

OPERATING MANUAL

HEALTH AND SAFETY GUIDANCE NOTES MODEL: E3C



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VERSION: 1

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1. Safety Regulations

Read this manual thoroughly before using the machine.

1.1 General safety rules

1.1.1 Operating safety precautions

- * The operator must be a technician who is trained in the operation and familiar with the manual.
- * Do study the safety information and practice safety first.
- * The operator should wear safety clothes, such as a helmet safety glass working clothes, safety shoes etc, which must conform to local industrial safety regulations.
- * Eye protection-eye protection facilities must be considered as optional instruments and shall be carefully selected, fitted and used. Compulsory wearing of spectacles with impact resistant lenses shall be a safety policy.
- * Before you start a machine, be sure you know what is going happen.
- * Be sure you know how to stop the machine before you start it.
- * Be alert for any bystanders or unauthorized person who may be in the area of the machine travel limits areas.

An area is not a hazard to the operator that his control station may be hazardous to an assistant or by standers.

- * The operator and person (s) performing maintenance must be mutually aware of each other's presence in the machine area.
- * Do not attempt to perform any cleaning, chip removal or workplace clamping while units are in motion.
- * Do not attempt to measure moving workplaces in the machine, always stop spindle and machine motion when measuring.
- * Do not wear gloves and any hand covering while operating machine.
The operators need wear gloves and safety shoos while leading and unloading.
- * Long hair should be covered with a protective cover such as a hair net.
- * Never take depth of cuts beyond machine's capability.
- * Make sure power has been turned off when machine is unused for sometime.
- * Due to these potential dangers inherent in a machine tool, protective guards, safety design features and warning signs are utilized. For maximum personal safety it is imperative that all operators, maintenance personnel, observers, and all other that could be exposed to inherent machine hazards shall be made fully aware of potential dangers, and are thoroughly instructed in the safety precautions they must follow to avoid those dangers. It is essential that persons required to become involved with the machine are properly trained and have the required knowledge and skill to perform their respective functions.

- * If you are assigned as an assistant for any reason, both the assistant and the operator have the responsibility of deciding whom will be in command of the machine and its controls. Shall only one person controls the machine. Anyone else should stand clearly and be visible to the person who is assigned to operate the machine controls.

1.1.2 Safety for tool use

- * This manual is provided with machine. The user should have the manual available for the personnel working with this machine tool.
- * User must have available adequate lifting facilities capable of lifting within the safe load limits, also appropriate slings and hitches.
- * Do not use broken, chipped or defective tools.
- * Be aware of conditions that may be a fire hazard, such as volatile liquids and machining materials with low fire point.
- * Do not clean a machine with an air hose. Flying chips can cause personal injury or damage to machine.
- * Do not use cutters, wrenches, or other tools that do not fit properly.
- * Do not apply wrenches to moving work or parts.
- * Do not cutting Mg material.

Materials recommend being use for the machine as following:

1. Steel
2. Iron
3. Casting iron
4. Aluminum alloys
5. Copper alloys.

Note: Other materials should be selected carefully by operators.

- * The coolant fluid shall below flash point.

1.1.3 Machine operator's precautions

- * Guards and shields are to be in place at all times.
- * Be sure that all protective guards are in place before the machine is started.
- * During maintenance or lubrication, the machine should be taken out of service.
- * Do not attempt to use the machine beyond its designated capabilities.
- * Always supports the work piece as necessary using chucks, steadies and centers.
- * Never place hand on chuck or work piece to stop rotation of the spindle.
- * Make sure power has been turned off when machine is unused for sometime.

- * Never remove protection for even a short time when operating the machine.
- * Be sure the work piece is mounted securely in the table.
- * Do not attempt to adjust a tool while the machine is running.
- * Do not attempt to brake or slow down moving machine parts with your hands or makeshift devices.

1.1.4 Environmental safety

- * This machine is inadequate for explosive environment.
- * Keep the immediate area tidy. Avoid slippery floors, remove debris, and remove obstacles, remove chips, etc.
- * Remember that your work area may change during the day as material is delivered to and removed from your machine area. Be alert for pinch point and work hazard areas created by workplace storage.

1.2 Danger areas of machine

In general speaking, the specific risks of the machine come from the rotating cutting tool, which is mounted, on the spindle and the motor drives it. However, a table guard is provided and installed on the lower part of the head to reduce the risk.



The area inside the sheet metal guard is a danger area.

Fig. 1-1

2. Description of the machine

2.1 General description

- (1) This machine is designed with theoretical calculation to comply with the stress requirements especially for spindle rigidity, transmission belt strength, X, Y and Z Axes transmission stress, safety window glass stress coolant system, lubrication system, and etc.
- (2) Materials used for this machine had been considered for properly corrosion, wearing, and life time to avoid faults on machine.
- (3) The air system designed inciting pressure; component supports are in compliance with the design instructions.

2.2 Out looking, main units, and operator's position.

2.2.1 Names of machine parts

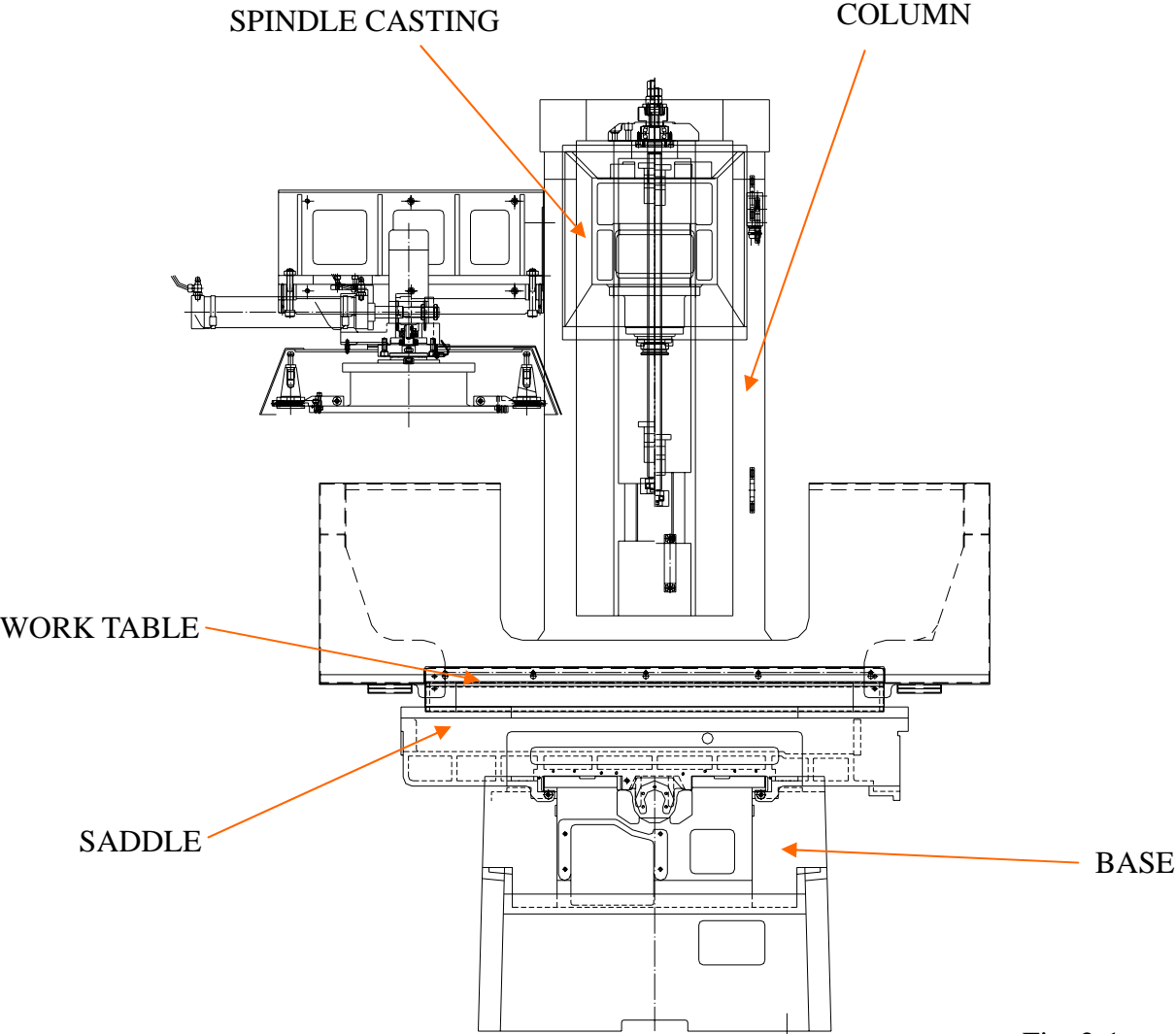


Fig. 2-1

2.2.2 Operator's position

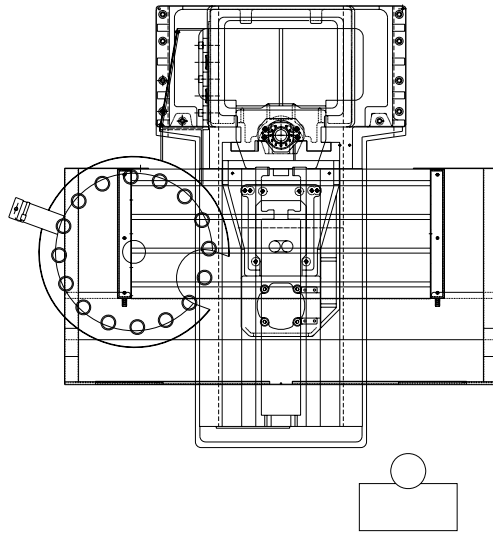


Fig. 2-2

2.2.3 Noise Level

- (1) The noise test is carried out in compliance with ISO 11202:1996.
- (2) No load
 - a. A-weighted sound pressure level at operator's
 $L_{A,eq} = 72 \text{ dB (A)}$
 - b. A-weighted sound power level
 $L_{w,eq} = 86.84 \text{ dB (A)}$
- (3) Load
 - a. A-weighted sound pressure level at operator's
 $L_{A,eq} = 78.5 \text{ dB (A)}$
 - b. A-weighted sound power level
 $L_{w,eq} = 91.18 \text{ dB (A)}$

2.2.4 Spindle nose detail

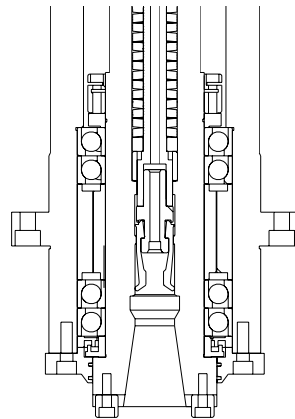


Fig. 2-3

2.3 Machine specifications

2.3.1 Specification

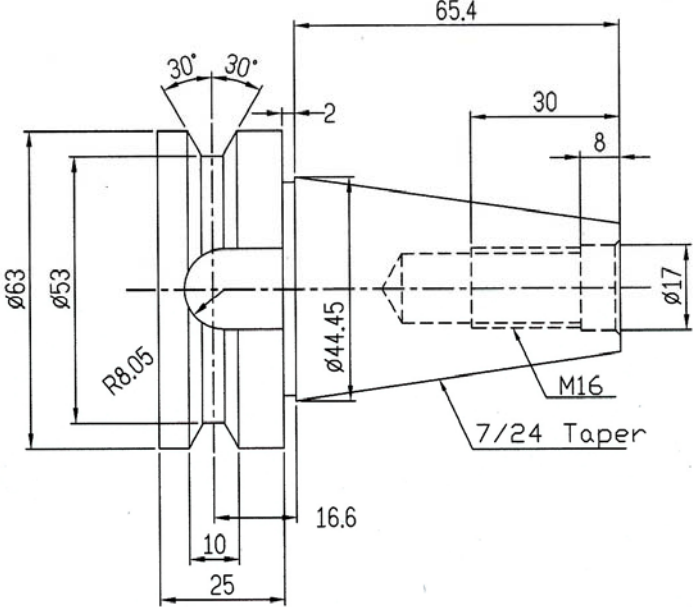
Work table	1040 x 405mm (41" x 16")
Table T-slots (WxN)	18mm (0.71") × 4
Table load max	350kgs (770lbs)
X axis travel	860mm (33.9")
Y axis travel	410mm (16.1")
Z axis travel	510mm (20.1")
Spindle nose to table surface	105-615mm (4.1"~24.2")
Spindle center to column	450mm (17.7")
Table surface to floor	1010 mm (39.7")
Spindle taper	BT or CAT #40
Spindle speed	6000rpm
Spindle motor	7.5HP
Spindle belt	8YU belt
Cutting feed	5M/min
X、Y axis rapid feed	8M/min
Z Axis rapid feed	8000 mm (320ipm)/min
Ball-screw diameter	Ø32mm (1.26")
Pitch of ball-screw	5mm (0.20")
ATC type	Armless (Arm type is opt.)
Tool storage capacity	12 tools
Max. tool diameter	Ø90mm (3.54")
Max. tool Weight	7kgs (15.4lbs)
Positioning accuracy	±0.01mm (±0.0004")
Repeatability accuracy	±0.005mm (±0.0002")
Weight (Approx)	2,800kgs (6,160lbs)
Floor space (LxWxH)	2,500x2,150x2,280 mm

※ We reserve the right to change design, color or specification without notice.

