XYZ Machine Tools

XYZ 1100 HD

VERTICAL MACHINE CENTER
GENERAL MANUAL

CE

ISO 9001

Manual Number：KRDM5B00 Date：JUN, 2023 REV：V1.3

IMPORTANT SAFETY NOTICE WARNING

The following documentation are provided by us.

(1) Introduction manual
(2) Electrical document
(3) Other document provided by OEM partners

WARNING !!!

Please read this documentation thoroughly before using the machine. Adequate training by the manufacturer or by OEM partner is required before starting to use these machines.

WARNING !!!

It is the customers responsibility to ensure the machine is installed in a safe operating position with all service pipes and cables clear of the operation area so as not to cause a hazard. Access must be allowed for safe maintenance, swarf and oil disposal including safe stacking of machined and unmachined components.

WARNING !!!

This machine is designed to cut common, metallic engineering materials (such as steel and aluminium). DO NOT use to cut special materials (such as composites) without agreement from XYZ Machine Tools. Any damage caused to the machine by processing such materials will not be covered by the warranty.

NOTE !!!

The recipient hereby agrees not to copy or distribute this document without written consent.

SPECIFICATION

WORKING TABLE	Working area	1200 × 600 mm
	T-slot size (no. × wid. × dis)	5 × 18 × 100 mm
	Maximun loading capacity	1500 kg
STROKE LIMIT	X axis	1100 mm
	Y axis	610 mm
	Z axis	600 mm
	Distance from spindle nose to working table surface	165 ~ 765 mm
	Distance from spindle center to main column	675 mm
SPINDLE	Taper	BT 40
	Bearing diameter	Ø70
	Speed	10000 rpm
FEED RATE	Cutting feed rates (X,Y,Z)	1~24000 mm / min
TOOL MAGAZINE	Capacity (no. of tool)	30 arm type
	Max. tool weight	7 kg
	Tool change time (T-T)	2.5 sec
	Machine tool holder	BT40
DRIVE MOTOR	Spindle drive motor	15 HP
	Coolant	3/4 HP
	Chip conveyor	1/4 HP (optional)
	Chip wash	3/4 HP x2
GENERAL	Door Opening Width	1100 mm
	Overall dimensions (W×D×H)	2800x2610x2810 mm 3860x3370x2810 mm(with opeator panel)
	Gross weight (approx.)	7000 kg

**** To keep improving and developing new functions,the Specifications is subject to change without future notice.

STANDARD ACCESSORIES

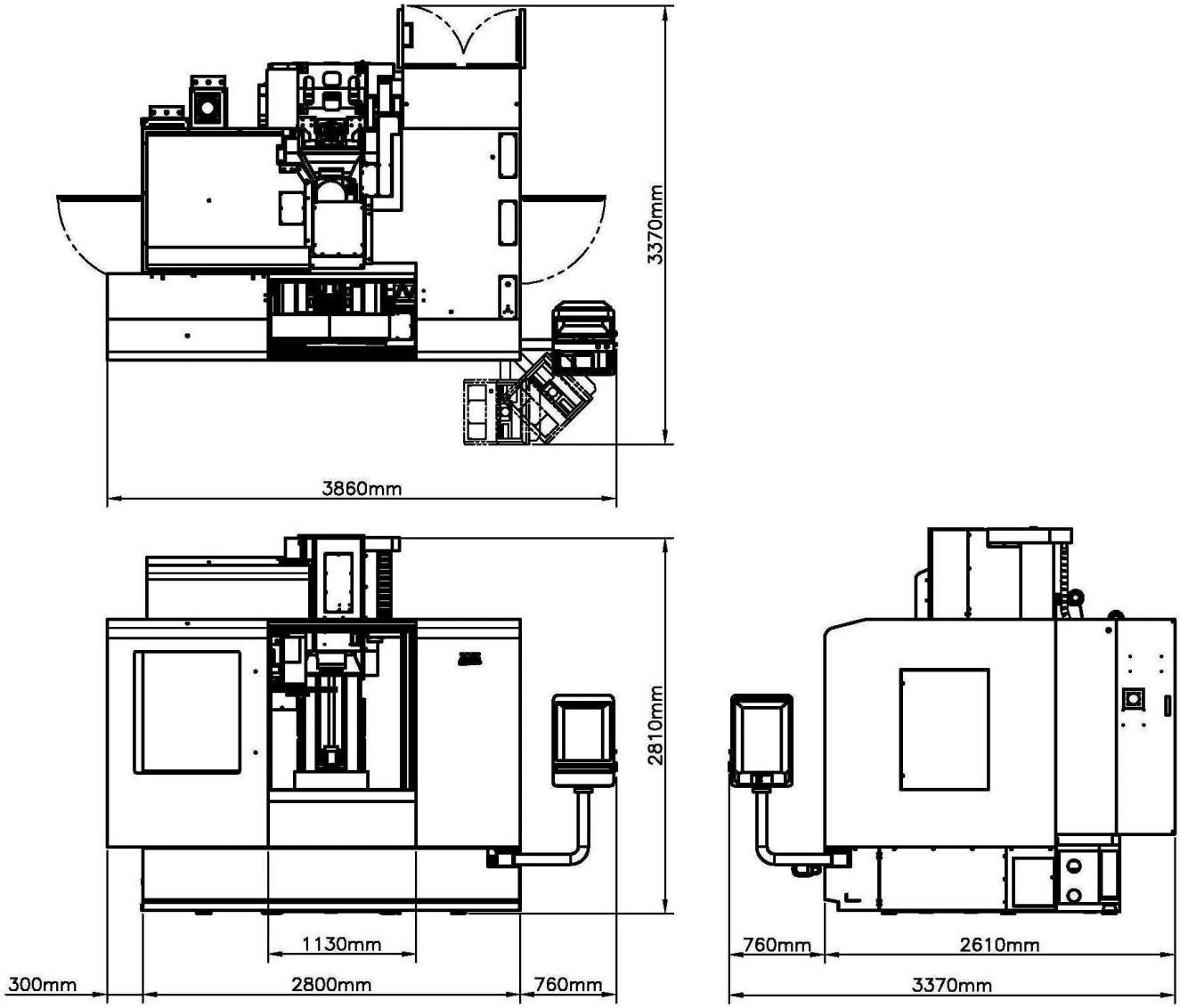
- Siemens 828D ShopMill Control.
- 15” Touch Screen.
- Optimised Digital Servo’s.
- Hardened Table.
- Rigid Tapping.
- Twin Swarf Augers.
- High Pressure Flood Coolant.
- Coolant Washdown.
- LED Worklight.
- 30 Station Arm Type Tool Changer.
- Pneumatically Counter Balanced.
- Head.
- Remote Electronic Handwheel.
- Easy Clean Swarf Tray.
- Steel Concertina Guards on all Axes.
- Stainless Steel Floor Pan.
- Powder Coated Guarding.
- Pull Studs.
- Networking.
- USB Port.

OPTIONAL EQUIPMENT

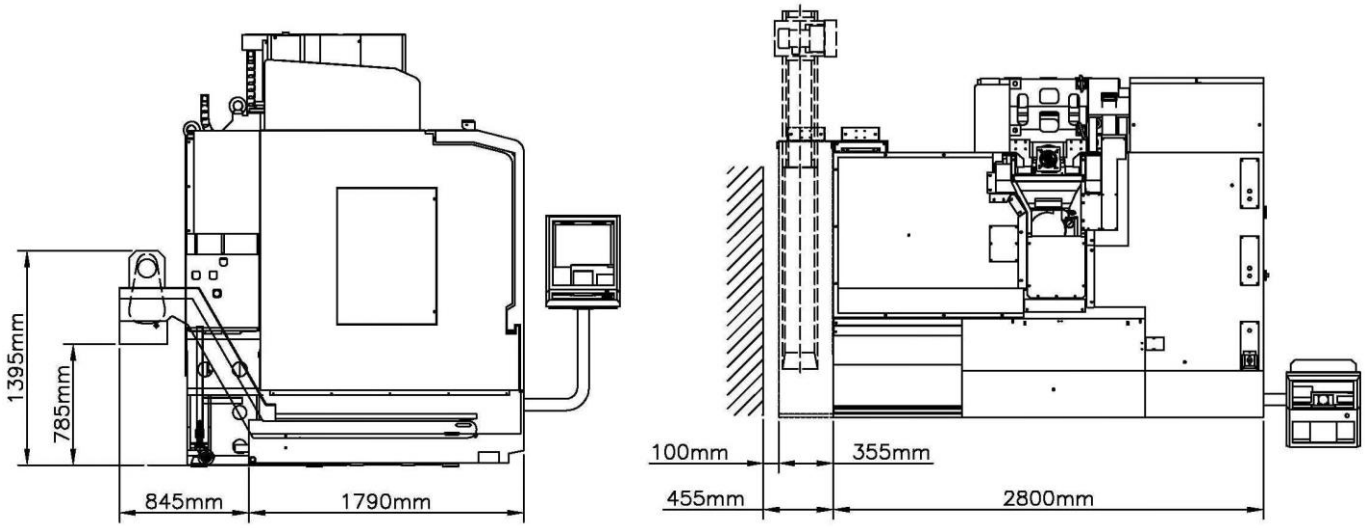
- ◎ 4th Axis Rotary Table.
- ◎ 5th Axis Rotary Table.
- ◎ Swarf Conveyor & Bin from Auger.
- ◎ 12,000 rpm Spindle.
- ◎ Through Spindle Coolant.
- ◎ Offline Programing.
- ◎ Renishaw Toolsetting and Probing.
- ◎ Contour Handwheel (wind the handwheel to run through the program).
- ◎ Factory Networking.
- ◎ Oil Skimmer.

****** To keep improving and developing new functions,the Specification is subject to change without future notice.**

DIMENSION (STANDARD)



DIMENSION (WITH CHIP CONVEYOR)



INTRODUCTION

This machine is made up of bed base, headstock, main column, saddle, working table, operation panel, hydraulic, lubrication system, chip conveyor, chip collecting equipment, safety guards, CNC controllers, etc. These machine are designed to machine those workpieces that do not generate power chip, corrosive or flammable substances, such as magnesium alloy. Please contact our local dealer or us if in doubt.

Because this machine can machine the workpiece in an automatic mode, the safety and efficiency of the working process could be increased tremendously. Nevertheless, read all the manuals we provided thoroughly. Do not try to use this machine unless you understand how to operate and stop the machine and all the safety matters concerned. Details about how to operate this machine follow.

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CHAPTER 2 SHIPPING AND HANDLING

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CHAPTER 1

HEALTH AND SAFETY

PLEASE READ CAREFULLY BEFORE

OPERATION OF THIS MACHINE

1.1 OPERATOR SAFETY

Safety devices are installed in this machine to protect the operator from injury. However, this fast, powerful machine can be dangerous if used under improper circumstances.

