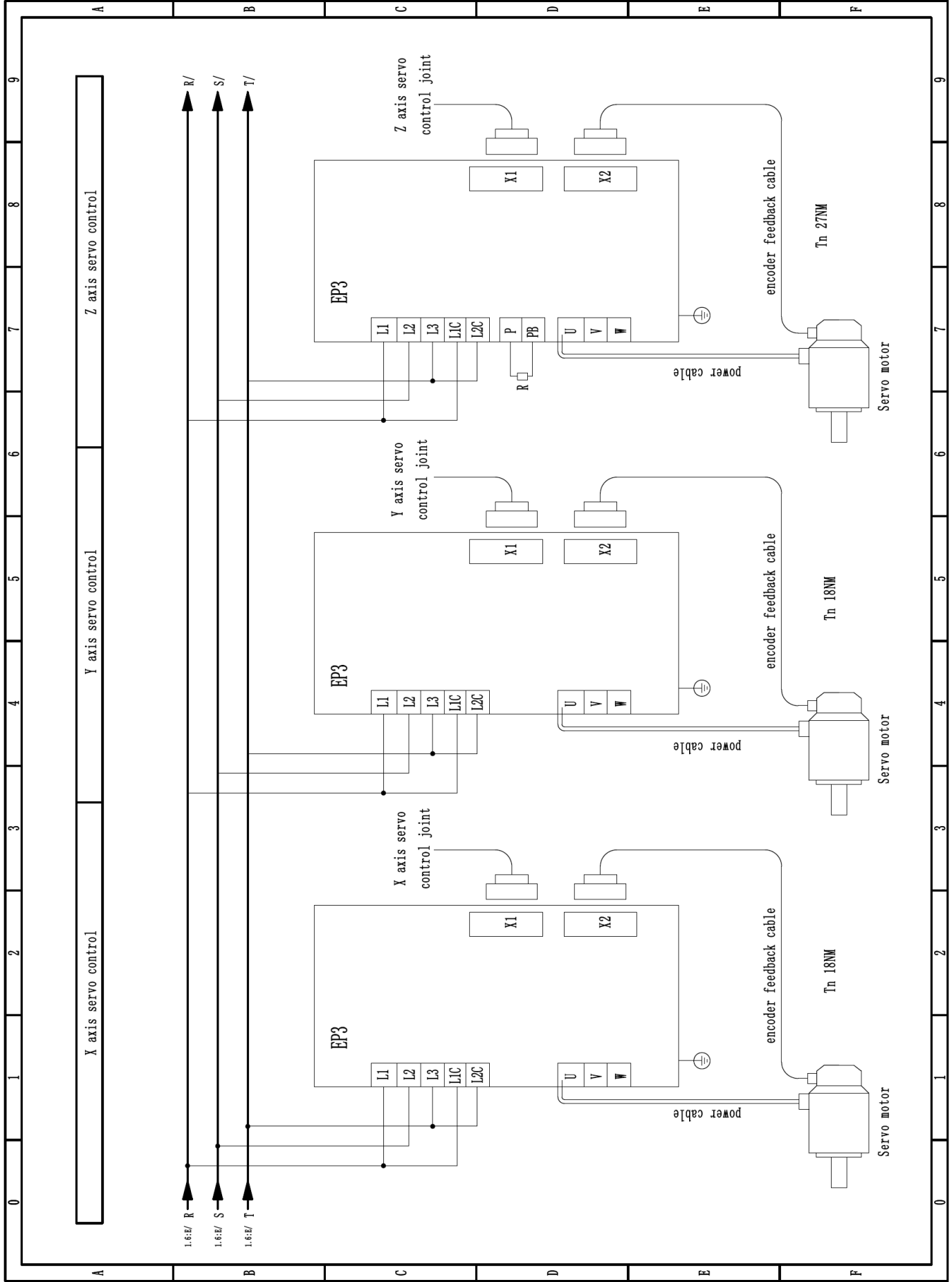
**Wiring Diagram for JUM-1469VXL Servo DRO
JUM-1469VXL Servo DRO 3~400V 50Hz**