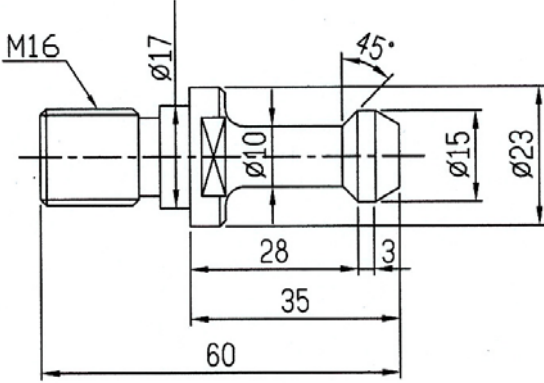
2.3.2 Tool holder detail drawing

2.3.2.1 BT 40

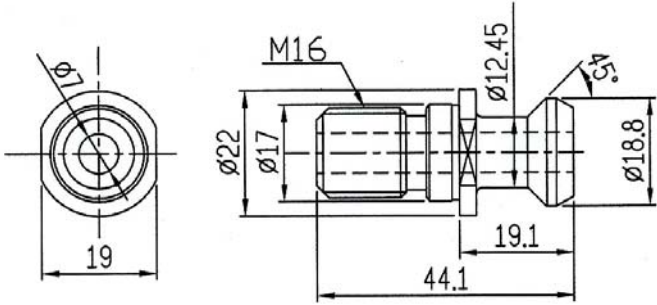
(1) Shank : BT40



(2) Pull stud : P40T-45°

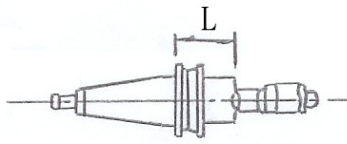


(3) Pull stud- Coolant through spindle / C.T.S. : MAZAK-BT40

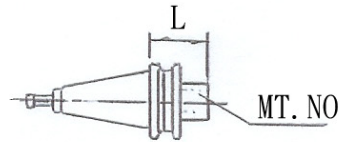


2.3.3 BT-40 Tooling system

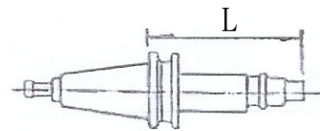
Face mill arbor



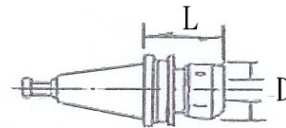
Morse taper sleeve



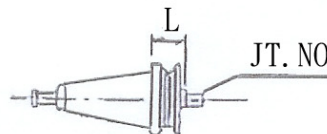
Auto taper



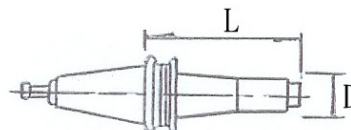
Milling chuck



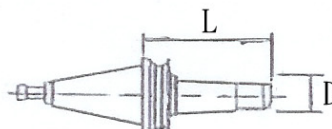
Jacobs taper adaptor



Boring bar
(Square tool type)




Boring bar
(Cartridge type)




2.3.4 Table of G commands

G code system		Group	Function
2	3		
■ G00	■ G00	01	Positioning
■ G01	■ G01	01	Linear interpolation
G02	G02	01	Circular interpolation (clockwise)
G03	G03	01	Circular interpolation (counterclockwise)
G04	G04	00	Dwell
G09	G09	00	Exact stop
G10	G10	00	Program parameter input
G11	G11	00	Program parameter input mode cancel
▣ G14	▣ G14	18	*Balance cut OFF
G15	G15	18	*Balance cut ON
■ G17	■ G17	02	Plane selection Xp-Yy
■ G18	■ G18	02	Plane selection Zp-Xy
■ G19	■ G19	02	Plane selection Yp-Zy
■ G20	■ G20	06	Inch command
■ G21	■ G21	06	Metric command
G22	G22	04	Barrier check ON
▣ G23	▣ G23	04	Barrier check OFF
G27	G27	00	Reference point return check
G28	G28	00	Reference point return
G29	G29	00	Return from reference point
G30	G30	00	2 nd reference point return
G30.1	G30.1	00	Tool position return 1
G30.2	G30.2	00	Tool position return 2
G30.3	G30.3	00	Tool position return 3
G30.4	G30.4	00	Tool position return 4
G30.5	G30.5	00	Tool position return 5
G31	G31	00	Skip function
G31.1	G31.1	00	Multistage skip function 1
G31.2	G31.2	00	Multistage skip function 2
G31.3	G31.3	00	Multistage skip function 3
G32	G33	01	Thread cutting
G34	G34	01	Variable lead thread cutting
G37	G37	00	Automatic tool length measurement
▣ G40	▣ G40	07	Tool nose R compensation cancel
G41	G41	07	Tool nose R compensation left
G42	G42	07	Tool nose R compensation right
G46	G46	07	Tool nose R compensation (automatic selection of direction) ON
G50	G92	00	Coordinate system setting/spindle clamp speed setting
G52	G52	00	Local coordinate system setting

G code system		Group	Function
2	3		
G53	G53	00	Machine coordinate system selection
■ G54	■ G54	12	Work coordinate system 1 selection
G55	G55	12	Work coordinate system 2 selection
G56	G56	12	Work coordinate system 3 selection
G57	G57	12	Work coordinate system 4 selection
G58	G58	12	Work coordinate system 5 selection
G59	G59	12	Work coordinate system 6 selection
G61	G61	13	Exact stop check mode
G62	G62	13	Automatic corner override
G63	G63	13	Tapping mode
■ G64	■ G64	13	Cutting mode
G65	G65	00	Macro call
G66	G66	14	Marco modal call A
G66.1	G66.1	14	Marco modal call cancel
■ G67	■ G67	14	Marco modal call cancel
G70	G70	09	Finishing cycle
G71	G71	09	Straight turning cycle
G72	G72	09	Face rough machining cycle
G73	G73	09	Stock removal in rough machining cycle
G74	G74	09	Face cut-off cycle
G75	G75	09	Straight turning cycle
G76	G76	09	Multiple repetitive thread cutting cycle
■ G80	■ G80	09	Hole machining cycle cancel
G83	G83	09	Deep hole drilling cycle 1 (Z axis)
G79	G83.2	09	Deep hole drilling cycle 2
G84	G84	09	Tapping cycle (Z axis)
G85	G85	09	Boring cycle (Z axis)
G87	G87	09	Deep hole drilling cycle (X axis)
G88	G88	09	Tapping cycle (X axis)
G89	G89	09	Boring cycle (X axis)
G90	G77	09	Straight turning canned cycle
G92	G78	09	Thread cutting canned cycle
G94	G79	09	Face turning canned cycle
■ G96	■ G96	17	Constant peripheral speed control
■ G97	■ G97	17	Constant peripheral speed control cancel
■ G98	■ G94	05	Asynchronous feed
■ G99	■ G95	05	Synchronous feed
-	■ G90	03	Absolute value command
-	■ G91	03	Incremental value command
-	■ G98	10	Hole machining cycle initial return
-	G99	10	Hole machining cycle reference point return

Note 1: The “” mark denotes a G code which is selected within each group when the power is switched on or when resetting that initializes the modal commands is executed.

Note 2: The”  “mark denotes a G code for which a parameter can be selected as the initial status when the power is switched on or when resetting that initializes the modal commands is executed. Note that the inch/metric conversion is selectable only when the power is switched on.

Note 3: An asterisk (*) indicates a function which is provided to a multi-system only.

2.3.5 Constraints on materials

Any material will generate dust or other substances harmful to health and pollute the environment shall be forbidden.

2.3.6 Working space required

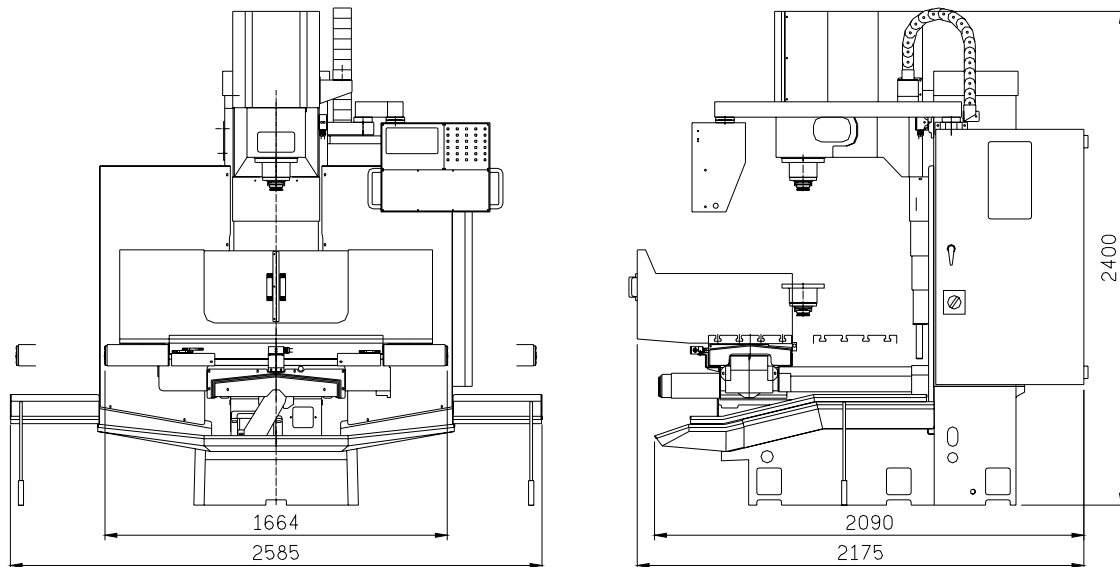


Fig. 2-4

2.3.7 Requirements of operators and servicemen

It is so designed that only a skilled technician is allowed to operate this machine, otherwise he must be trained until knowing how to operate correctly and safely. Qualified technicians shall carry out the electrical maintenance works only.

2.3.8 Requirements of circumstance

It is so designed that this machine cannot be used in the potential explosive environment. Generally, this machine will be installed on the following conditions:

- (1) Ambient temperature: 5-40°
- (2) Atmosphere: Free from excessive dust, acid fume, corrosive gases and salt.
- (3) Avoid exposing to abnormal vibration.
- (4) Avoid exposing to direct sunlight or heat rays, which can change environmental temperature.
- (5) Have to connect to earth.
- (6) Relative humidity: 30~95% (without condensation)
- (7) Source frequency: nominal frequency $\pm 1\%$
- (8) Supply voltage: nominal supply voltage $\pm 10\%$

3. Preparation for installation

3.1 Requirements of foundation

With the common usage of tungsten carbide cutting tools nowadays, heavy cutting and quicker spindle speed are therefore reinforced. This may cause the vibration easily. In order to ascertain the best cutting condition, it is necessary to build a sound & good floor basis. (Please refer to following figure)

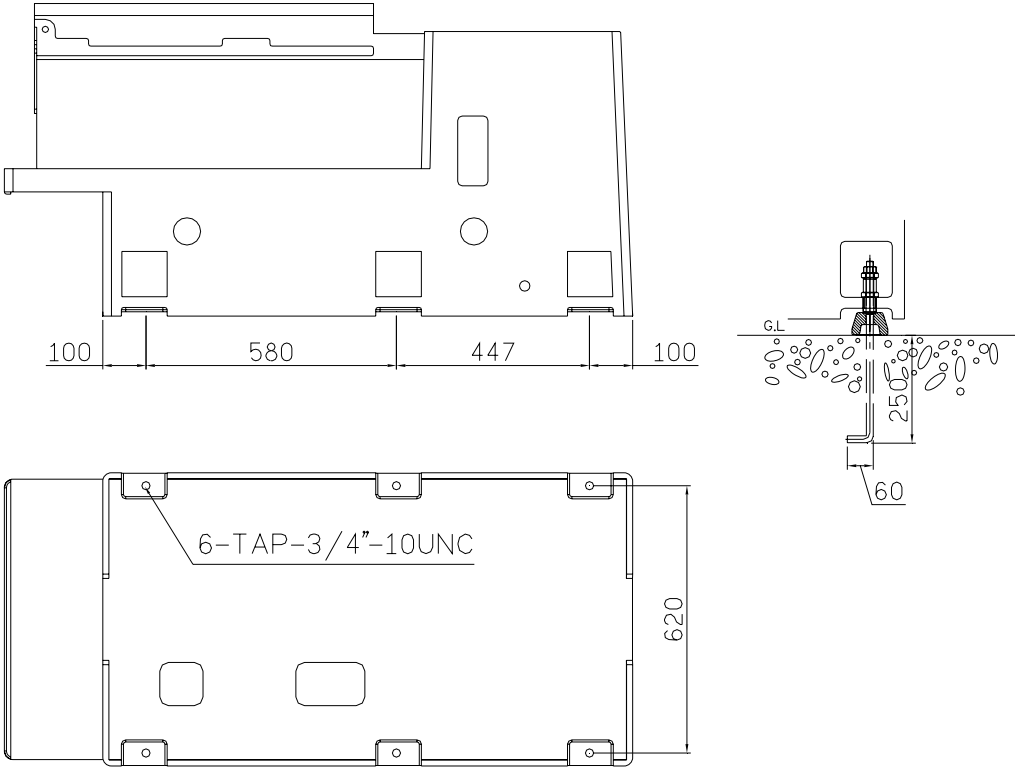


Fig. 3-1

4. Transportation and installation

4.1 Shipping chest

This chest is used to pack the machine for shipment.