Please read the following health and safety guidance notes and understand how to operate the machine before using the machine.

WARNING !!!

The machine is equipped with safety devices. Do not change any safety devices on this machine. If changes to these safety devices are made, the manufacturer and our OEM partner will not be responsible for any ensuing issues of product liability. This action will also invalidate any remaining warranty entitlement.

1.2 HEALTH AND SAFETY AT WORK

In accordance with the requirements of the Health and Safety at work, this manual contains the necessary information to ensure that the machine tool can be operated properly and with safety. It is assumed that the operator has been properly trained, has the requisite skill and is authorized to operate the machine, or, if undergoing training, is under the close supervision of a skilled and authorized person.

Attention is drawn to the importance of compliance with the various statutory regulations, which may be applicable, such as "The Protection of Eyes Regulations". It is further stressed that good established workshop practice is essential.

Adequate information is also provided to enable the machine to be properly serviced and maintained by persons with the necessary skills and authority.

1.3 NOISE LEVEL

The noise level of this machine is within 85dB(A). In real life, the noise level can be higher than 85dB(A) because actual working conditions might be different.

WARNING !!!

Do not stay in the working area with an unpleasant noise level without wearing appropriate protective equipment, such as earplugs. Otherwise this might cause hearing pain or more serious problems.

1.4 OPERATING HAZARDS

When using the machine be fully aware of the following operating hazards.

1.4.1 METAL CUTTING FLUIDS

Cancer of the skin may result from continuous contact with oil; Particularly with undiluted cutting oils, but also with soluble oils. The following precautions should be taken:

1. Avoid unnecessary contact with oil.
2. Wear protective clothing.
3. Use protective shields and guards.
4. Do not wear oil soaked or contaminated clothing.
5. After work, thoroughly wash all parts of the body that have come into contact with oils.
6. Avoid mixing different types of oils.
7. Change oils regularly.
8. Dispose of oils correctly.

1.5 VARIABLE SPEED DRIVE

Note that these machines are designed to allow fast and easy change of the spindle speed. Take care to ensure that the workpiece is secure and the maximum safe speeds for any operation are not exceeded.

1.6 POTENTIAL DANGER AREAS

Keep away from those areas having moving or rotating machine parts. Do not touch or reach over moving or rotating objects. Although the moving or rotating parts are designed to be shielded by guarding doors or covers, they still might cause a serious accident if not used properly. Fully understand all the safety procedures before starting to use the machine. Beware of potential dangerous areas to avoid any injury or accident.

1.7 MACHINE SAFETY GUARD

The machine is equipped with full-enclosed sheet metal enclosure guards. These guards are interlocked through the machine logic in such a way that the machine conforms to all Health and Safety requirements necessary for CE marking.

WARNING !!!

The machine is equipped with safety devices. Do not change any safety devices on this machine. If changes to these safety devices are made, the manufacturer and our OEM partner will not be responsible for any ensuing issues of product liability. This action will also invalidate any remaining warranty entitlement.

1.8 OPERATING SAFETY PRECAUTIONS

1. Never use the machine without adequate lighting or if the machine light is broken.

2. The floor could become slippery because of spilt water or oil and cause an accident. Ensure the floor is clean, dry and orderly.

3. Keep the machine and work area neat, clean and orderly.

4. Always provide an ample working space.

5. Keep all guards and cover plates in place and all machine cabinet doors closed.

6. Never lay anything on the working surfaces of the machine, where it may foul with rotating or moving parts.

7. Do not touch or reach over moving or rotating machine parts.

8. Do not touch any switch without care.

9. Ensure you know the function of the switch and how to use it before using it.

10. Do not operate the machine in excess of its rated capacity.

11. Stop the machine immediately if anything unexpected happens.

12. Ensure that you know how to stop the machine before starting it.

13. Eye protection must be worn by the operator and all exposed persons operating this machine.

14. Beware to reset the coordinates after you take over the machine unless it is not necessary due to common coordinates when several people share the machine operation.

15. Isolate the machine when leaving it unattended.

1.9 GENERAL PRINCIPLES CONCERNING OPERATOR SAFETY FOR THIS MACHINE CENTER

1. Do not wear rings, watches, ties or loose sleeved clothing.

2. Always use the recommended or equivalent hydraulic oil, lubricant oil and grease.

3. The working table adjacent to the machine should be secured to prevent the workpiece falling onto the machine.

4. Ensure the machine is stopped and the power is off before replacing fuses.

5. Always use fuses with the same specification for replacement.

6. Do not use other workholding devices without checking for compatibility with this machine.

7. Do not touch switches with wet hands that could result in electric shock.

8. Do not touch the electric equipment and operating panel with wet hands, this could result in electric shock.

9. Do not grip a component with grease or oil on it.
   (a) Grip all components firmly.
   (b) Do not attempt to hold components that are too awkward or too difficult to hold.
   (c) Do not hold components that are too heavy for the machine.
   (d) Know how to hold components properly when lifting.

10. Be sure to clean oil or grease from hand tools, levers and handles.

11. Be sure there is enough texture on the surface of the hand tool or lever handle for proper safe hand contact.

12. Grip hand tools and lever handles firmly.
    (a) Always choose the proper hand tool and appropriate grip position on the lever handle.
    (b) Do not use hand tools or lever handles in an awkward position.
    (c) Do not apply excessive force.

13. Always use the recommended gripping position to grasp hand tools and lever handles.

14. Do not use broken, chipped or defective tools.

15. Be sure that the workpiece is immobile in vice or other holding device.

16. Beware of irregular shaped workpieces.

17. Beware of large burrs on workpieces.

18. Always select the correct tool for the job.

19. Do not run the machine unattended.

20. Do not use tools without handles.

21. Always support the workpiece as necessary-using vice.

22. Do not rush work.

23. Never substitute the wrong size tools if the correct sized tool is not available or cannot be located in the shop.

24. Do not move guards while the machine is under power.

25. Do not place hand or body in path of moving objects.
    (a) Beware of moving machine parts that can fall.
    (b) Be aware of where you are moving your hand or body in relationship to the machine.
    (c) Be aware of hands or other parts of the body that may be in position to be hit by a spindle or workpiece.

26. Know the function of each and every control.

27. Never place hand on spindle or workpiece.

28. Make sure power has been turned off when machine is unused for some time.

29. Never start spindle with tool key in the tool.

30. Do not allow distractions to interfere with the machine operations.

31. Do not operate machine while talking.

32. Beware of machine dangers when attending to other aspects of machine operation.

33. Beware of loose clothing near the rotating parts of the machine.

34. Beware of loose hair near the rotating parts of the machine.

35. Beware of performing another operation while in close proximity to the rotating parts of the machine.

36. Be sure spindle is not running when using gauges on the machine.

37. Always wear protection before operating the machine.
    (a) Never remove protection for even a short time when operating the machine.
    (b) Wear protective devices correctly.
    (c) Know the correct way to wear protective devices.

38. Beware of material and tool flying from the machine.

39. Beware of where you leave tools during set up.

40. Keep protective guards at the point of operation.
    (a) Know how to set or attach protective guards properly.
    (b) Never use the wrong protective guard.
    (c) Know how to select the proper guards.

41. When the spindle and workpiece are in motion, never reach over under or around a workpiece to make an adjustment.

42. Never reach over, under or around a workpiece to retrieve anything.

43. Never reach over, under or around the workpiece to tighten a machine part.

44. Never reach over, under or around a workpiece to move hand tool to another position.

45. Never reach over, under or around a workpiece to remove swarf.

46. Know the proper procedure for applying loads. Never apply force from an awkward position.

47. Never mount a workpiece too large for the machine.

48. Never mount a workpiece too large for the operator to handle.

49. Use the equipment necessary for handling workpieces.

50. Never apply undue force on an accessory.

51. Secure all workpieces.

52. Secure all nuts, bolts and blocks.

53. Always use the correct equipment.

54. Never take cuts beyond the machine's capability.

55. Never use excessive forces in polishing, filing.

56. Always use the proper hand tool to remove swarf.
    (a) Never hurry to remove swarf.
    (b) Beware of swarf wrapped around the spindle or workpiece.

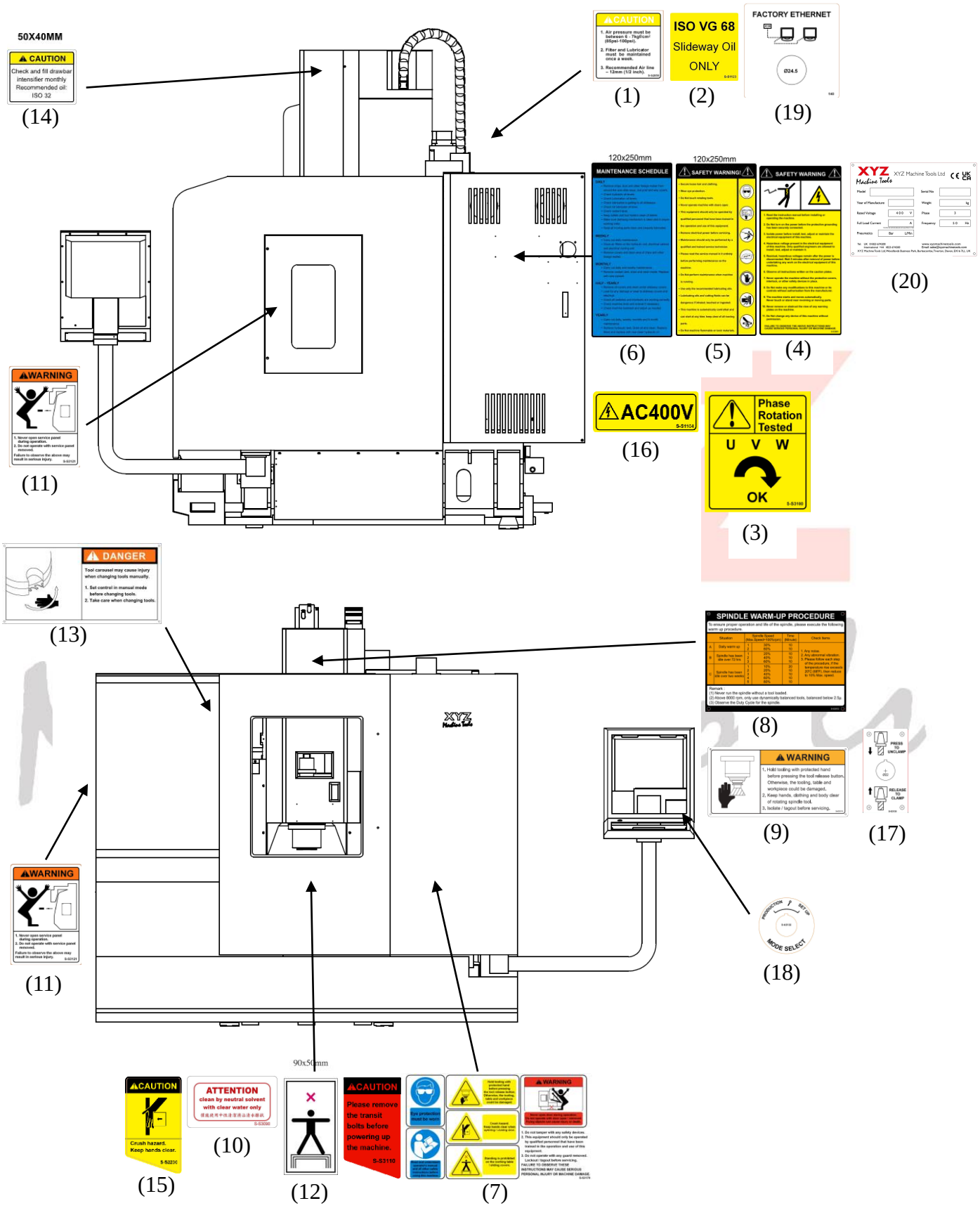
57. Beware of tools or machine parts falling on controls.