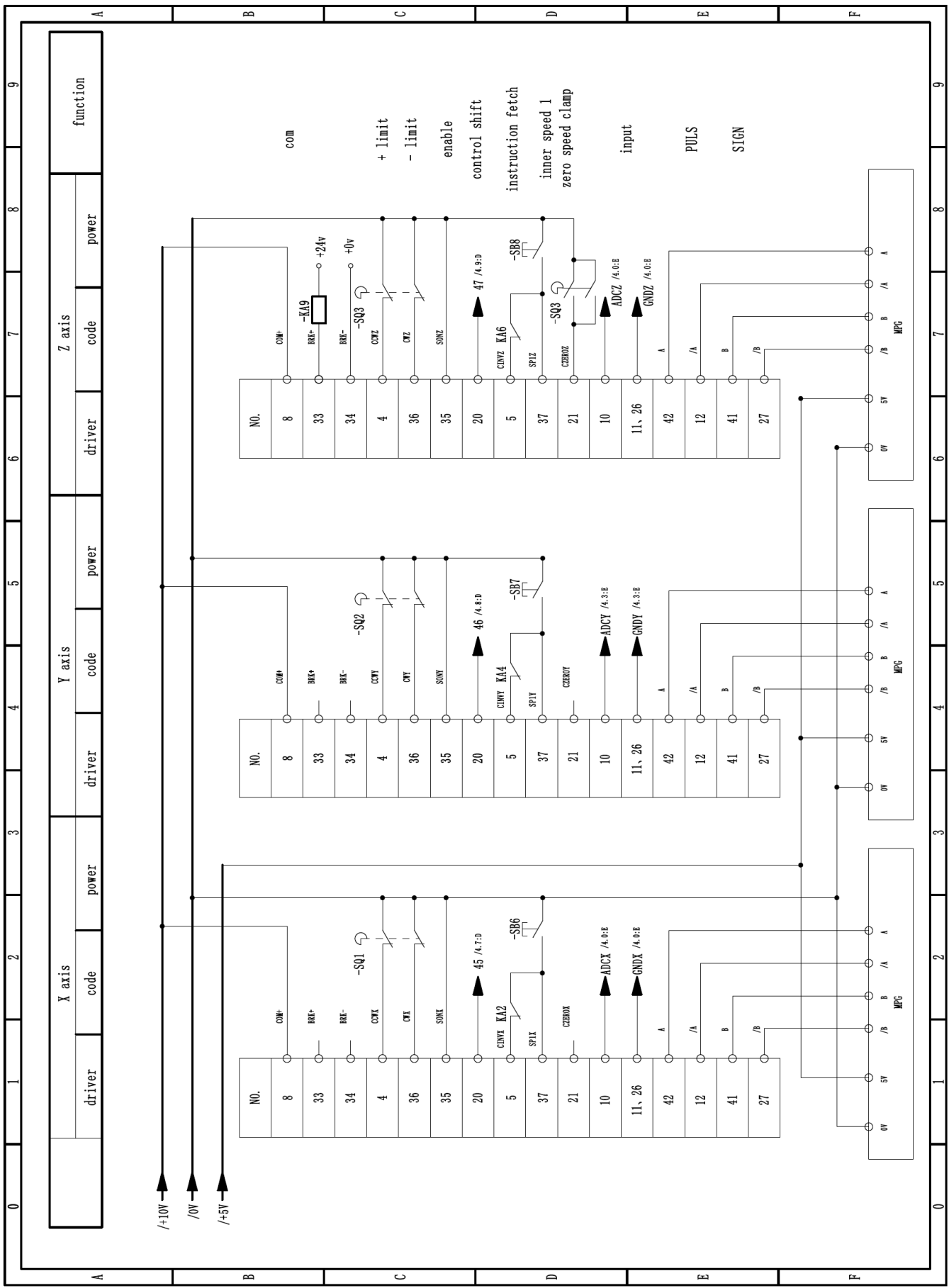












Packing List --Main machine, Accessories and tools

No.	Name	Detail	Qua	Rmk
1	Milling Machine		1	
2	Draw Bar		1	
3	End Face Milling Cutter Handle	7: 24 ISO40 Ø32	1	
4	Double-Ended Wrench	12x14	1	
5	Double-Ended Wrench	22x24	1	
6	Allen Wrench	5	1	
7	Allen Wrench	8	1	
8	Allen Wrench	10	1	
9	Operation Manual		1	
10	Certificate Of Quality		1	
11	Packing List		1	