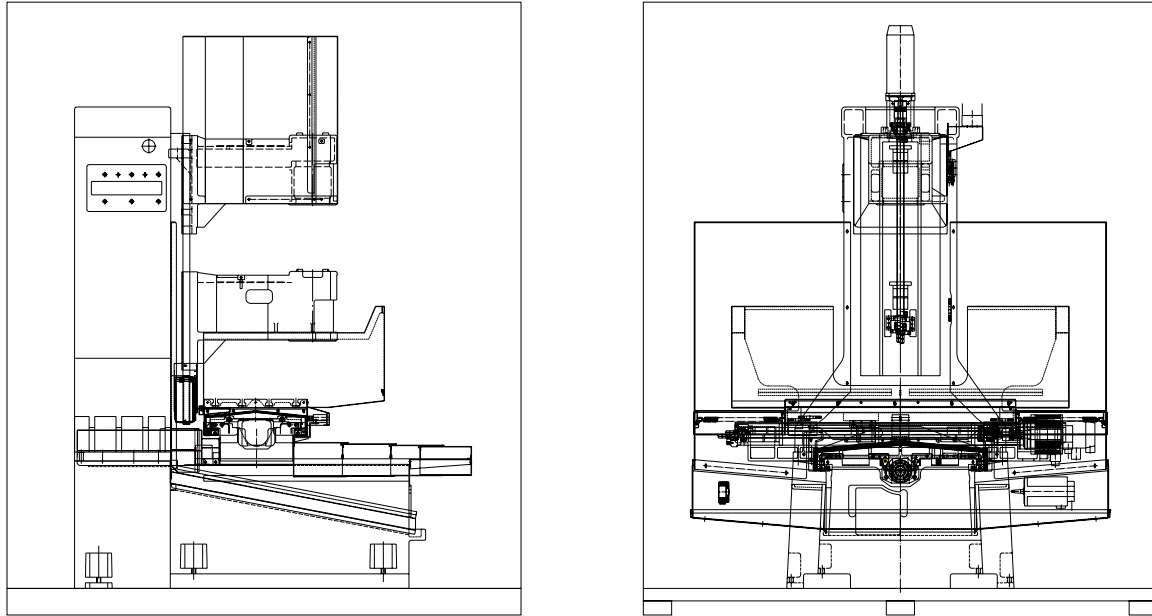


Fig. 4-1

4.2 Notices for transportation

- (1) The machine will be moved and bumped caused by braking, turning corner and shaking when the truck moves on the road. Therefore, the machine should be tightening in secure and balanced condition before transporting.
- (2) This machine is a package unit, all the parts should be fixed firmly to link up with the machine before shifting.
- (3) Make sure that the machine is completely fasten with the bottom rack of the chest or carrying rack by means of bolts.
- (4) To avoid coolant and oil leakage and the machine rusting because of moisture during transporting, they shall be drained out completely prior to shifting. However required amounts of them shall be refilled before starting up.
- (5) For the interests of machine safety and personal safety, the hoist driver shall be qualified with a certificate.
- (6) Sunshine and raindrop shall be avoided during transporting.

4.3 Notices for open the shipping chest

- (1) The chest shall be opened by professional personnel with specific tools.
- (2) The top cover shall be dismantled first and second t the side walls.
- (3) Don't open the chest in case of the workers with bad mood.
- (4) After it is uncovered, people who are not professional technician for trial run and service shall be prohibited to wire the power, trial run the machine, dismantle or any else relevant.
- (5) Please refer to the local regulation of environment protection to treat the scraps after the chest was broken.

4.4 Requirement of transportation equipment

4.4.1 Methods of transport

- (1) Machine net weight: approx. 3100 kg.
- (2) Prior to unpacking, transport may be using a forklift.
- (3) After packing, transport may be made by hoisting with a reinforced cable.
 - a. Use the forklift of fork to lift an about 10 cm high. Then put the riser at the bottom.
 - b. Drive the fork to the side of machine and insert the forklift slowly into the space of the bottom. After the base is put on the forklift completely, lift the machine slowly.

NOTE: Must not lift the machine at the side of machine directly, which will overturn the machine.

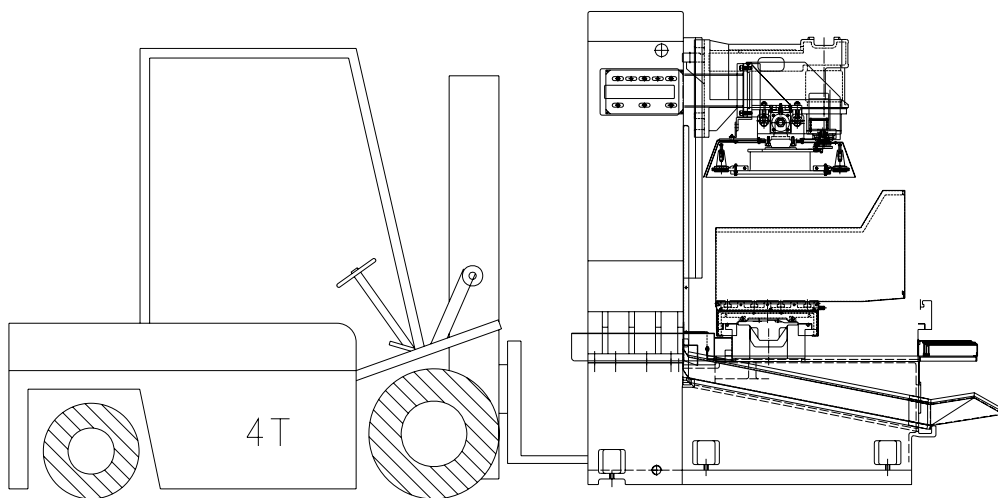


Fig. 4-2

Remarks:

- (1) Always ensures capacity of equipment is adequate before attempting to lift.
- (2) When the machine is being hoisted, keep the personnel after.
- (3) To hoist the unpacked case by reinforced cable, the motion shall that observe strictly the instruction appeared on the side of the wooden case.
- (4) Keep the worktable and saddle in the proper positions so as to keep the machine balance.
- (5) Do not hoist the machine too high. The best position is to keep the machine base approximately 10 cm from the ground.
- (6) Only an authorized forklift or crane operator is allowed to transport the machine.

4.4.2 Cautions for unpacking

- (1) To transport the machine, it is necessary to support the machine with the rated case or pallet to avoid moisture. In case of damage by moistening, please contact our agent or the transported.
- (2) After unpacking, check and see if all tools and accessories are intact, otherwise, please contact our agent.
- (3) After unpacking, do not move the sliding surfaces and worktable as long as the rustproof oil on them are cleaned off and followed with the lubrication.
- (4) Before the cleaning starts, the sliding protective pieces must be dismantled, and all sliding surface setting levers, loosened. When the rustproof oil is removed, proper amount of lubricant should be injected onto various sliding surfaces. Then move the sliding surfaces for final cleansing and lubrication.
- (5) Do not remove the oil brushes in the process of cleaning.
- (6) Do not use gasoline or any other inflammable oil cleaner.

4.5 Notices for installation

E320 is a precession CNC milling machine, any work related to this machine shall only be by service engineers or qualified technicians. This manual shall be prior to use it.

4.5.1 Work environment

This machine is inadequate for any explosive environment.

4.5.2 Power supply installation

Using a phase-sequence detector to check the correctness of phase sequence (L1, L2, and L3).

4.5.3 Leveling adjustment

- (1) To keep the accuracy and to maintain the good condition of lifetime of this machine, leveling adjustment is one of the important factors. To show the excellent precision and quality of this machine, please carry out leveling accordingly after installation.
- (2) First, a flat ground being able to burden the weight of machine shall be prepared. After positioning the machine on the prepared foundation, then install the machine according to the instruction manual. Roughly leveling the machine by adjusting the leveling bolts at the bottom of machine base. Moving worktable to the X and Y axis middle position place an accurate level 150mm length with a minimum scale of 0.02mm/M (0.0008"/40") on the worktable. Then turning the leveling bolts to make the deviation within 0.02mm/M (0.0008"/40").
- (3) If vibration occurs due to ill horizontality or cutting scared defective condition occurs, leveling shall be re-tuning again.
- (4) Within 2 or 3 days after installing completed, the horizontal should be re-checked before operating. Under normal working condition, the horizontal shall be examined in a period of half year initially and then quarterly in the subsequent years.

5. Preparation for trial runs

5.1 Cleaning

All machine surfaces are covered with rust preservative, which must be thoroughly cleaned before moving any parts of the machine. Only mild solvent and soft rags must be used for cleaning.

NOTE: Never use lacquer, thinner, gasoline or other inflammable as a cleaning fluid.

5.2 Visible inspection

At first, removing any stopper used to prevent the machine from movement in transportation (e.g. the doorplates). Check if the machine is rusted and damaged as well as shape transformed, broken, etc. Any fault shall be removed prior to trial run.

5.3 Fluids

Lubricant and coolant shall be filled to designated quantities first. Referring to section 7.5 to perform maintenance to maintain the machine for operating in good condition.

5.4 Pneumatic piping

The pneumatic power system, all have to do is to pay attention toward the cleanness of air source and then connect it to the machine.

Any unclean pneumatic piping will be a key point to damage the filter-regulator lubricator unit and the pneumatic system leading therefore to deteriorate producing efficiency.

5.5 Electrical earthing system

Make sure that a stable power voltage as well as the frequency for NC unit wires the machine. The machine should be earthen properly to protect the NC unit from any electric shock.

A: Connecting terminal.
L1,L2,L3: Power cables above 5.5 mm^2
PE: Protective earthing cable above 5.5 mm^2

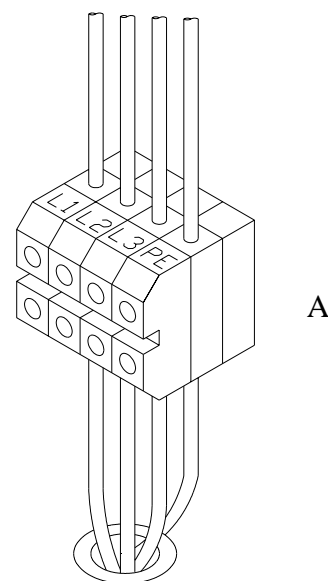


Fig. 5-1

6. Lubrication, Air pressure and coolant

6.1 Spindle

Bearings in the spindle are forced lubricated the assembling by grease (KLEUBER ISO FLEX-NBU 15).
 This high-speed grease is low-temperature and long-term grease, especially for High-speed rolling bearings or high load.
 When the machine does not be operated for a long time (morn than 6 days) ,you Should perform the spindle at low speed about one hour before the operation.