58. Do not change the original setting parameters unless it is necessary. Always keep records of the original setting values before change.

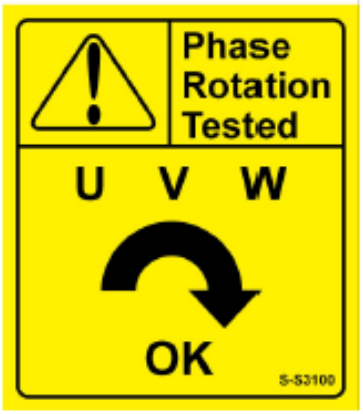
59. Do not blur, block or take away any plates and signs for warning、notice、danger. Please contact us or our local dealer or distributor to purchase a new plates or signs.

60. Disconnect the circuit breaker of the main power immediately if the power supply is short or unstable.

1.10 SIGNS

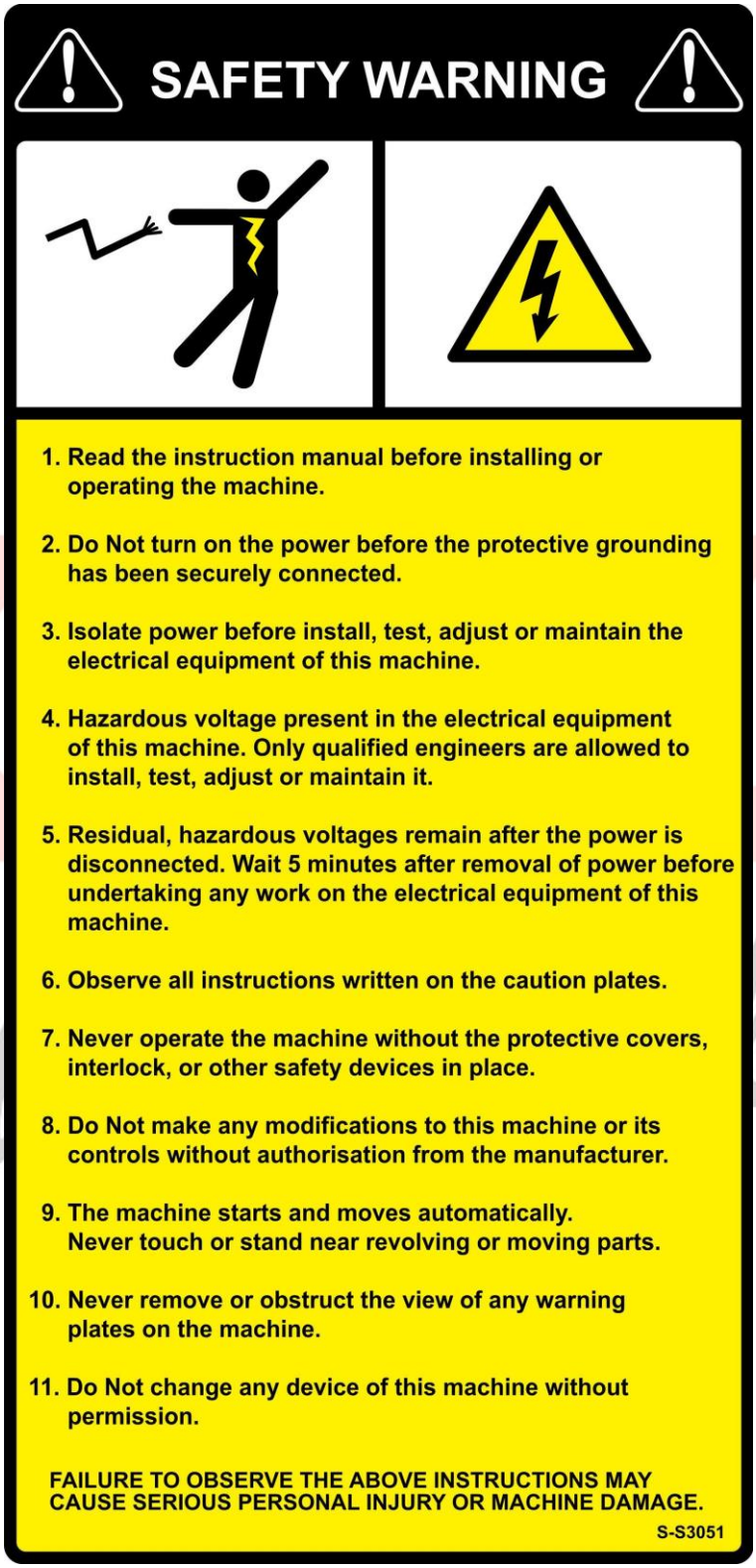

50X40MM
CAUTION
Check and fill drawbar intensifier monthly
Recommended oil: ISO 32
(14)
CAUTION
1. Air pressure must be between 6 - 7kgf/cm² (85psi-100psi).
2. Filter and Lubricator must be maintained once a week.
3. Recommended Air line – 12mm (1/2 inch)
(1)
ISO VG 68
Slideway Oil
ONLY
(2)
FACTORY ETHERNET
Ø24.5
(19)
120x250mm
MAINTENANCE SCHEDULE
(6)
120x250mm
SAFETY WARNING!
(5)
SAFETY WARNING
(4)
XYZ Machine Tools
(20)
WARNING
(11)
AC400V
(16)
Phase Rotation Tested
U V W
OK
(3)
DANGER
Tool carousel may cause injury when changing tools manually.
1. Set control in manual mode before changing tools.
2. Take care when changing tools.
(13)
SPINDLE WARM-UP PROCEDURE
(8)
WARNING
1. Hold tooling with protected hand before pressing the tool release button. Otherwise, the tooling, table and workpiece could be damaged.
2. Keep hands, clothing and body clear of rotating spindle tool.
3. Isolate / lagout before servicing.
(9)
PRESS TO UNCLAMP
RELEASE TO CLAMP
(17)
WARNING
(11)
PRODUCTION
SET UP
MODE SELECT
(18)
90x50mm
CAUTION
Crush hazard. Keep hands clear.
(15)
ATTENTION
clean by neutral solvent with clear water only
(10)
(12)
CAUTION
Please remove the transit bolts before powering up the machine.
S-S3110
WARNING
(7)

1.10.1 MACHINE SIGNS

(1) S-S2050 Air Pressure Request Caution	
(2) S-S1123 ISO VG 68	
(3) S-S3100 Phase Rotation Tested	

(4) S-S3051

Safety Warning



(5) S-S3040

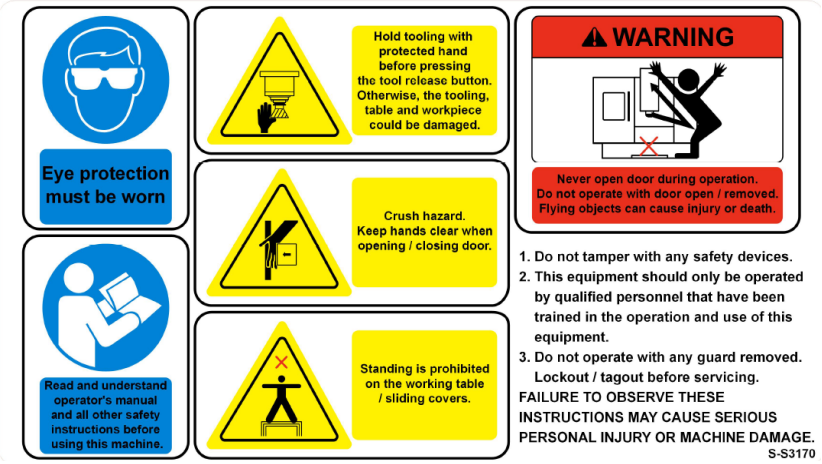
Safety Warning

(6) S-S3030

Maintenance Schedule

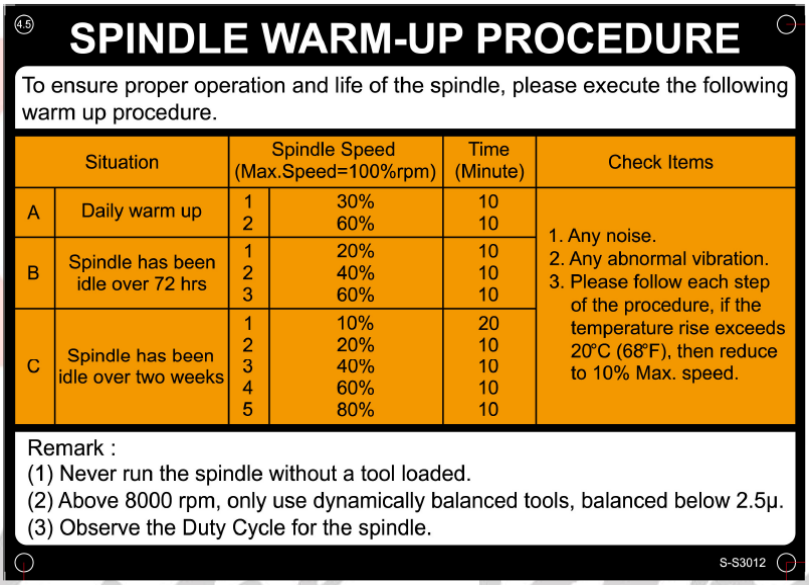
(7) S-S3170

VMC Safety F Warning



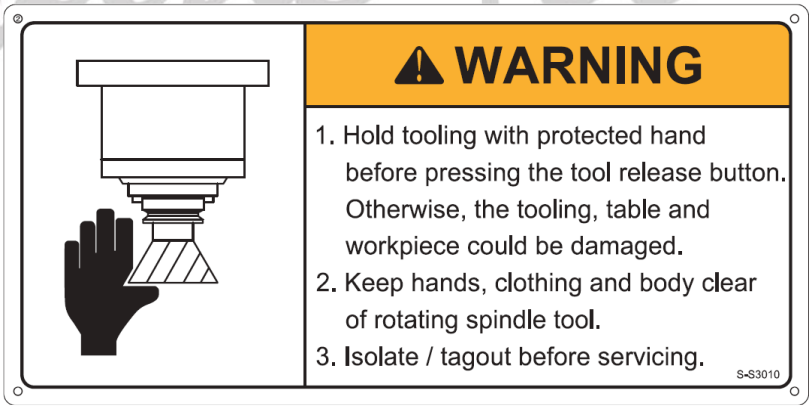
(8) S-S3012

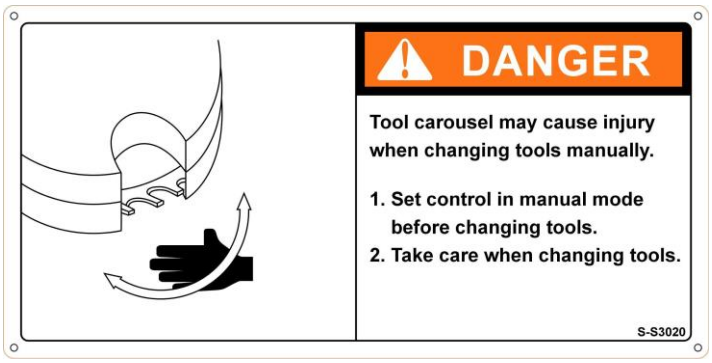
Spindle Warming Up Procedure

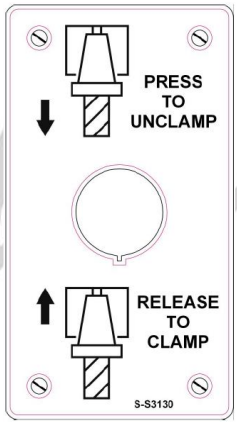


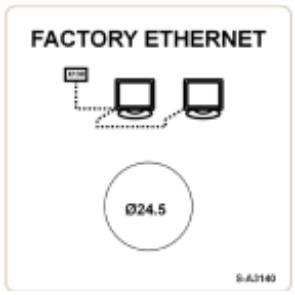
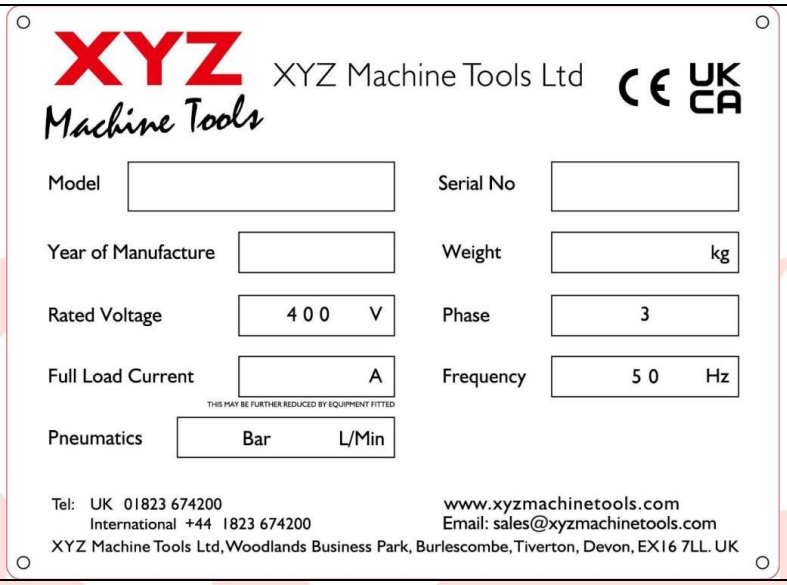
(9) S-S3010

Spindle Rotating Warning



(10) S-S3090 Window Clean Attention	
(11) S-S3121 Service Panel Warning	
(12) S-S3070 Standing Prohibit Warning	
(13) S-S3020 Tool Change Warning (on Carousel type ATC)	

(14) S-S3080 Power Drawbar Request Caution	
(15) S-S2230 Crush Hazard Caution	
(16) S-S1104 AC400V	
(17) S-S3130 Drawbar Button Panel	
(18) S-A3132 Mode Select Switch	

(19) S-A3140 FACTORY ETHERNET	
(20) S-B1029 XYZ Machine Body Plate (blank)	

1.10.2 MACHINE SHIPPING SIGNS

S-S3110 Shipping Brackets Caution	

NOTE!!!

On the machine there are shipping brackets the hold the machine head, ATC and axes in place during shipping. These brackets must be removed before operating the machine. Do not discard the shipping brackets. The shipping brackets must be replaced if the machine is ever moved.

CHAPTER 2

SHIPPING AND HANDLING

PLEASE READ CAREFULLY BEFORE SHIPPING

AND HANDLING OF THIS MACHINE

2.1 SHIPPING AND HANDLING

This machine is composed of headstock, tool magazine, main column, working table, saddle, bed base, operation panel, lubrication system, electrical cabinet and CNC unit. Those components are connected with electrical cables and or pneumatic piping circuit.

During transportation, the machine body and coolant tank are packed separately. The shipping and handling equipment used should be able to lift a gross weight of 10 tons at least. Due to sizes of the machine, it is recommended to lift this machine with crane and use only the sling frame provided by us. Read the following section carefully before handling the package.

2.1.1 DANGERS

Ensure that the shipping and handling equipment can handle a gross weight of 10 tons at least. If you cannot be certain of the load capacity, please contact the supplier of the handling equipment.

Do not try to lift the machine if the load capacity of the lifting equipment is unknown.

Use only the sling frame provided by us to lift this machine. Use of any other sling frame is prohibited because damage to machine, equipment may occur or also personnal injury. Ensure the wire ropes can withstand at least a gross weight of 10 tons if they are used with the lifting equipment to lift the machine.

2.1.2 WARNINGS

1. Ensure the lifted machinery package is balanced before starting to move it.

2. Abrupt changes in lifting & lowering speed might cause unexpected damage to the machinery package and are therefore prohibited.

3. No people or vehicle is allowed to stay under the lifted package.

4. Make sure nobody is around the working area before starting to lift the package. Holding onto the sling frame or wire ropes by any person is very dangerous and is definitely prohibited.

2.1.3 NOTICES

1. Check if there are any people or blockages around the working area before starting to lift the package. Blockages should be removed and people told to leave before proceeding.

2. Do not stop the lifting motions suddenly during the process. Prevent sudden movement of the machine, too quick and the machine could become unbalanced. This might reault in a serious accident that causes the machine to drop.

3. Only qualified people are allowed to operate the lifting equipment to handle this machinery package so that accidents are prevented.

NOTE!!!
The packing is subject to change without prior notice.

2.2 LIFTING WITH THE MACHINE PACKED

2.2.1 SAFETY RULES FOR MACHINE LIFTING

The following safety rules must be absolutely followed when lifting and/or moving the machine：

1. Use a forklift of sufficient capacity to raise or move the packed or machine.
2. Pay special attention to machine balance while lifting.
3. Have another person to help guide the way while lifting the machine.
4. Make sure the forks of the forklift protrude past the far edge of the machine base.
5. Do not raise the machine too high as this may cause a loss of stability.
6. The forklift should be driven by experienced personnel.

2.2.2 USING FORK-LIFTING TRUCK

This machine should be lifted and moved by a forklift. Attention should be paid to the machine balance during lifting and moving. This machine should be lifted under the following conditions：

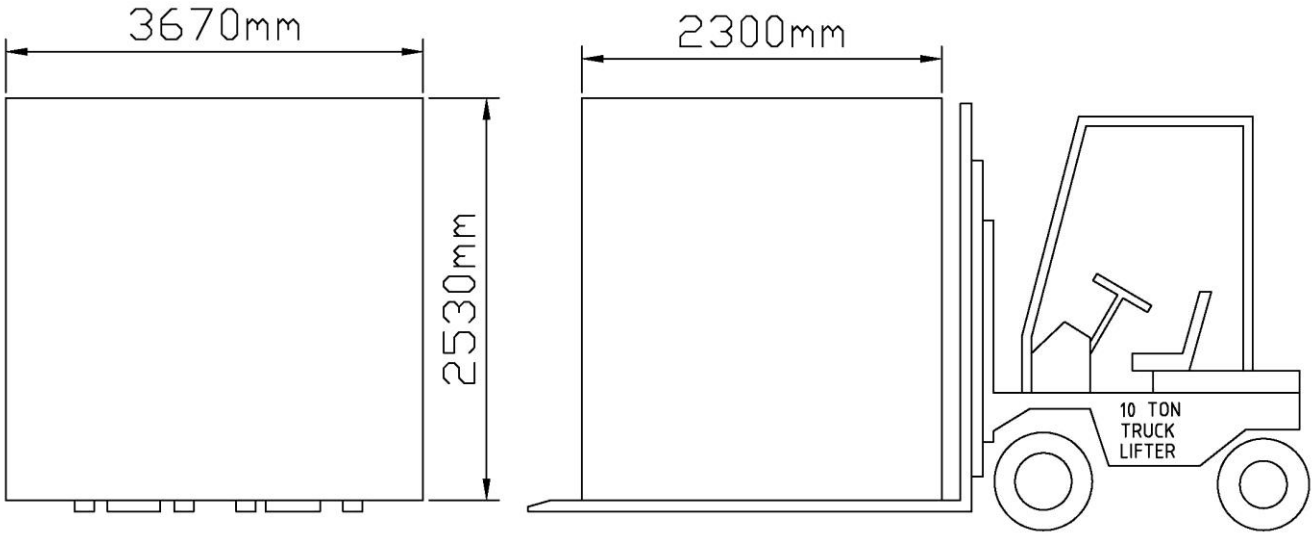
1. The loading capacity of the lifting equipment should be 10 tons at least.

2. Wire cables and chains of the lifting equipment should be able to bear a load of 10 tons at least.

3. The packed machine is 3670 mm in width, 2300 mm in depth and 2530 mm in height. Ensure nobody is in the way and the path is not blocked before moving the packed machine. It could prevent the machine from collision.