6.2 Pneumatic power system

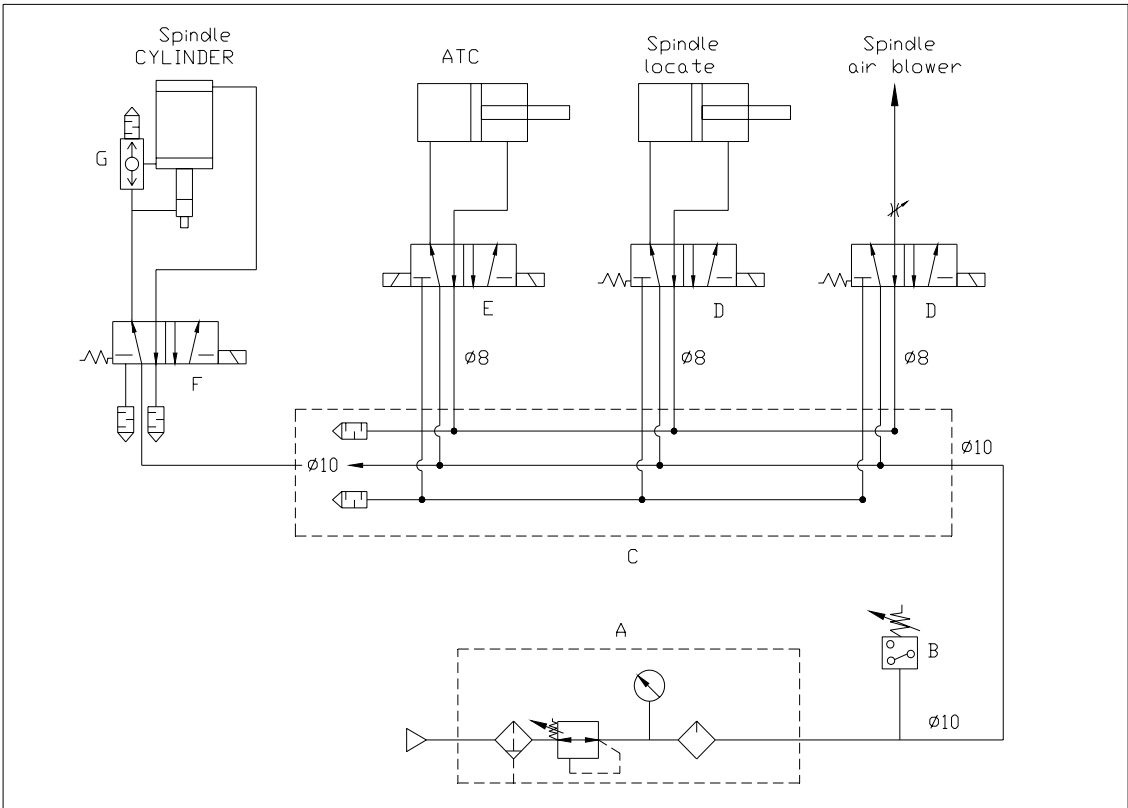


Figure 6.1 Scheme of pneumatic

A	050FRL	Air Service Equipment	1
B	KP1	Pressure control	1
C	BN-260-3TN	End subbase	1
D	BN-2600-4E1/110V	Solenoid valve	2
E	BN-2600-4E2/110V	Solenoid valve	1
F	BN-3000-4E1/110V	Solenoid valve	1
G	OV-03	Pressure discharge	1
H	PSL-02	Silencer valve	4
I	AWG-03	Pressure control switch	1

6.3 Adjustment is air pressure

The air pressure is adjusted normally at 5-7 kgf/cm².

6.4 Coolant replacement

The sump locates in base of the machine. The volume of the sump is 160 liters.

1. Turn off the power source.
2. The dirty coolant is drained through the drain plug on the back of the machine base.
3. Supply fresh coolant through the filter into the sump.
coolant volume (table guard) : 84 liters.
coolant volume (full enclosure) : 249 liters.

Table of coolant usage

Material	Recommendation	PERIOD
Ferrous materials	ARAL SAROL 345	4 month
Cast iron	ARAL MULTROL 820	
Else materials	Any suitable coolant. Do not use low flash point Coolant. Adequate coolant with little or no harm to health.	

Notice:

The old coolant handling should comply with the local usage.

7. Adjustment

As a result of long-term operation between the sliding surface and gibs will create a clearance. Therefore the gibs must be adjusted to upkeep the precision of sliding surfaces.

7.1 Adjustment of work table gibs

The gibs are attached onto between the saddle seat and worktable dovetail.

- (1) Clean the slide way and add the lubricant.
- (2) Use a screwdriver and spanner adjusts the gib screw and nut (D) on both sides of saddle seat.
- (3) Replace the excessive worn-out gib whenever necessary.

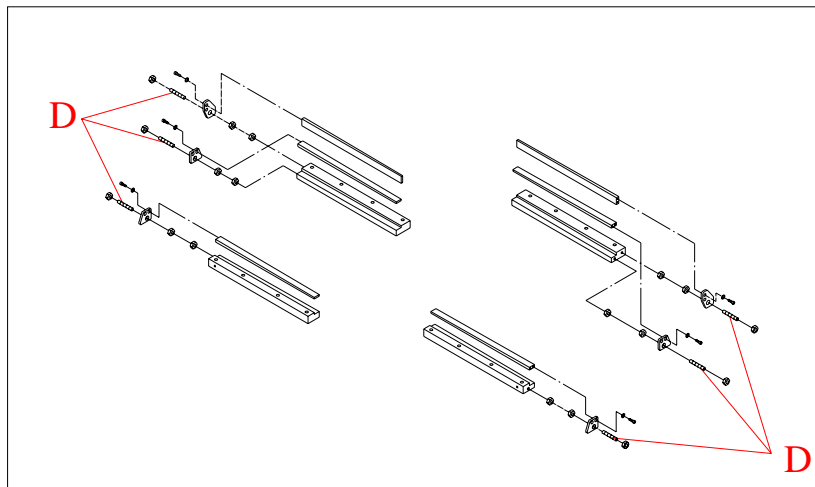


Fig. 7-1

7.2 Adjustment of saddle gib

- (1) Move the saddle to the front of base.
- (2) Clean the slide way and add the lubricant.
- (3) Use screwdriver to adjust the gib screw (E) of the saddle.
- (4) Employ the same methods to adjust the work table gib.

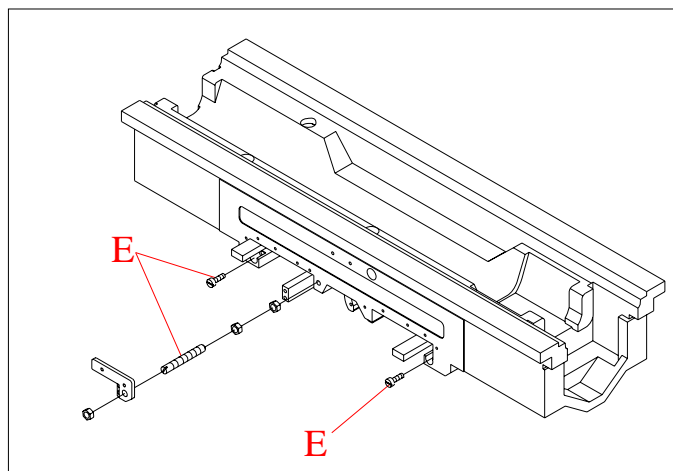


Fig. 7-2

7.3 Adjustment of elevating gib

The elevating gib is attached to the precision of elevating and column dovetail. The adjustment can be performed as follows:

- (1) Clean the slide way and add the lubricant.
- (2) Use a screwdriver to adjust the gib screw (R) of the elevating.
- (3) Employ the same methods to adjust the word table gib.

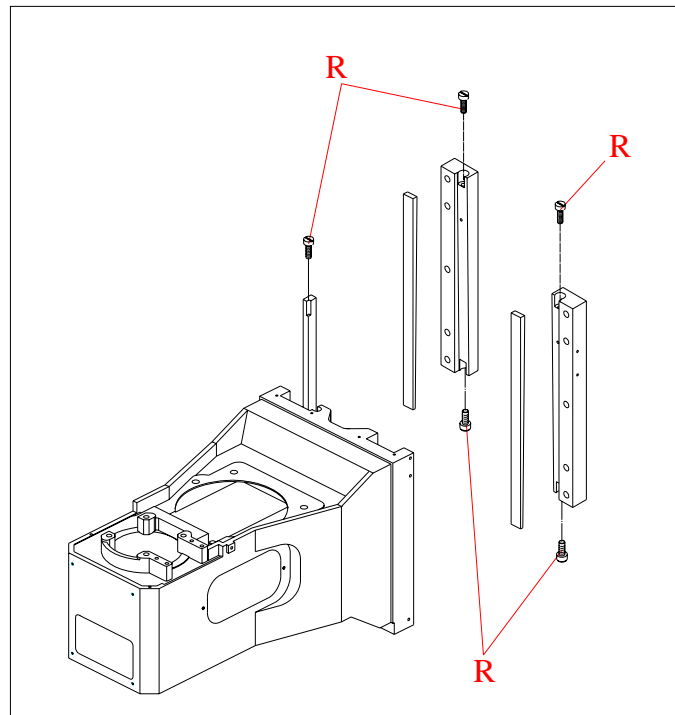


Fig. 7-3

8. Service and maintenance

8.1 Belt maintenance

- (1) When the abnormal belt is discovered; please exchange or adjust the belt immediately. Because of tightness, looseness, transforming and friction will make noise and have an effect on belts lifetime.
- (2) Belt transmission should be examined the status of transmitting, noise and efficiency etc. to prevent abnormal status occurred.
- (3) In case of exchange, the sharp tools are avoided to use the belt may be damaged to influence transmitting efficiency and life time of belt.
- (4) In case of machine stops operating more than 6 months, the belt should be loosened to prevent fatigue from long-time tension.

8.2 Air pressure system maintenance

- (1) The pressure of compressed air source is ordinary 5-7 kg/cm².
- (2) Make sure to install the filter-regulator-lubricator module. (The filter should be cleaned up and lubricant added in the fixing period) In order to keep the pneumatic parts work smoothly and life lasting longer.

8.3 Lubricant system maintenance

Eyes examine the pipe loop way at particular period (especially over one year). In order to prevent pipe loop fallen leaked, broken, stress fold. Blocked all lubricant parts should be lubricated sufficiently.

8.4 Cutting coolant system maintenance

- (1) The purpose to use coolant is to reduce thermal transformation while processing, also, the normal accuracy of workplace can be kept and the tool life time increased. So that the coolant can be selected properly depending on the sort of materials of workplace.
- (2) Dependence on the degree of pollution, the coolant should be changed regularly and avoids physical damage of worker and influence the accurate precise of workplace. According to the tankard of environmental protection.
- (3) The polluted coolant should be treated by treatment system, before drained off. Be cautioned the polluted coolant is treated incorrect method when drained out. The human health and environment will be damaged.

8.5 Electricity maintenance

- (1) All wiring shall be examined damage by eyes at particular period.
- (2) Prevention outside substances more into the control case and operation case due to human omission. This will cause short-circuiting.

- (3) Check and confirm all L.S. signals at particular period.
- (4) Clean up ventilator filter and check all vent hold of electrical control box at particular period.
- (5) The rotating of main motor's cooling fan shall be confirmed.

8.6 Maintenance measures for critical safety devices

The critical safety devices are particularly relating to safety.

In order to give those device healthy operation conditions, it is necessary to perform maintenance procedure as per the following table.

Device	Description of Maintenance
E-Stop	Pushing the Emergency stop button after daily starting up according to Operator's Manual. A "NOT READY" message displayed on screen means E-stop is healthy; otherwise, it is faulty and shall have a service by qualified technician.
Main Power Switch	Checking the tightness of holder every half year, if it is loose it must be tightened. If the fixing screw between the holder and link wears, replacement shall be changed according to the specification on the electrical parts list.
Lubricant Tank	Lubricant must be filled if lubricant shortage message displayed on CRT.

8.7 Cleaning for chip

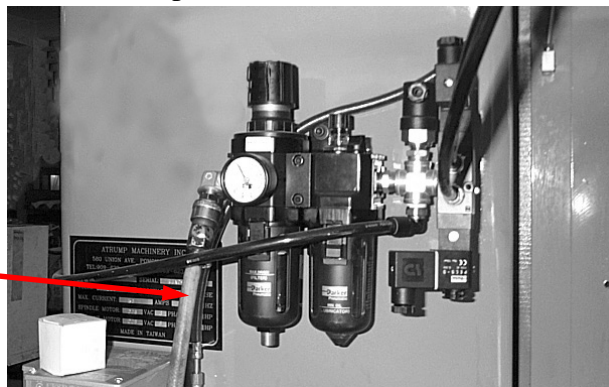
- (1) At first, open the door then turn off main power supply.
- (2) The operator should wear safety shoes, helmet; safety glove, safety glassed and clothes.
- (3) Use besom, rags, vacuum, hairbrush and dustpan clean chip.

Note : Don't use air blowing clearing the chip.

8.8 Air filter regulator meter maintenance

When machine runs long time, the air pipe needs to be pulled out and make the pressure down to 0 for water vapor clear out.

Pull out the
air pipe.



9. Self service and dismantling

9.1 Maintenance precaution

When unit parts of this machine is fixed, the specific tool equipment are required. And only the experienced professional technician is allowed to repair machine.

In case unit parts out of order, as electricity controller, ball screw linear way, and so on. The unit parts can not be dismantled and fixed arbitrarily by you. You may contact our agencies if service needed.

9.2 Safety confirmation

Turn the main power off and set up warning signs at each side surrounding the achiever with 3 meters; if the machine is disassembled and fixed.

9.3 Requirements of replacement

For safety and keeping accurate quality and sort of unit parts should be used as the same as the original designed specification and manufacture brand, while exchanging or fixing needed.