4. Beware that the lifting truck might overturn because of an improper lifting height. This might cause people injury and damage the machine.

5. Always assign a person to guide the way to ensure safety.



2.2.3 SLING CRANE OR OTHER LIFTING EQUIPMENT

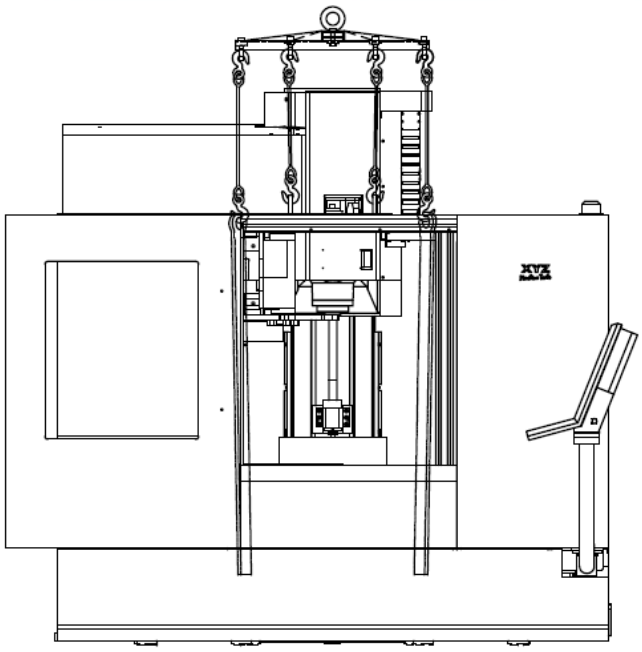
1. The loading capacity of the lifting equipment should be 10 tons at least. The loading capacity below10 tons is prohibited.

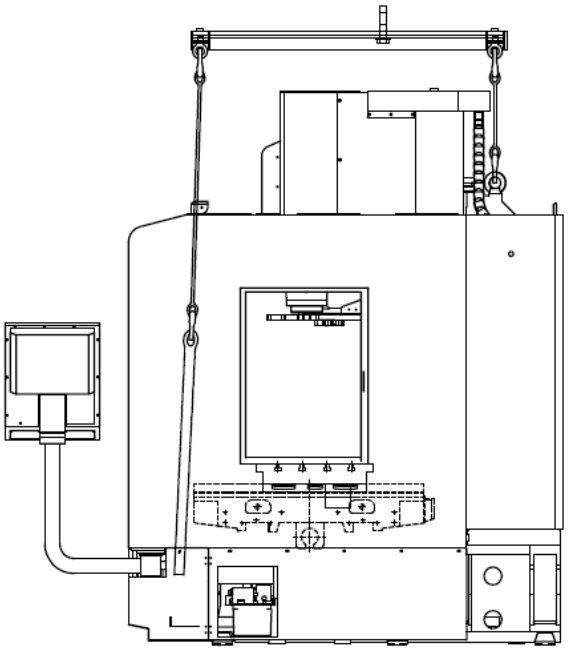
2. This machine is 2800 mm in width, 2610 mm in depth and 2810 mm in height. Ensure nobody is in the way and the path is clear before commencing to move the machine. Otherwise collision with the machine might occur.

3. Pay special attention to machine balance while lifting. Please adjust the machine like the figure.

4. Beware that the machine might be overturned because of an improper lifting height. Otherwise injury to people or machine damage may occur.

5. Always assign a person to guide the way to ensure safety.





2.3 FIX MACHINE DURING TRANSPORTATION

2.3.1 HEAD

Move the working table to the middle and move the saddle to the main column as close as possible. Place a wooden block on top of the table, them lower the head slowly until it rests on the wooden block.

2.3.2 TOOL MAGAZINE (CAROUSEL TYPE ATC)

Install a shipping block on left side of magazine to lock the position durning transportation.

2.3.3 OPERATION PANEL

Install a support plate under the panel's pivot to support the operation panel.

2.3.4 POWER CABINET

Place wooden blocks under the power cabinet to support the power cabinet.

2.3.5 MISCELLANEOUS

Ensure to fasten all the loose parts firmly inside the crate.

2.4 REMOVE FIXTURE

Ensure to remove all the fixtures listed below before operating the machine：

1. Remove the wooden block under the headstock.
2. Remove the fixture which fix the working table.
3. Remove the support plate under the operation panel.
4. Remove the fixture of the sliding doors.
5. Remove the steel rod and washer fixing the counterbalance weight.
6. Remove all fixtures on the machine.

2.5 STORAGE

2.5.1 STORAGE WITH THE MACHINE PACKED

1. Ensure to fasten all the loose parts and have an anti-rust treatment of the machine.
2. Ensure to fix the machine firmly inside the crate to prevent the machine move from falling.
3. Ensure to enclose the machine with a waterproof cover to keep this machine fro moisture or corrosive substance. It prevents the mechanical and electrical parts from damage.
4. Ensure to put an anti-moisture substance inside the crate.
5. Do not place the whole packing directly under the sunlight or near any other heat source.
6. Keep away from any corrosive substance or any equipment causing abnormal vibration.
7. The ambient temperature and moisture should be moderate and kept as constant and smooth as possible.

2.5.2 STORAGE OF THE BARE MACHINE

1. Ensure to fasten all the loose parts and have an anti-rust treatment of the machine.

2. Ensure to fasten all the sliding guards and doors to prevent from moving even falling.

3. Ensure to enclose the machine with a waterproof cover to keep this machine from moisture or corrosive substance. Otherwise might cause the mechanical and electrical parts damage.

4. Ensure to put anti-moisture substance inside the electric cabinet, operating panel, and any other enclosure of this machine.

5. Do not place the machine directly under the sunlight or any other heat source. Keep away from any corrosive substance or any equipment causing abnormal vibration. The ambient temperature and moisture should be moderate and kept as constant and smooth as possible. Otherwise might cause the mechanical and electrical and electrical parts damage.

6. Ensure all the power supplies are off and the main power supply cables are taken off before put the pack in store.

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CHAPTER 3

INSTALLATION

PLEASE READ CAREFULLY BEFORE

INSTALLATION OF THIS MACHINE

3.1 PREPARATION

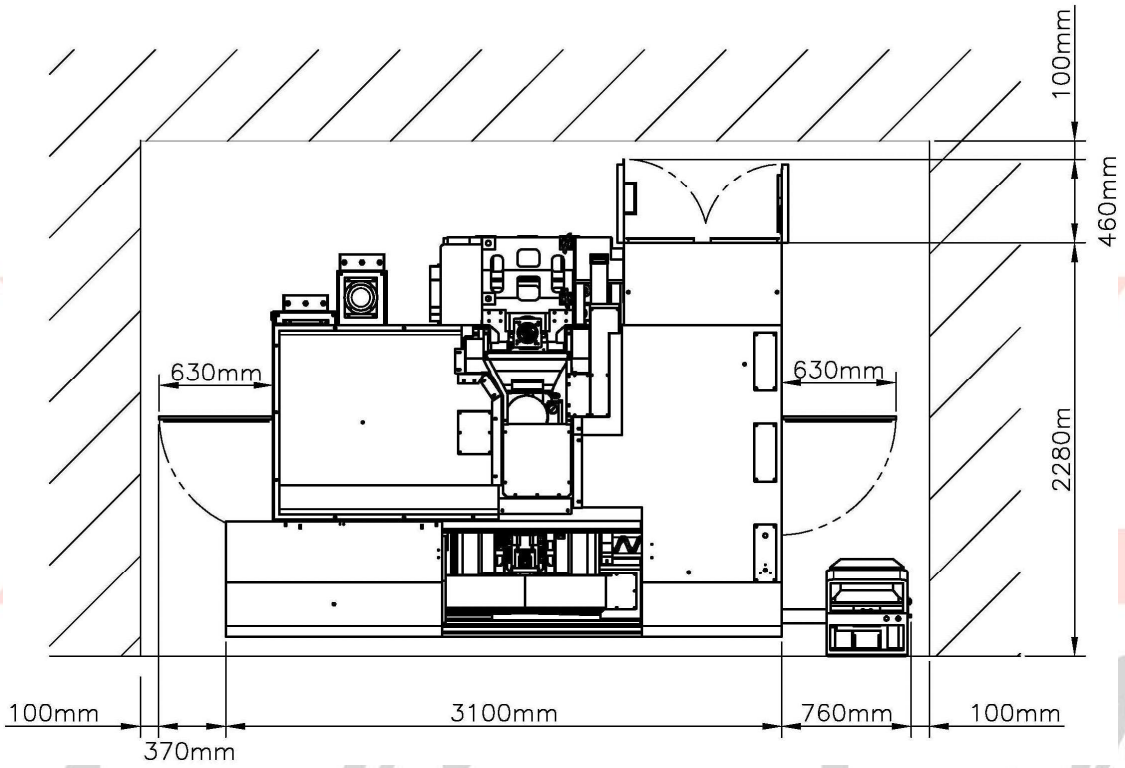
Ensure the site space and the path width is large enough to install and transport the whole machine at least 30 working days before the arrival of this machine. If short of space, please inform local agent or us as soon as possible, we will provide a suggestion and information service for you. Please clear the space in advance for the machine to move in and install.

WARNING !!!

Ensure to reserve space for optional equipment. Please contact local agent or contact us if you have any problem in installing this machine.