9.4 Simply maintaining and dismantling each main parts unit

9.4.1 Spindle belt exchanging

- (1) Turn off the Main power
- (2) To take off the right side cover.
- (3) After clamping tool, the vacant space for (A) area will become bigger.
- (4) After loosen four screws (B), To push spindle motor(C) to front side.
- (5) After operator finsih the belt(D) changing, reference contrary steps to set up it

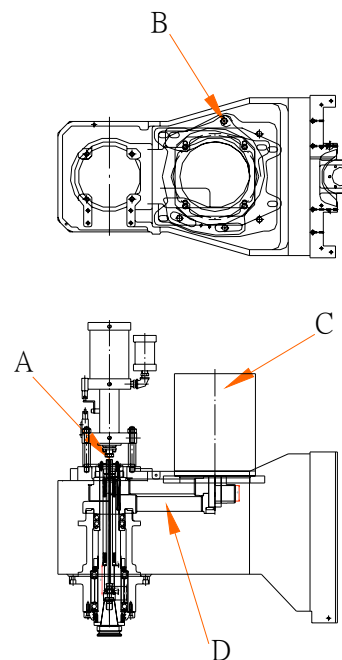


Fig. 9-1

※The machine w/- ATC magazine :

Changing belt will affect spindle orientation angle. So, the spindle orientation needs to be checked and adjusted after changing belt.

9.4.2 Coolant pump exchange

At first, remove wire and loosen the fixing bolts of coolant pump. Then take the unit off to exchange. Test for rotating confirmation action before operating.

9.5 Inspection and maintenance period list

9.5.1 Inspection

No	Item	Inspection detail	Period
1	Voice	In operation, checked to see if the machine were abnormal voice.	Daily
2	Vibration	In operation, checked to see if the machine were abnormal voice.	Daily
3	Temperature	After operating, checked to see if the head stock temperature were too high.	Daily
4	Motor	Checked to see if the spindle motor were run correct.	Daily
5	Lubrication	Checked to see if the lubrication oil were correct.	Weekly
6	Cleaning	Checked to see if the machine were cleaning.	Weekly
7	Button	Checked to see if the push button were acumen.	Monthly

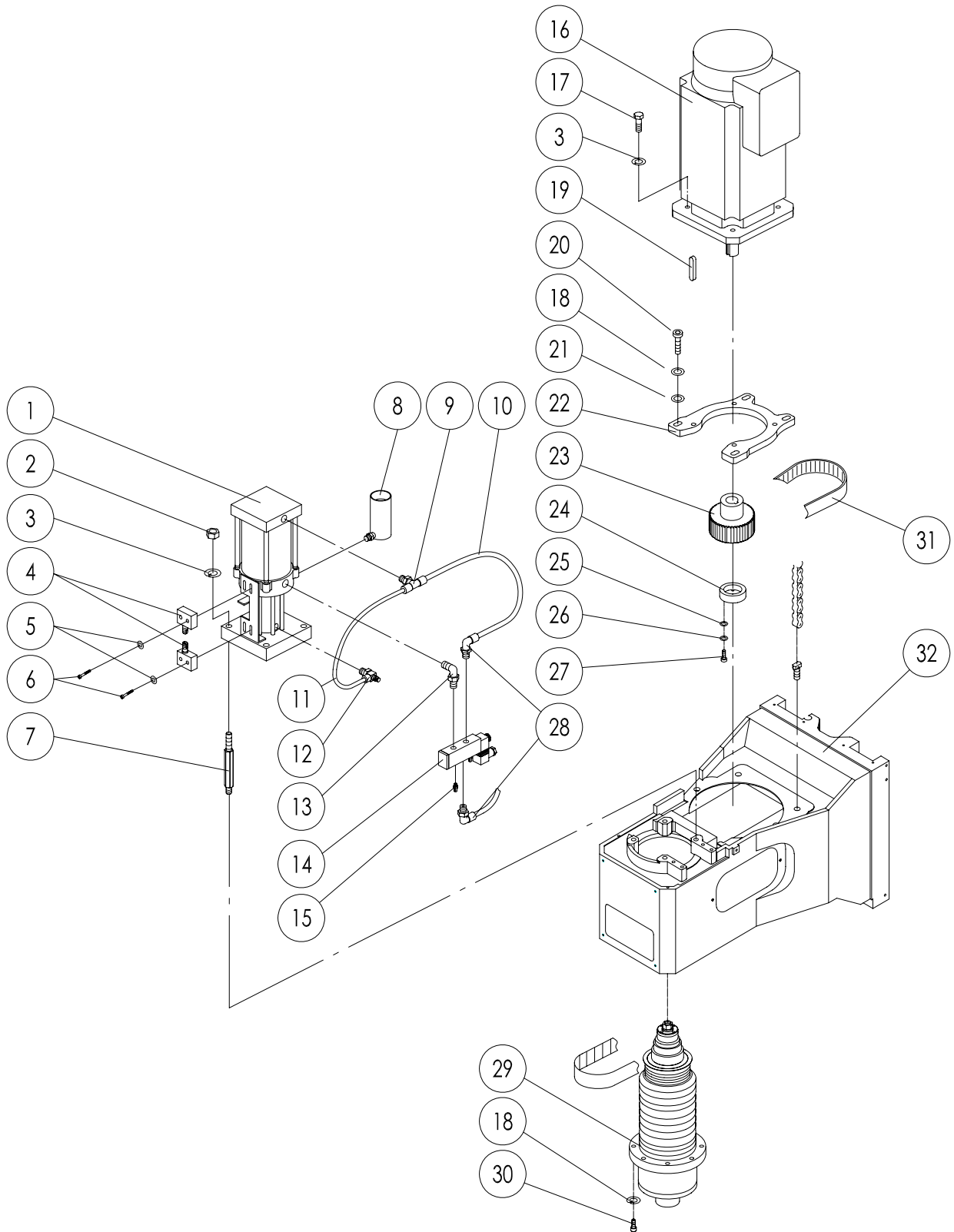
9.5.2 Maintenance

No	Maintenance detail	Period
1	In case of machine stops operating the belt should loosened to prevent fatigue from long-time tension.	6 months
2	The pipe loop way be examined by eyes at particular period.	Especially over one year
3	Dependence on the degree of pollution, the coolant should be changed.	4 months
4	All wiring shall be examined damage by eyes at particular period.	1 month

10. PARTS LIST

10.1 ELEVATING ASSEMBLY-6000RPM

10.1.1 ELEVATING ASSEMBLY-6000RPM DRAWING

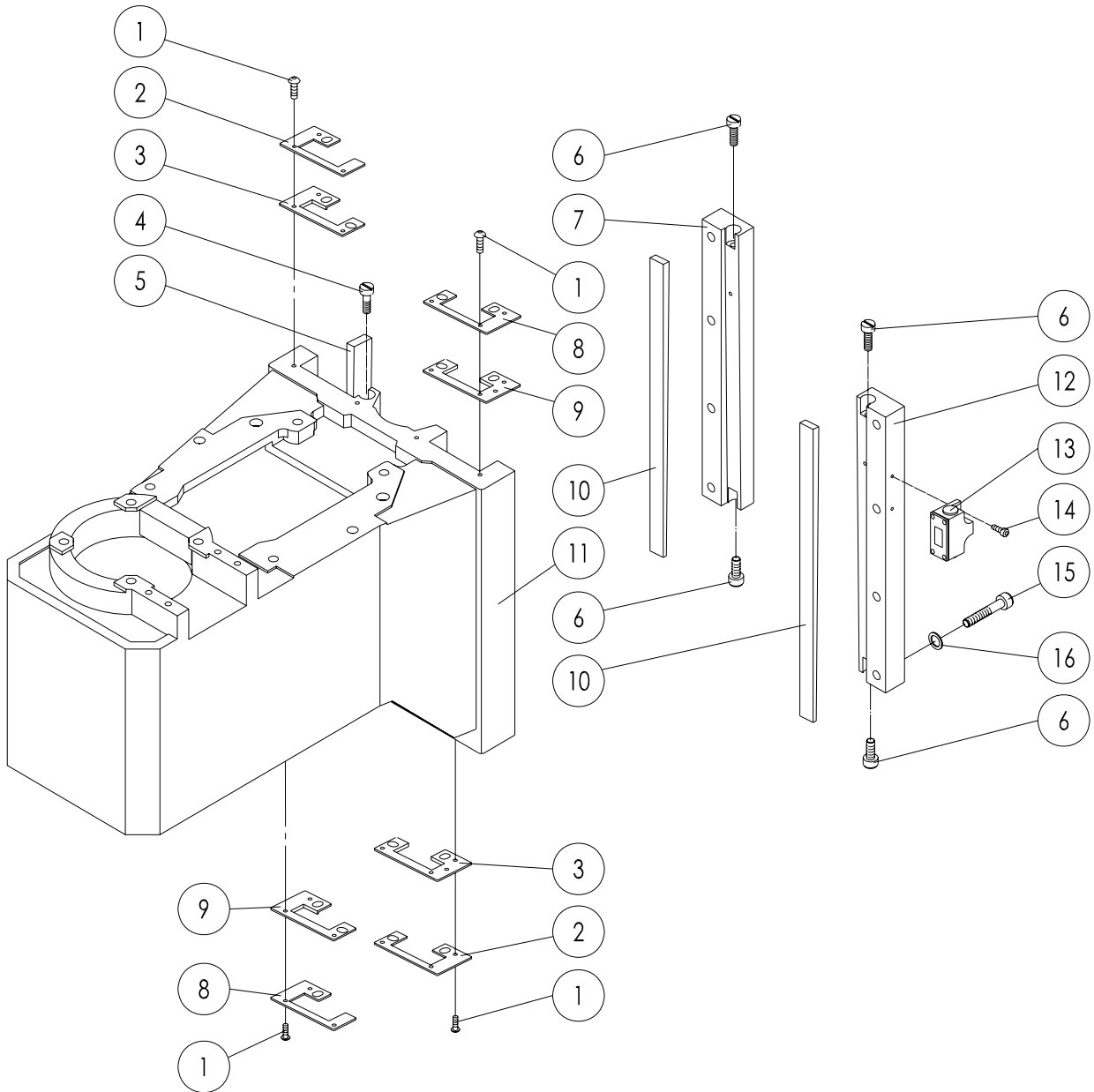


10.1.2 ELEVATING ASSEMBLY-6000RPM PARTS LIST

NO.	PART NO.	DESCRIPTION	QTY
1.	3.5TON×13	PNEUMATIC BOOSTING CYLINDER	1
2.	HN-M12	HEX.NUT	4
3.	WS-Ø12	SPRING WASHER	8
4.	TZ7311	LIMIT SWITCH	2
5.	WF-Ø4	FLAT WASHER	4
6.	SC-M4×30L	SOCKET CAP SCREW	4
7.	V5-H046-01	LOCK BOLT	4
8.	OIL CAP	OIL CAP	1
9.	3108.10.13	SUTD FITTING	1
10.	Ø10×30L	PU CONVEYING HOSES	1
11.	Ø10×40L	PU CONVEYING HOSES	1
12.	JSC1002-B	STUD FITTING	1
13.	PT1/4"×PT1/4"(P074)	90° BRASS ADAPTER	1
14.	PHS520S-8	SOLENOID VALVES	1
15.	SL-01	SLIEVCERS	2
16.		SPINDLE MOTOR (FANUC)	1
17.	SH-M12×40L	HEX. HEAD SCREW	4
18.	WS-Ø10	SPRING WASHER	12
19.	KY-8×10×30L	KEY	1
20.	SC-M10×40L	SOCKET CAP SCREW	4
21.	Ø12×Ø35×6	FLAT WASHER	4
22.	2M-H049-00	MOTOR BASE	1
23.	V5-H051-M0	SPINDLE MOTOR HTD GEAR	1
24.	4M-H008-F0	LOCK BLOCK	1
25.	WF-Ø5	FLAT WASHER	3
26.	WS-Ø5	SPRING WASHER	3
27.	SC-M5×20L	SOCKET CAP SCREW	3
28.	3109.10.13	SUTD FITTING	2
29.	BT-#40	SPINDLE	1
30.	SC-M10×35L	SOCKET CAP SCREW	8
31.	38T:57T 500-5M×27	SPINDLE MOTOR BELT	1
32.	4E-A002-00	ELEVATING CASTING	1