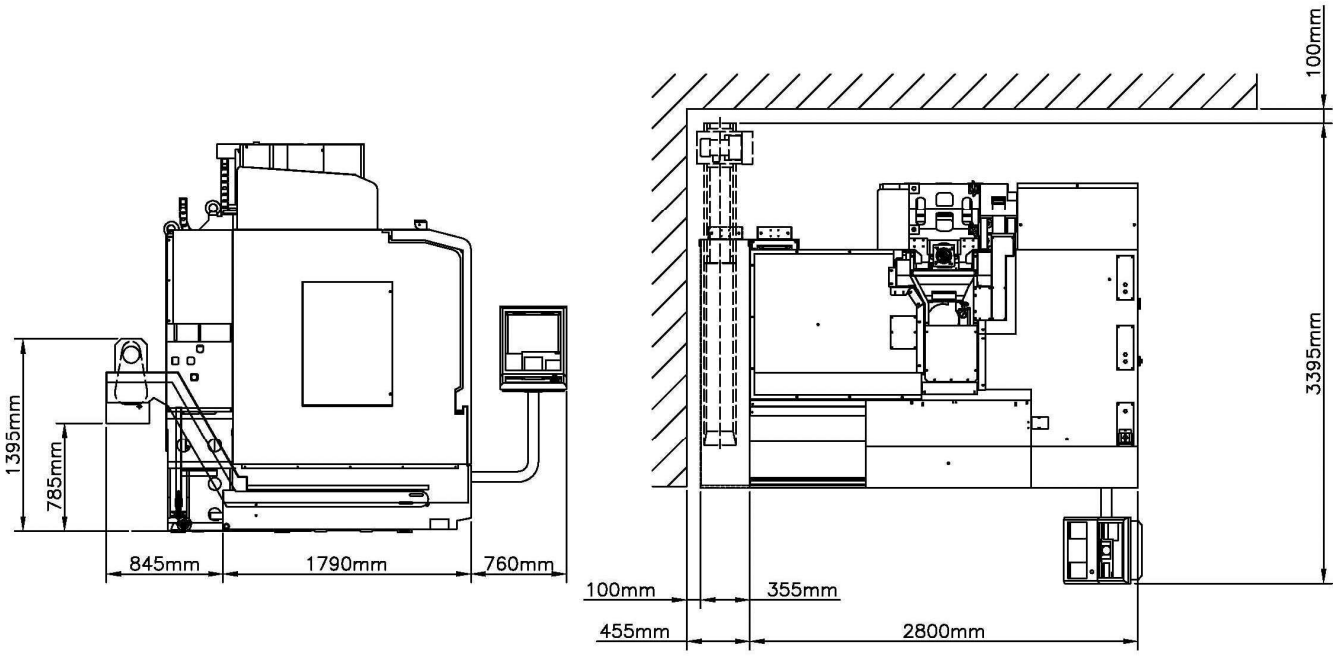
3.1.1 SPACE REQUIREMENT (STANDARD)

A distance of at least 500 mm is required from machine to wall end objects or between machines to ensure easy repair, cleaning and maintenance of machine. Recommended site space for the machine with standard equipment is shown below.



3.1.2 SPACE REQUIREMENT (WITH CHIP CONVEYOR)

If machine is with Chip Conveyor, a distance of at least 455 mm is required from machine left side to well end objects or between machines.



3.2 INSTALLATION LOCATION

To ensure the operation efficiency and accuracy of this machine, a proper foundation is required.

It is recommended that this machine should be located in a plant with ambient temperature : 5°C~40°C, and without the influence of dampness, chemical gas
or vibration.This machine should be installed under the following conditions：

1. Do not install the machine in a location near vibration sources, such as air compressor, punch press, etc. Otherwise poor machining accuracy may result.

2. Do not expose this machine and its NC controller to direct sunlight, moisture, etc.

3. Keep this machine away from dust, corrosive substances, etc.

3.2.1 ENVIRONMENTAL REQUIREMENT

This machine should be installed under the correct environment as following：

1. Supply voltage：90% to 110% of the rated voltage.

2. Source frequency：Rated frequency ±1 Hz.

3. Ambient temperature： 5˚C to 40˚C.

4. Altitude: shall be at altitudes under 1000m above mean sea level.

5. Relative humidity – less than 90%, and not exceed 50% at 40°C.

6. Atmosphere: Free from excessive dust, acid fumes, corrosive gases and salt.

7. Do not expose the machine directly under sunlight or heat source, which might result in considerable environmental temperature changes.

8. Do not place the machine near any abnormal vibrations.

9. Do not place this machine near to magnetic and static electric fields.

10. Do not place this machine near to air compressors or presses.

11. Do not place this machine near any equipment causing electronic noise.

12. Electrical equipment shall withstand the effects of transportation and storage temperature within a range of -25°C to 55°C and for short periods not exceeding 24 hours at up to +70°C.

3.3 FOUNDATION CONSTRUCTION PLAN

This machine should be placed upon a solid foundation to maintain the machine accuracy for a long life. Dig the planning site to about 100cm underground. Pave the bottom with a layer of pebble 20 cm thick, then fill the site with concrete. The foundation surface should be level and flat. Ensure to reserve spaces for the foundation-fixing studs. Please refer to the section of foundation construction plan for details.

3.3.1 FOUNDATION CONSTRUCTION PLAN ONE

1. Ensure the foundation construction work is finished at least 12 days prior to the arrival of the machine. Refer to the following foundation construction diagrams for details. The construction procedures are listed as follows: Dig the foundation site. Pave the site bottom with a layer of pebble stone.

2. Ensure to reserve 6 spaces for installing the L shape fixing studs and foundation pads before filling up the foundation site with concrete. Ensure those 6 surfaces are level and flat.

3. After the concrete is dry and solid, place temporary foundation pads on those 6 reserved spaces, then place the machine above the foundation pads. Ensure to leave a space of 50mm between the machine base bed and ground to install the L shape fixing stud.

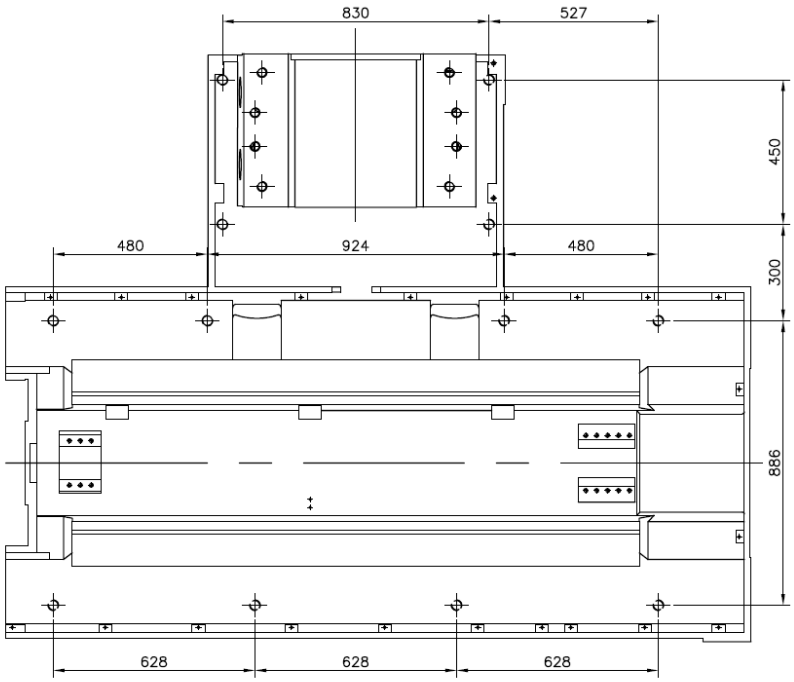
4. Place foundation pads on those reserved spaces, insert the L shape fixing stud through the foundation pad and foundation bolt, then fasten the fixing stud with the nut, as shown in the following figures.

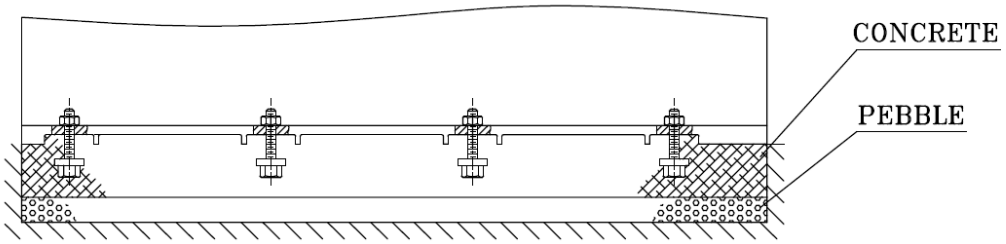
5. Adjust the L shape fixing studs based on dimensions shown in the following figures. (see 3.3.3) Fill up those reserved spaces with concrete. Level the machine after the concrete is dry and solid.

3.3.2 FOUNDATION CONSTRUCTION PLAN TWO

Ensure the ground is rigid enough to place the machine. Place the leveling blocks on the ground, then place the machine upon the leveling blocks. Level the machine accordingly. (see 3.3.3)

3.3.3 FOUNDATION CONSTRUCTION





WARNING!!!

After Leveling the machine base, you need to lock 8 reserved spaces as well.

3.4 ELECTRICAL REQUIREMENT

This machine should be installed under the correct electrical environments.

WARNING!!!
Before connecting the power wires, make sure the voltage is the same for both the machine and the plant power.

3.4.1 POWER SUPPLY

1. Ensure all the associated connections and wiring are appropriate, that is, connections and wiring should conform with the local safety rules at least.

2. Ensure to install an adequate current-fault breaker(see 3.4.5) prior to the power supply switch or transformer of this machine.

3. Thread the power supply cable through the cable inlet positioned at the lower right side of the machine, rest the cable upon the electric cabinet frame, then connect the cable to the main power supply switch of this machine.

3.4.2 POWER WIRING

Follow the instructions below to wire power：

1. Ensure the electrical cables have the same or better power rating as prescribed in the electrical document.

2. Only qualified engineers are allowed to connect the power cable of this machine.

3. Do not connect any power cable that might generate signal noises on the power panel of the machine.

4. Do not connect the power cable of the machine to any power source or power panel that might cause an abrupt voltage drop.

5. Remove all the anti-moisture substances placed inside the cabinets or panels.

6. Ensure to turn off all the power supplies and place “Under Installation High Voltage Equipment. Do not turn on the Power” warning signs in front of the main power supply switch before connecting the power supply.

WARNING !!!

Only qualified engineers are allowed to install or maintain the electrical equipment of the machine. Failure to do so will result in a serious accident.

3.4.3 GROUNDING

Connect the connector marked with “PE” inside the electric cabinet to the external grounding conductor. If it is no “PE” wiring on the external power supply system, please prepare one ground wire and set a grounding copper rod into the ground, then connect the “PE” connector on the electric cabinet and the ground rod with the ground wire.

The minimum cross section area of the grounding wire cable used is 14 mm^2. The impedance of the grounding wire should be less than 100 ohm(Class 3 grounding). Dimensions of this wire should be larger than A W G No.5 and S W G No.6 . (Ensure this NC machine is grounded to a individual grounding rod.) If this kind of arrangement is not possible, please ground the machine based on the following instructions：

1. The grounding wire of the machine should be connected to its own grounding terminal individually. This kind of arrangement could prevent external grounding current overflow into this machine. This overflow current might result in a serious damage on this machine and is prohibited.

2. The reinforced concrete steel rod is usually used as a grounding terminal because of its low resistance to ground (less than 100 ohm). In doing so, please make connections according to the following instructions. These instructions are also valid when connecting ground wires to other types of grounding terminal. (see 3.4.4)

3. Do not share the grounding terminal of this machine with other equipment, such as welding equipment and high frequency induction machine.