10.2 SPINDLE CASTING ASSEMBLY

10.2.1 SPINDLE CASTING ASSEMBLY DRAWING

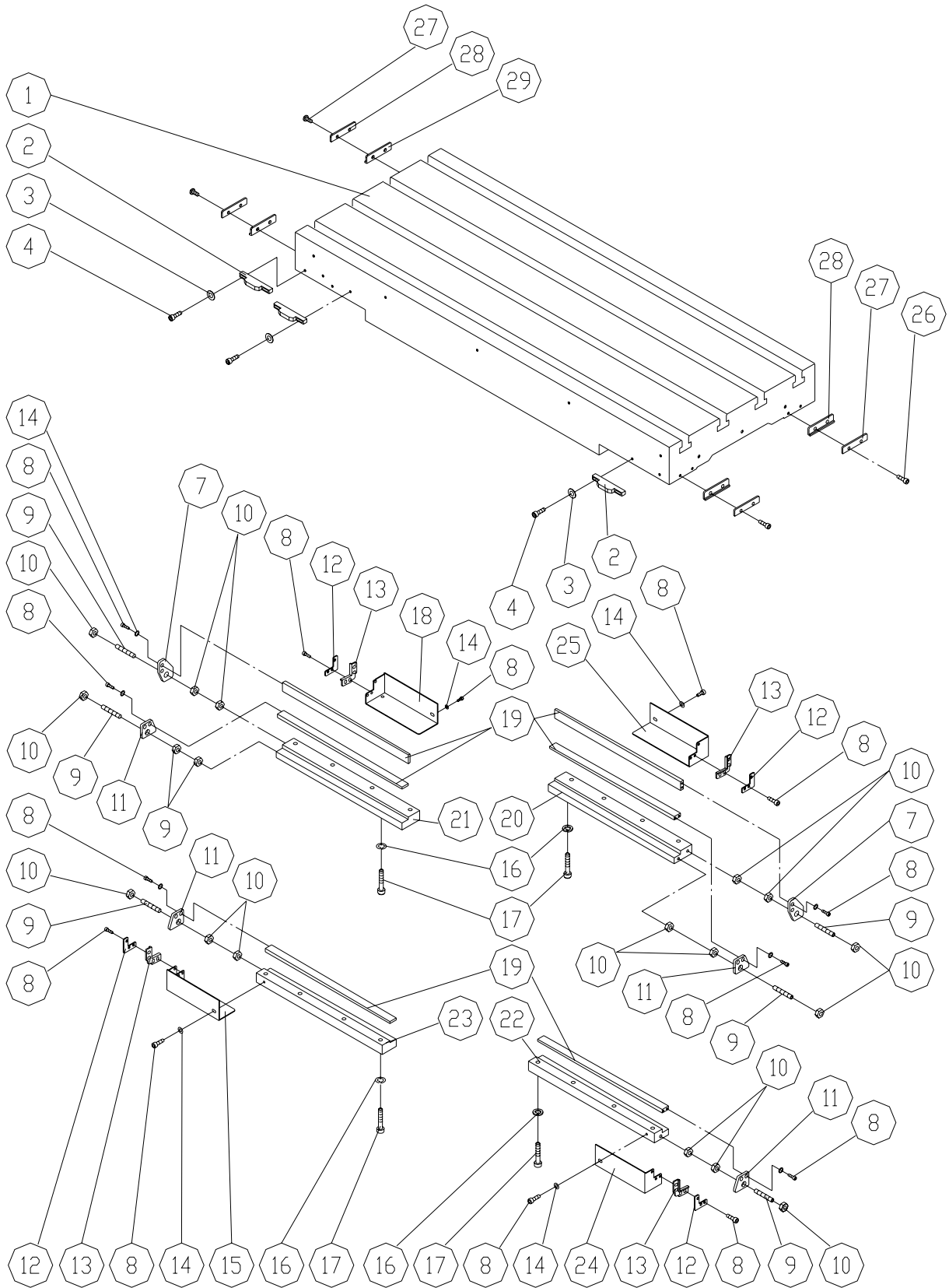


10.2.2 SPINDLE CASTING ASSEMBLY PART LIST

NO.	PART NO.	DESCRIPTION	QTY
1.	SB-M5x16L	HEX SOCKET BUTTON HEAD SCREW	12
2.	2E-Z013-L0	WIPER HOLDER	2
3.	V6-Z015-R1	WIPER	2
4.	K2-C041-A0	GIB SCREW	2
5.	B6-Z022-00	ELEVATING CASTING GIB	1
6.	K2-C041-00	GIB SCREW	4
7.	2E-Z010-00	SLICING LEFT	1
8.	2E-Z013-R0	WIPER HOLDER	2
9.	V6-Z015-L1	WIPER	2
10.	B6-Z024-00	ELEVATING CASTING GIB	2
11.	2E-A002-01	SPINDLE CASTING	1
12.	2E-Z011-00	SLICING RIGHT	1
13.	SN02D12-502C1688	LIMIT SWITCH	1
14.	SC-M5x20L	SOCKET CAP SCREW	1
15.	SC-M12x40L	SOCKET CAP SCREW	8
16.	WS-Ø12	SPRING WASHER	8

10.3 TABLE ASSEMBLY

10.3.1 TABLE ASSEMBLY DRAWING

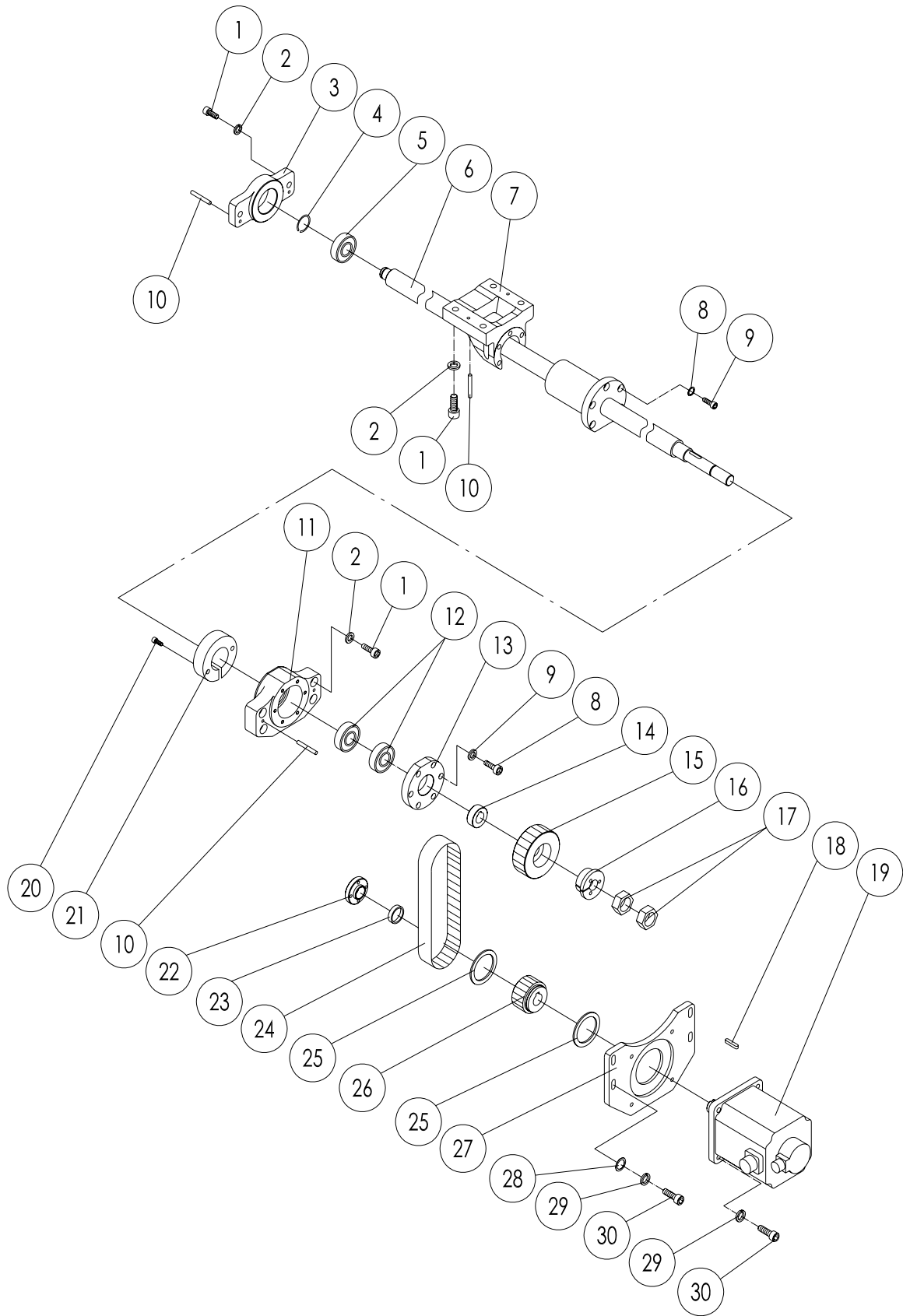


10.3.2 TABLE ASSEMBLY PART LIST

NO.	PART NO.	DESCRIPTION	QTY
1.	3E-X001-01	WORK TABLE	1
2.	4M-X016-00	DOG	3
3.	WF-Ø5	FLAT WASHER	6
4.	SC-M5x20L	SOCKET CAP SCREW	6
7.	V5-XB47-00	RIGHT GIB ADJUSTING PLATE	2
8.	SC-M6x16L	SOCKET CAP SCREW	28
9.	B6-X046-00	GIB SCREW	6
10.	HN-M10	NUT	18
11.	V5-XB77-00	LEFT GIB ADJUSTING PLATE	4
12.	V5-XB64-00	WIPER HOLDER	4
13.	V5-XB70-00	WIPER	4
14.	WS-Ø6	SPRING WASHER	24
15.	3E-X058-L0	WIPER COVER (LEFT)	1
16.	WS-Ø10	SPRING WASHER	16
17.	SC-M10x40L	SPRING WASHER	16
18.	3E-X059-L0	WIPER COVER (LEFT)	1
19.	B6-Z024-00	SLICING RAIL GIB	6
20.	2M-XB67-R0	SLICING RAIL (RIGHT)	1
21.	2M-XB67-L0	SLICING RAIL (LEFT)	1
22.	2M-XB66-R0	SLICING RAIL (RIGHT)	1
23.	2M-XB66-L0	SLICING RAIL (LEFT)	1
24.	3E-X058-R0	WIPER COVER (RIGHT)	1
25.	3E-X059-R0	WIPER COVER (LEFT)	1
26.	SB-M5x16L	HEX SOCKET BUTTON HEAD SCREW	8
27.	A6-X068-00	WIPER HOLDER	4
28.	A6-X069-00	WIPER	4