4. Ensure the power rating of the grounding terminal is compatible to the power rating of this machine.

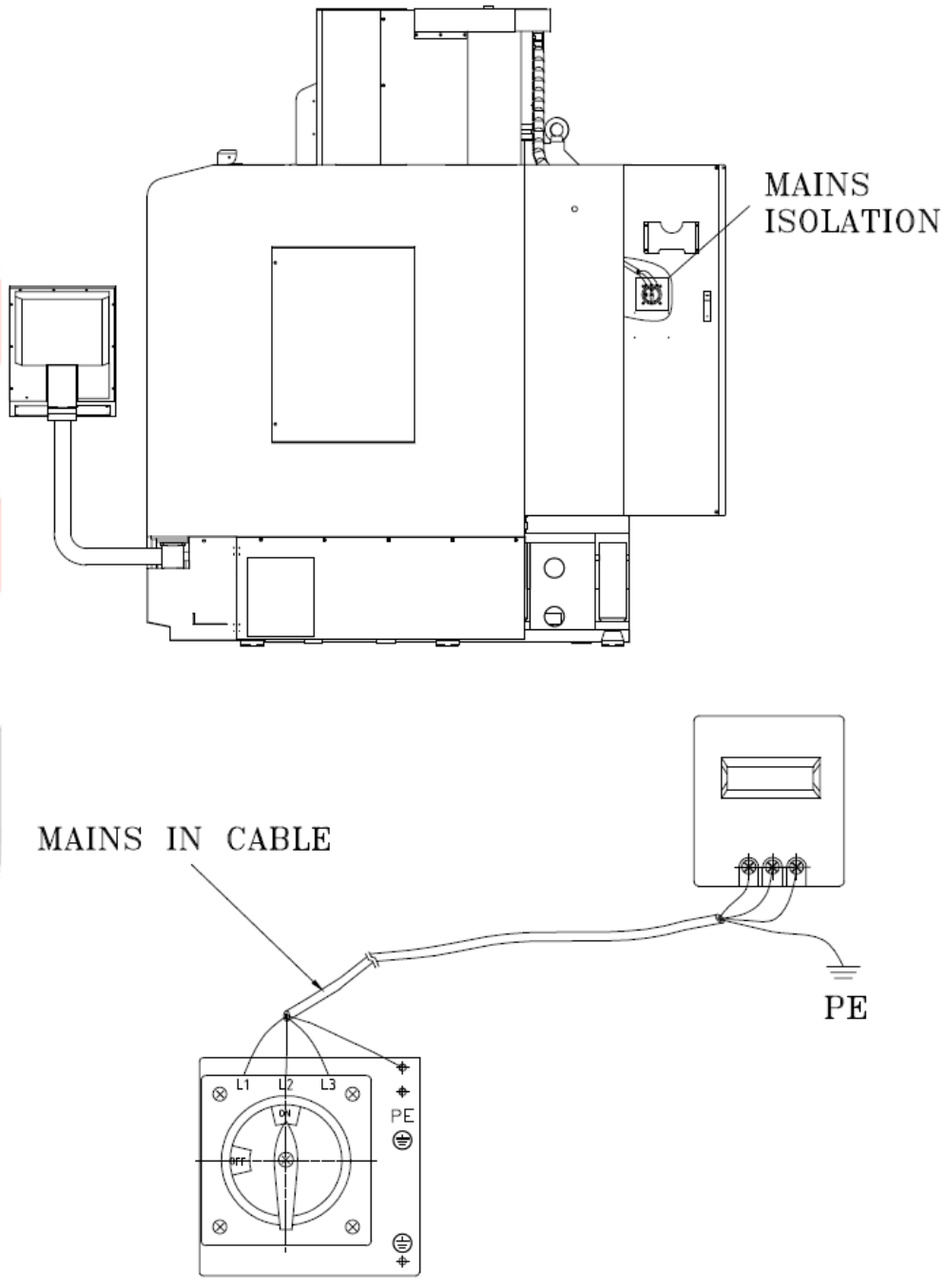
5. Always use an isolated grounding wire with a minimum length.

6. Be sure to measure the impedance to ground of the grounding device if only one equipment is connected, and the resistance should be less than 100 ohm.

WARNING !!!

Don’t turn on the power before the protective grounding has been well connected. Otherwise this might result in a serious accident.

3.4.4 ELECTRICAL CONNECTION



3.4.5 SPECIFICATION OF ELECTRICAL REQUIREMENT

EX：

KVA ：[11 kW + (3.1 kW + 3.1 kW + 3.1 kW) X 0.8 + 1.9 kW + 2 kW] / 0.746
= 29.946 KVA = 29946 VA

220V：[(29946 VA / 220V)/1.732] x 1.2 = 94.3 A

380V：[(29946 VA / 380V)/1.732] x 1.2 = 54.6 A

400V：[(29946 VA / 400V)/1.732] x 1.2 = 51.9 A

415V：[(29946 VA / 415V)/1.732] x 1.2 = 50 A

CONTROL：SIEMENS (STANDARD)

Total power capacity of the equipment： 24.2 kW				
No.	**Voltage**	**Power Consumption**	**Wire**	**Current-fault breaker**
1	220V	94.3 A	≧ 22 m㎡	100 A
2	380V	54.6 A	≧ 10 m㎡	60 A
3	400V	51.9 A	≧ 10 m㎡	60 A
4	415V	50 A	≧ 10 m㎡	60 A

3.5 LEVELING THE MACHINE

3.5.1 ADJUST THE MACHINE

If this machine is not installed properly, its bed may become twisted. Even a slight amount of twist will move centers out of alignment, and result in inaccurate work. Adjust the machine leveling under the following procedures：

1. Place the temporary foundation pads or leveling blocks on the foundation.

2. In the first case, insert the L-shape fixing stud through the pad and foundation bolt, then fasten the fixing stud with the nut.

3. Adjust foundation bolts until the space between the base bed and foundation pad is 5mm (approx.) long.

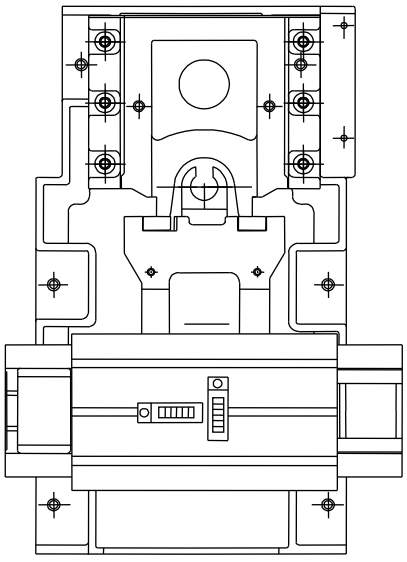
4. Place two horizontal levels on the working table orthogonal, level the machine until differences between levels in both directions are within 0.05mm/m.

5. Fasten the setup nuts for the foundation pads and L shape-fixing studs.

6. Fill up the foundation with concrete.

7. Wait for about seven days until the concrete is dry and solid.

8. Place two 200mm long horizontal levels on the working table orthogonal, level the machine until difference between levels in both directions is within 0.02 mm/m.



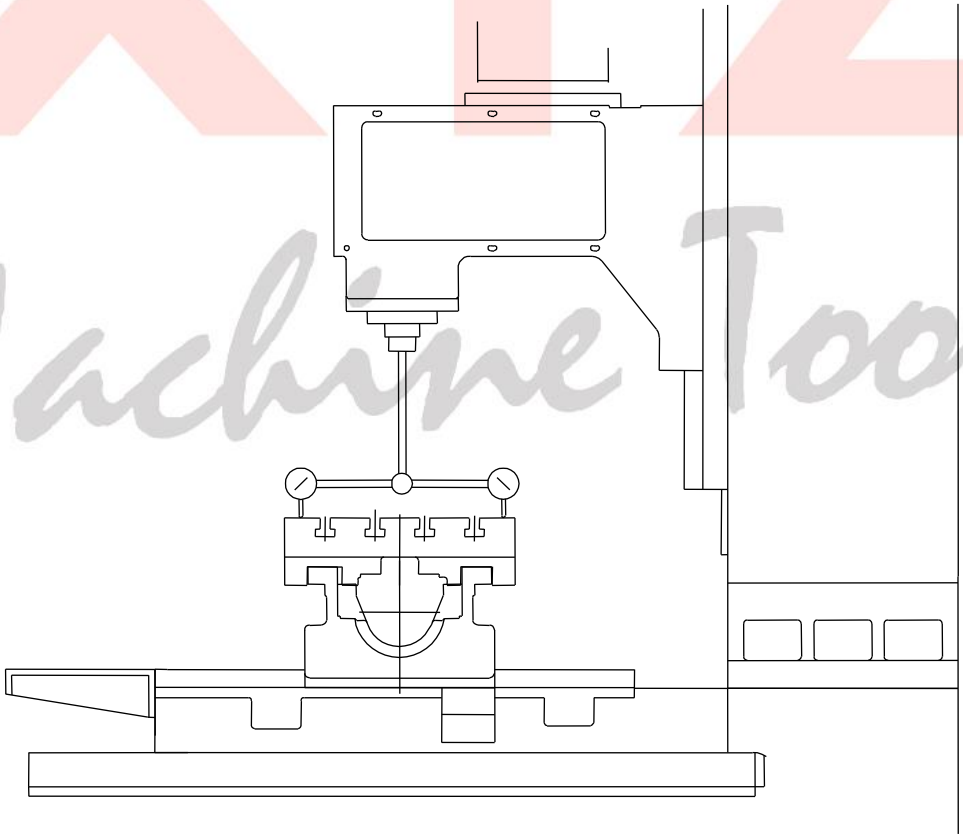
3.5.2 ADJUST THE SQUARE BETWEEN THE SPINDLE CENTERLINE AND THE WORKING TABLE SURFACE