10.4 X AXIS ASSEMBLY

10.4.1 X AXIS ASSEMBLY DRAWING

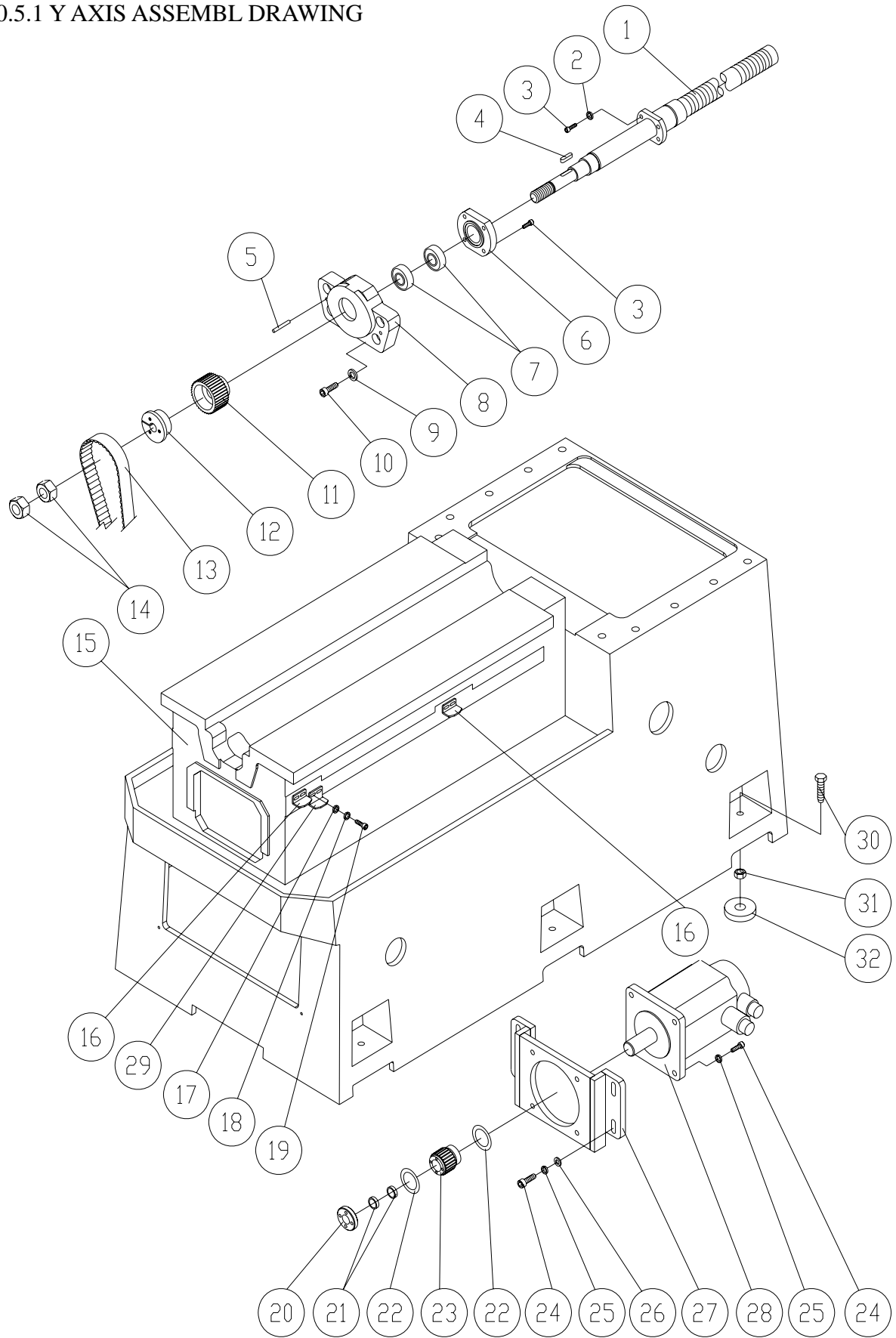


10.4.2 X AXIS ASSEMBLY PART LIST

NO.	PART NO.	DESCRIPTION	QTY
1.	SC-M10x45L	SOCKET CAP SCREW	10
2.	WS-Ø10	SPRING WASHER	10
3.	4E-XA05-00	X AXIS CLAMPING	1
4.	SE-20	SNAP RING	1
5.	6204	BEARING	1
6.	3E-X017-01	X AXIS BALL SCREW	1
7.	2M-X003-01	FEED NUT BRACKET	1
8.	SC-M6x20L	SOCKET CAP SCREW	11
9.	WS-Ø6	SPRING WASHER	11
10.	TP-#4x45L	TAPER PIN	6
11.	4E-X005-00	BEARING BRACKET	1
12.	2562	BEARING	2
13.	3M-X009-00	BEARING CAP	1
14.	3E-X026-00	BEARING SPACER	1
15.	B6-X030-01	38T 5M HTD GEAR	1
16.	B6-X031-02	LOCK BLOCK	1
17.	B8-Y035-00	M20 NUT	2
18.	KY-6x6x25	KEY	1
19.	MHM	SERVO MOTOR (PANASONIC)	1
19-1.	1KW	SERVO MOTOR (MITSUBISHI)	1
20.	SC-M5x20L	SOCKET CAP SCREW	2
21.	4E-X085-01	PROTECTION BLOCK	1
22.	A6-X027-P0	LOCK BLOCK	1
23.	Ø62xØ20x6.3	LOCK RING (SEM)	1
24.	5M-420x27	MOTOR BELT	1
25.	2V-YA07-00	SIDE RING	2
26.	4E-X008-P1	38T HTD PULLEY	1
27.	3E-XC25-P0	X AXIS MOTOR BASE	1
28.	WF-Ø8	FLAT WASHER	4
29.	WS-Ø8	SPRING WASHER	8
30.	SC-M8x25L	SOCKET CAP SCREW	8

10.5 Y AXIS ASSEMBLY

10.5.1 Y AXIS ASSEMBLY DRAWING

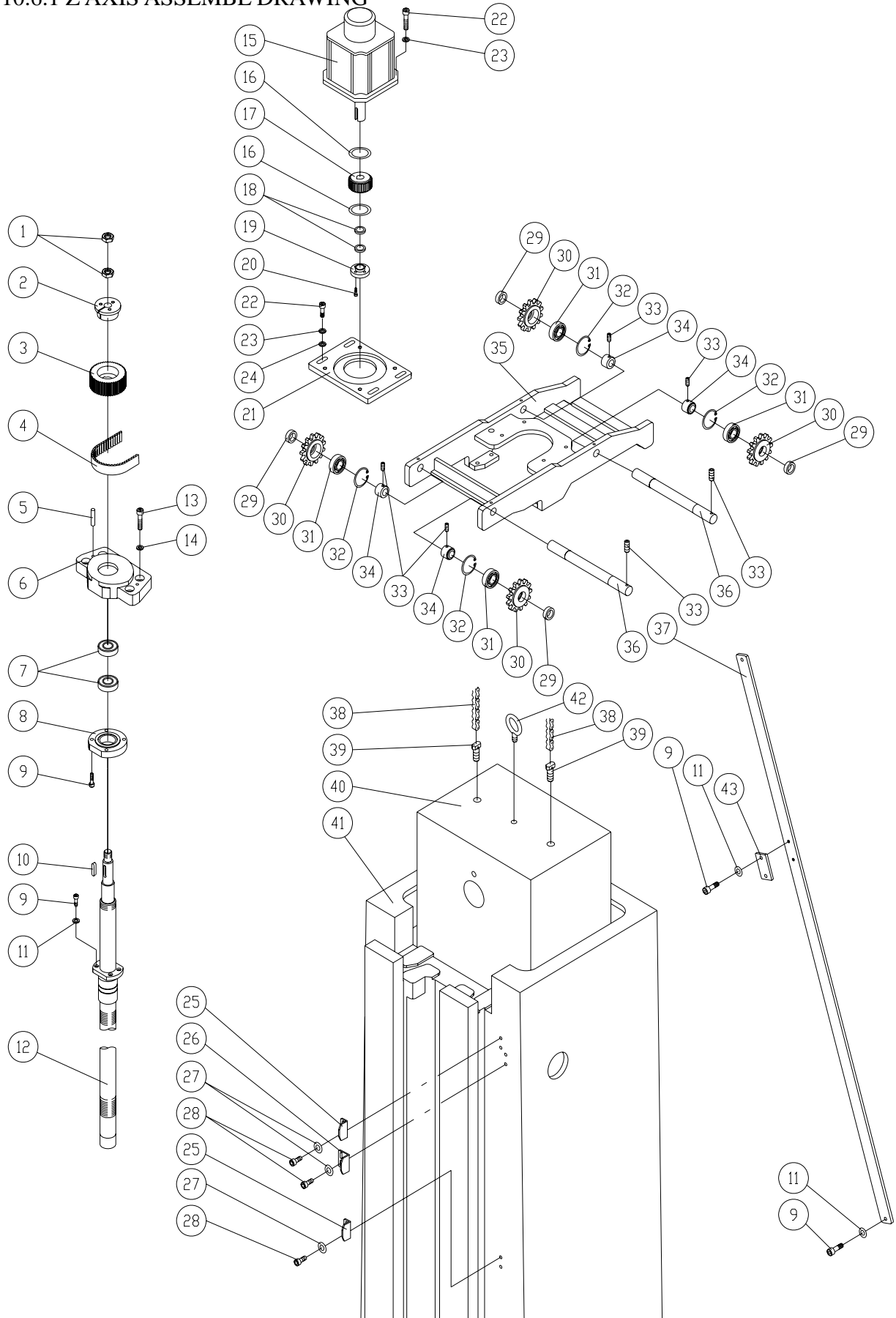


10.5.2 Y AXIS ASSEMBLY PART LIST

NO.	PART NO.	DESCRIPTION	QTY
1.	2E-Y000-00	Y AXIS BALL SCREW	1
2.	WS-Ø6	SPRING WASHER	5
3.	SC-M6x25L	SOCKET CAP SCREW	9
4.	KY-6x8x20L	KEY	1
5.	TP-#4x38L	TAPER PIN	2
6.	B4-YA11-00	Z AXIS BEARING BRACKET COVER	1
7.	20TAA04DB	BEARING	2
8.	2E-Z001-00	BEARING BRACKET	1
9.	WS-Ø10	SPRING WASHER	4
10.	SC-M10x40L	SOCKET CAP SCREW	4
11.	3Y-YC30-T0	38T 5M HTD GEAR	1
12.	B3-X031-02	LOCK BLOCK	1
13.	HTD-500-5Mx22	MOTOR BELT	1
14.	B6-Y035-00	5/8"NF NUT	2
15.	3E-A000-C0	BASE	1
16.	B6-X016-02	DOG	2
17.	WF-Ø5	FLAT WASHER	6
18.	WS-Ø5	SPRING WASHER	6
19.	SC-M5x15L	SOCKET CAP SCREW	6
20.	B6-Z028-00	LOCK BLOCK	1
21.	SEC-300	BEARING	2
22.	B6-X010-P0	SIDE RING	2
23.	V3-X008-S0	24T 5M MOTOR HTD GEAR	1
24.	SC-M8x25L	SOCKET CAP SCREW	4
25.	WS-Ø8	SPRING WASHER	4
26.	WF-Ø8	FLAT WASHER	4
27.	2E-Y015-M0	Y AXIS MOTOR BASE	1
28.	MOTOR	YAXIS MOTOR	1
29.	B6-X021-01	DOG	1
30.	SH-3/4"x3"	HEX. HEAD SCREW	6
31.	HN-3/4"	NUT	6
32.	K5-C099-00	BLOCK	6

10.6 Z AXIS ASSEMBLY

10.6.1 Z AXIS ASSEMBL DRAWING

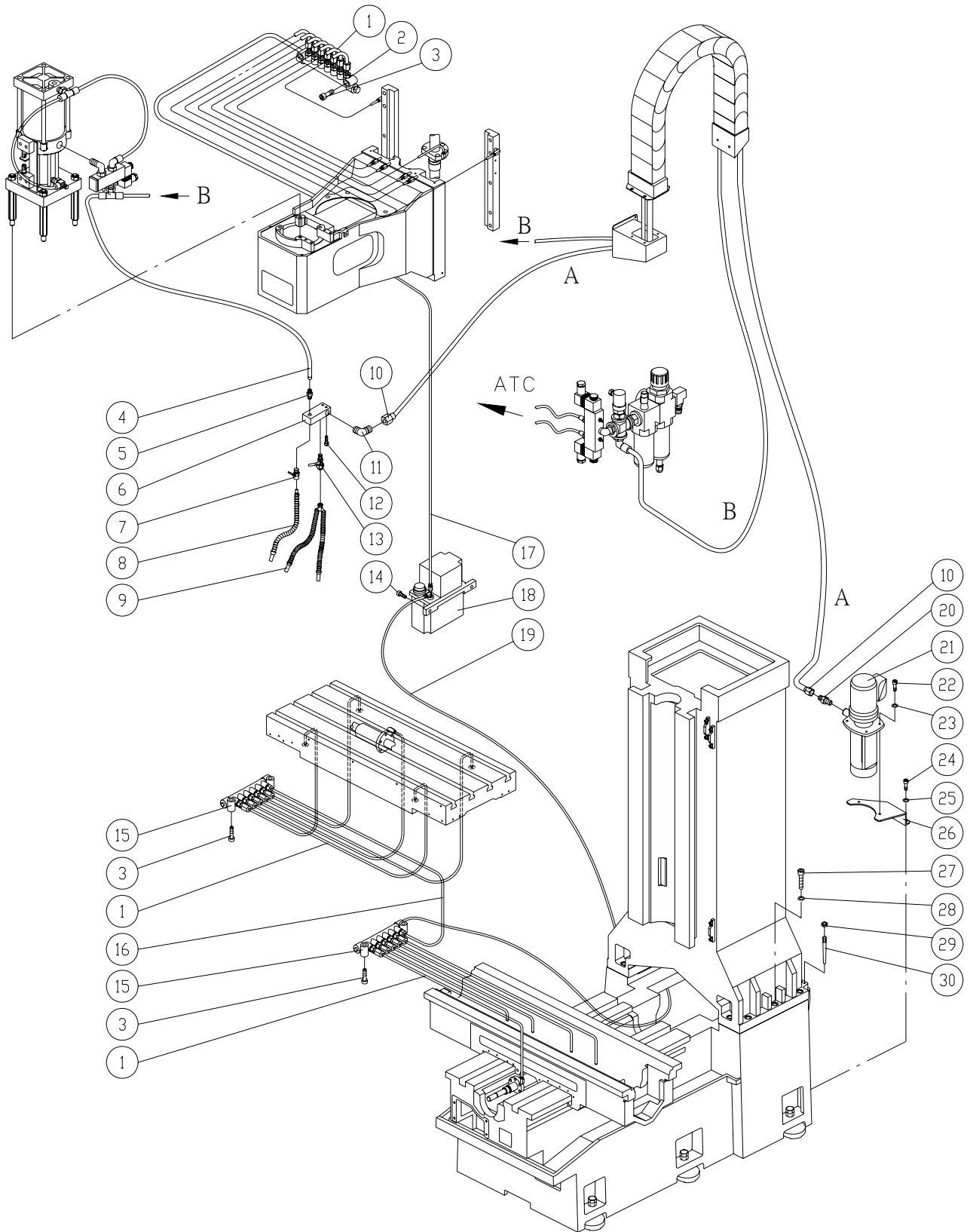


10.6.2 Z AXIS ASSEMBLY PART LIST

NO.	PART NO.	DESCRIPTION	QTY
1.	B6-Y035-00	5/8"NF NUT	2
2.	B3-X031-02	LOCK BLOCK	1
3.	3E-YC30-00	48T 5M HTD GEAR	1
4.	5M-420x27	MOTOR BELT	1
5.	TP-#4x38L	TAPER PIN	1
6.	2E-Z001-00	BEARING BRACKET	1
7.	20TAA04DB	BEARING	2
8.	B4-YA11-00	Z AXIS BEARING BRACKET COVER	1
9.	SC-M6x20L	SOCKET CAP SCREW	12
10.	KY-6x8x20L	KEY	1
11.	WS-Ø6	SPRING WASHER	8
12.	2E-Z000-00	Z AXIS BALL SCREW	1
13.	SC-M10x40L	SOCKET CAP SCREW	4
14.	WS-Ø10	SPRING WASHER	4
15.	MOTOR	Z AXIS MOTOR	1
16.	B6-X010-00	SIDE RING	2
17.	V3-X008-S0	38T 5M MOTOR HTD GEAR	1
18.	SEC-300	BEARING	2
19.	V5-X027-S0	LOCK BLOCK	1
20.	SC-M5x40L	SOCKET CAP SCREW	6
21.	B6-Z034-00	Z AXIS MOTOR BASE	1
22.	SC-M8x25L	SOCKET CAP SCREW	8
23.	WS-Ø8	SPRING WASHER	8
24.	WF-Ø8	FLAT WASHER	4
25.	B6-X016-02	DOG	2
26.	B6-X021-01	DOG	1
27.	WS-Ø5	SPRING WASHER	6
28.	SC-M5x15L	SOCKET CAP SCREW	6
29.	3M-Z039-00	BEARING SPACER	4
30.	3M-Z037-00	BALANCING PULLEY	4
31.	6004ZZ	BEARING	4
32.	R-42	SNAP RING (FOR HOLD)	4
33.	SS-M6x8L	SOCKET SET SCREW	8
34.	3M-Z056-00	SPACER	4
35.	2E-Z029-00	Z AXIS BALANCING BASE SUPPORTER	1
36.	2M-Z038-00	BALANCING PULLEY SHAFT	2
37.	2E-Z080-00	BALANCING BLOCK SUPPORTER	1
38.	SC-530	CHAIN	2
39.	M3-Z008-00	BALANCING SCREW	2
40.	2M-A005-00	BALANCING BLOCK	1
41.	2E-A001-00	COLUMN	1
42.	NB-M12	HOOK BOLT	1
43.	4M-Z082-00	PROTECTION BLOCK	2

10.7 TABLE GUARD COOLANT W/- ATC SYSTEM ASSEMBLY

10.7.1 TABLE GUARD COOLANT W/- ATC SYSTEM ASSEMBLY DRAWING

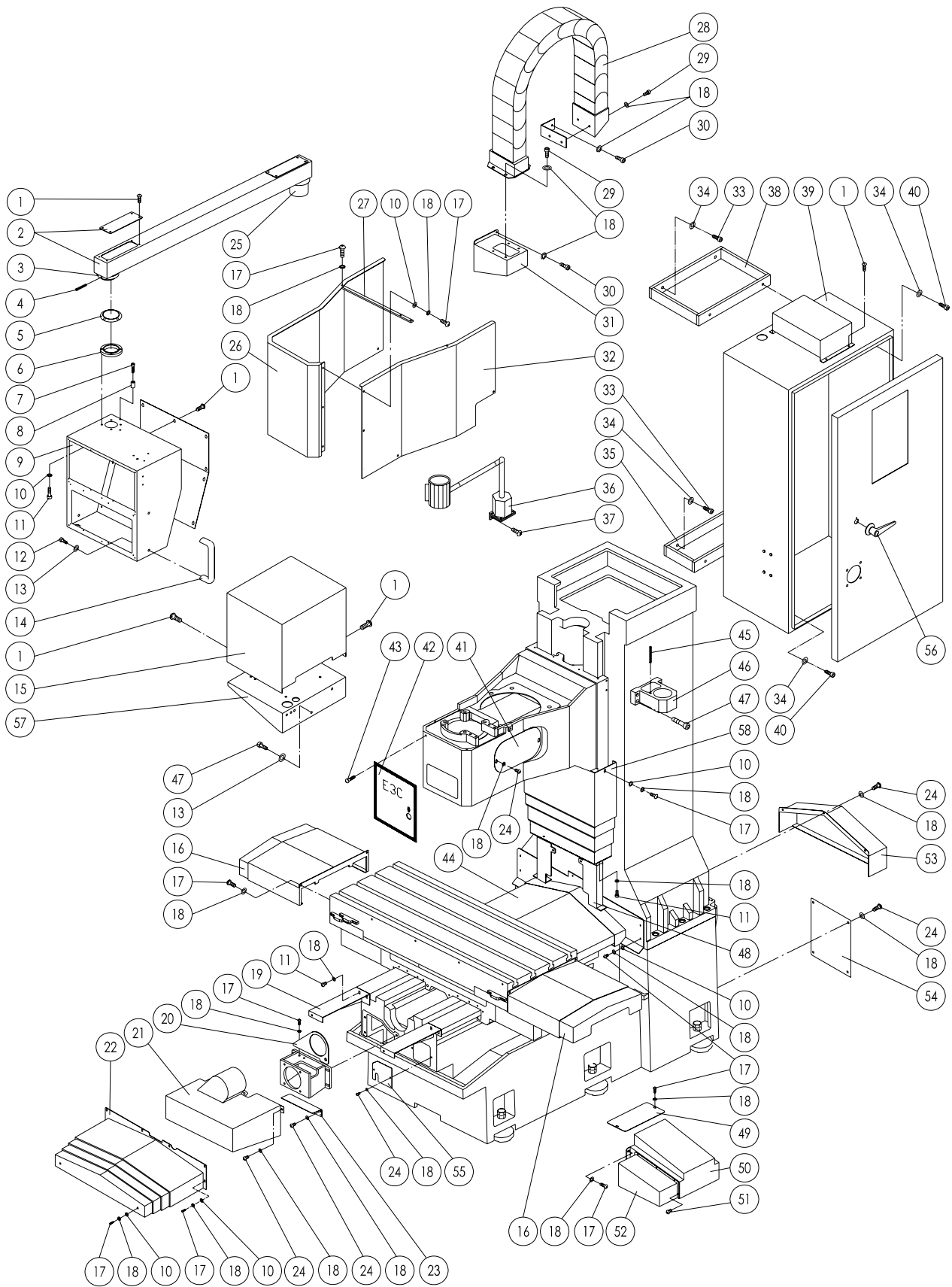


10.7.2 TABLE GUARD COOLANT SYSTEM ASSEMBLY PART LIST

NO.	PART NO.	DESCRIPTION	QTY
1.	LT-Ø4	LUBRICATION OIL TUBING	17
2.	A9	OIL DISTRUBTE	1
3.	SC-M6x25L	SOCKET CAP SCREW	6
4.	Ø10x850L	STAINLESS STEEL CONVEYING HOSES	1
5.	JPC8-02	LABORSAVING CONNECTION	1
6.	A6-Z045-A0	COOLANT TUBSE BRACKET	1
7.	22MF(PT1/4"xPT1/4")	COCK	1
8.	PT1/4"x17	AIR TUBE	1
9.	10½"	COOLANT TUBE	1
10.	PH1/2"x1700	STAINLESS STEEL CONVEYING HOSES	1
11.	PT3/8"xPH1/2"	90° ADAPTER	1
12.	SC-M6x30L	SOCKET CAP SCREW	2
13.	3/8"	BALL VALVE	1
14.	SC-M6x20L	SOCKET CAP SCREW	2
15.	A8	OIL DISTRUBTE	2
16.	Ø4	WATER PIPE	1
17.	Ø4x1300L	LUBRICATING STRING	1
18.	CSED	ELECTRONIC LUBRICATION	1
19.	Ø4x3000L	LUBRICATING STRING	1
20.	PH1/2"x PT 3/4" xPH1/2"	TRIPLE HEADED CONNECTION	1
21.	175L-1/4HP	PUMP	1
22.	SC-M8x25L	SOCKET CAP SCREW	2
23.	WS-Ø8	SPRING WASHER	2
24.	SC-M8x20L	SOCKET CAP SCREW	2
25.	WF-Ø8	FLAT WASHER	2
26.	3E-A010-00	PUMP BASE	1
27.	SC-M16x70L	SOCKET CAP SCREW	10
28.	WS-Ø16	SPRING WASHER	10
29.	HN-M6	NUT	2
30.	DF-6004-00	GIB	2

10.8 TABLE GUARD SHEET METAL ASSEMBLY

10.8.1 TABLE GUARD SHEET METAL ASSEMBLY DRAWING



10.8.2 TABLE GUARD SHEET METAL ASSEMBLY PART LIST

NO.	PART NO.	DESCRIPTION	QTY
1.	SB-M5x10L	HEX SOCKET BUTTON HEAD SCREW	20
2.	2E-C144-00	PENDANT ARM	1
3.	B6-C143-00	PENDANT ARM LINK	1
4.	Ø6x24L	SPRING PIN	1
5.	6308	WASHER	1
6.	B6-C157-00	CONSOLE'S LINK	1
7.	SC-M6x20L	SOCKET CAP SCREW	2
8.	V6-C151-00	CONSOLE'S ANGLE FIXED LINK	2
9.	V5-C146-02	OPERATE CONSOLE	1
10.	WF-Ø6	FLAT WASHER	30
11.	SC-M6x16L	SOCKET CAP SCREW	12
12.	SC-M8x8L	SOCKET CAP SCREW	2
13.	WF-Ø8	FLAT WASHER	5
14.	B6-C149-00	CONSOLE'S HANDLE	1
15.	4M-C170-01	CONVERTER BOX	1
16.	3E-X013-00	X AXIS TELESCOPING WAY COVER	2
17.	SB-M6x12L	HEX SOCKET BUTTON HEAD SCREW	32
18.	WS-Ø6	SPRING WASHER	70
19.	3E-YB46-00	Y AXIS TELESCOPING WAY COVER SUPPORTER	2
20.	3E-Y023-C0	BELT COVER	1
21.	3E-Y022-C0	PULLEY COVER	1
22.	3E-Y045-C0	Y AXIS TELESCOPING WAY COVER (FRONT)	1
23.	3E-A011-00	WATER FILTER NET	1
24.	SB-M6x10L	HEX SOCKET BUTTON HEAD SCREW	18
25.	B6-C147-B0	PENDANT ARM POST	1
26.	2E-A030-00	HEAD COVER	1
27.	2E-A032-00	HEAD COVER SUPPORTER	1
28.	PVC2×KR100×15×NO.6	FLEXIBLE CARRIER	1
29.	SC-M6x8L	SOCKET CAP SCREW	6
30.	SC-M6x12L	SOCKET CAP SCREW	2
31.	V5-Z063-01	BRACKET SUPPORTER BASE	1
32.	2E-A031-00	RIGHT HEAD COVER FLANK	1
33.	SC-M10x30L	SOCKET CAP SCREW	8
34.	WF-Ø10	FLAT WASHER	8
35.	2E-C153-00	CABINET BRACKET	1
36.	JW-55½RNTM(110V/24V)	WORK LAMP	1
37.	SB-M4x16L	HEX SOCKET BUTTON HEAD SCREW	2
38.	V6-C152-00	CABINET BRACKET	1
39.	B6-C148-G6	ELECTRIC BOX	1
40.	SC-M10x16L	SOCKET CAP SCREW	4
41.	V5-A033-00	ADJUSTING PULLEY APERTURE COVER	1
42.	PM-SW47-00	PLATE	1
43.	M4	SCREW	4
44.	3E-Y047-C0	Y AXIS TELESCOPING WAY COVER (REAR)	1
45.	Ø8×30L	SPRING PIN	1
46.	B7-C141-00	PENDANT ARM BRACKET	1
47.	SC-M8x30L	SOCKET CAP SCREW	5
48.	3E-Z061-00	Z AXIS TELESCOPING WAY COVER SUPPORTER	2
49.	3E-X072-C0	X AXIS MOTOR COVER	1
50.	3E-X007-02	X AXIS MOTOR COVER	1
51.	SB-M4x8L	HEX SOCKET BUTTON HEAD SCREW	5
52.	3E-X007-A1	X AXIS MOTOR COVER	1
53.	2M-X013-00	X AXIS TELESCOPING WAY COVER (LEFT)	1
54.	2E-A008-C0	BASE REAR COVER	1
55.	3E-A007-00	BASE FRONT COVER	1
56.	A-45-A	ELECTRIC BOX HANDLE (PLATE)	1
57.	4M-C171-01	CONVERTE SUPPORTER	1
58.	2E-Z060-00	Z AXIS TELESCOPING WAY COVER	1