1. Hold the dial gauge set directly under the spindle.

2. Ensure the distance between the dial gauge probe and spindle centerline is around 160 mm.

3. Move the headstock along the Z direction until the dial gauge probe touches the working table surface.

4. Rotate the spindle and measure the value. If any value is over the standard value, please adjust the machine.



3.5.3 ADJUST THE SQUARE AMONG THREE ORTHOGONAL

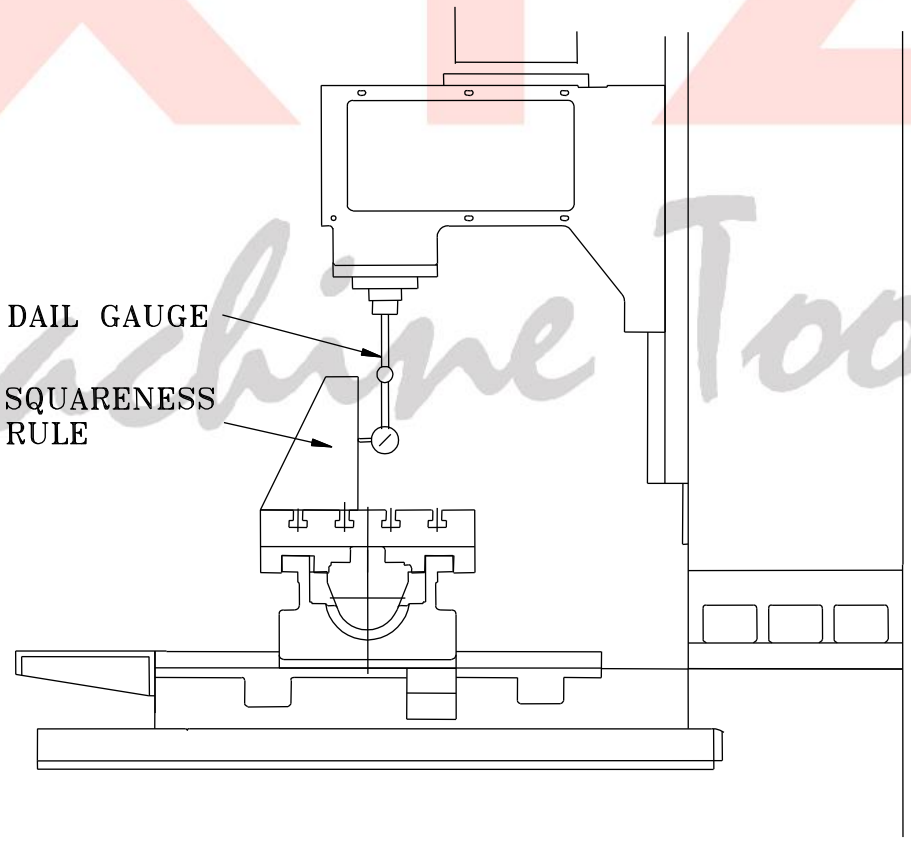
1. Prepare the dial gauge set and granite square.

2. Place the granite square on the working table.

3. Hold the dial gauge set directly under the spindle.

4. Move X, Y and Z direction to level the machine until readings at both ends are the same.

5. Measure the square among three orthogonal. If the values are over the standard value, please adjust the machine.



3.6 INSPECTION

3.6.1 BEFORE POWER START-UP

1. Ensure the power supply specification is correct.
2. Ensure electric cables and connectors are appropriate based on the local safety regulations.
3. Ensure connections between the machine and grounding terminals are correct.
4. Ensure the current-fault breaker required by the local safety regulations is installed on the power supply side.
5. Ensure all the temporary fastening equipment used during the transportation process is removed.
6. Ensure there are no loose parts on the working table.
7. Ensure there are no loose parts on the folding guard.
8. Ensure all the fixing studs are fastened properly.
9. Secure nuts, bolts, locks, and other parts needed to be secured.
10. Ensure the hydraulic, pneumatic, and cutting coolant systems are connected properly.
11. Ensure safety-guarding shields and doors are in a good condition.
12. Ensure the hydraulic oil, lubricant, and cutting coolant are filled up to the required level.
13. Ensure all the over-travel limit switches are working.
14. Ensure tension of the spindle drives belt is appropriate.
15. Ensure there is no unexpected person or substance around the machine before starting up the machine.
16. Read manuals carefully and ensure you understand all the safety instructions and operating procedures before starting up the machine.

3.6.2 AFTER POWER START-UP

Make sure the power source wires are connected to the right connection points. Follow the instructions below to check the power wiring：

1. Ensure functions of the power supply switches are normal.

2. Ensure the hydraulic pump and cutting coolant pump work normally. Stop the machine immediately if the pressure indication is abnormal. Check the power supply wiring connection if necessary.

3. Ensure the emergency stop switch.

4. Ensure the lubrication pump work and all the machine parts are lubricated properly.

5. Ensure the stroke-limiting functions specified by the NC programming codes and over-travel limit switch work.

6. Run the test program to ensure the machine is in a normal condition.

7. A time interval of more than 30 seconds is required between power switch off and on at the mains isolator to allow the machine interval self checking circuits to fully reset.

WARNING !!!

Only qualified engineers are allowed to install or maintain the electrical equipment of the machine. Failure to do so will result in serious accident.

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CHAPTER 4

OPERATIONAL PROCEDURE

PLEASE READ CAREFULLY BEFORE

STARTING TO OPERATE THIS MACHINE

4.1 MACHINE

The information about how to operate this machine is given below. Please read carefully before starting to operate this machine.

4.2 SAFETY EQUIPMENT

1. Fully-enclosed guard.

2. Emergency stop push button.

3. NC programming codes written to limit the traveling distance.

4. Interlock relationships specified by the NC software codes to prevent wrong operation of this machine.

4.3 BEFORE START-UP

Ensure all wires and cables are insulated properly before starting up this machine. Failure to do so could lead to earth leakage and electric shock.

WARNING !!!
Ensure the capacity is correct before turning on the power supply.

4.3.1 INSPECTION BEFORE TURNING ON THE POWER

1. Ensure there is no loose wiring or loose connections.

2. Ensure the electrical cabinet, doors of the NC controller and other safety guarding doors are closed.

3. Ensure all the machine parts are secured and fixed properly.

4. Ensure all the oil levels are normal.

4.3.2 WARNINGS

1. Ensure you know how to use this machine before starting it.

2. Always wear the correct personal protection equipment (PPE), such as safety goggles, oil-proof safety shoes, safety uniform, etc. before starting the machine.

3. Ensure all of the doors and guards of the machine, the operating panel and the main power supply panel are closed before starting up the machine.

4.3.3 NOTICES

1. Ensure that the incoming power supply is sufficient to run all of the units of this machine before starting up the machine.

2. All of the cables should be protected from contact with chips, which might result in an electrical short circuit.

3. Always clean and lubricate all of the sliding surfaces before starting up the machine if the machine is just unpacked or has not been used for a long time. Run the lubrication system for a while until all of the sliding parts are lubricated adequately before starting to use the machine.

4. Always use the proper type of lubrication oil as indicated in the nameplate or the manual.

5. Check all of the switches, push buttons and operating levers to make sure they can be operated smoothly.

6. Check the oil level of the oil tank regularly. Fill it up if necessary.

7. Check the coolant level of the cutting fluid tank regularly. Fill it up if necessary.

4.4 NORMAL SWITCH ON / OFF PROCEDURE

4.4.1 NORMAL SWITCH ON PROCEDURE

1. Turn on the main power supply isolating switch (factory equipment).

WARNING !!!
Ensure that the mains supply is adequate before switching on.

2. Turn on the main power isolating switch (machine cabinet).

3. Once the control system has powered up release any emergency stop pushbuttons and press the “RESET” pushbutton on the operators machine control panel.

4. If the main door is closed there will be a message to open/close it as part of the Safety test procedure. Please open and close main door and the Safety test procedure will test the emergency stop circuit by creating an emergency stop condition.

5. While the Safety test is running the Safety test button and the 3 stage warning lights will flash.

6. Once the Safety test procedure is finished the machine is ready for operation.

4.4.2 EMERGENCY STOP PROCEDURE

Should any condition occur which requires an emergency stop, press one of the red emergency stop push buttons on the main machine control panel or the handwheel. Twist or pull upwards to release the emergency stop.

4.4.3 NORMAL SWITCH OFF PROCEDURE

1. Press one of the red emergency stop push buttons.

2. Turn off the main power isolating switch (machine cabinet).

4.5 WARM-UP

If the machine has not been used for some time it is better to use a warm up procedure, as thermal expansion of castings may cause damage to contact surfaces of moving parts, and result in oil leakage and loss of precision.

4.5.1 WARM UP NOTES

1. Ensure axes have been returned to the reference position before warming up the machine in automatic mode. Ensure the correct warm up program is selected and that the machine is able to travel the required distance without collision with spindle, tooling, work piece, etc.

2. Ensure that the warm up procedure lasts for 20 minutes with an appropriate spindle speed and feedrate (500 mm/min).(follow below spindle warm-up procedures)

SPINDLE WARM-UP PROCEDURE

To ensure proper operation and life of the spindle, please execute the following warm up procedure.

Situation		Spindle Speed (Max.Speed=100%rpm)		Time (Minute)	Check Items
A	Daily warm up	1 2	30% 60%	10 10	1. Any noise. 2. Any abnormal vibration. 3. Please follow each step of the procedure, if the temperature rise exceeds 20°C (68°F), then reduce to 10% Max. speed.
B	Spindle has been idle over 72 hrs	1 2 3	20% 40% 60%	10 10 10	
C	Spindle has been idle over two weeks	1 2 3 4 5	10% 20% 40% 60% 80%	20 10 10 10 10	

Remark :
(1) Never run the spindle without a tool loaded.
(2) Above 8000 rpm, only use dynamically balanced tools, balanced below 2.5μ.
(3) Observe the Duty Cycle for the spindle.

S-S3012

3. There is a easy way to warm up the machine. (see 8.3)

4.6 PREPARATION

Please follow the steps below to prepare for the machining process ：

1. Select the proper method of machining, jig mounting and fixture equipment.
2. Plan the machining sequence.
3. Select the appropriate tools and tool sequence.
4. Select proper cutting conditions. Ensure that those conditions meet the specification of the machine.

4.6.1 WARNINGS

1. Always use recommended cutting tools. Failure to do so could result in damage to component/machine.
2. Do not use broken or defective cutting tools.
3. Ensure that the working area has sufficient lighting.
4. Keep the machine and working area clean and tidy. Tools and equipment should be kept in the appropriate area.
5. Do not obstruct working surfaces, including guideways, safety guards etc.

4.6.2 NOTICES

1. Check the oil level of the oil tank regularly. Please use the recommended oils as described in the oil guide table. (see 7.3.4)
2. Only use recommended cutting tools.
3. Always try a light test cut before using a heavy cut.

4.7 OPERATION

4.7.1 WARNINGS

1. Always wear the appropriate personal protection equipment (PPE).

2. Always handle large/heavy workpieces in the appropriate manner.
   (If more than 20kg,use lifting equipment)

3. Only use qualified personnel for material handling, lifting equipment, cranes, forklift etc.

4. Never machine workpieces in Automatic mode with the main door / guards open or remove.

5. Ensure the workpiece has been clamped firmly and properly on the holding device before machining the workpirce.

6. Always stop the machine before adjusting coolant nozzles.

7. Do not touch or reach over rotating or moving objects.

8. Do not remove any safety equipment.

9. Always use appropriate tools to remove swarf/cutting chips. Never use bare hands.

10. Never install/remove cutting tools or other tool holding devices unless the machine is fully stopped.

11. Always take the appropriate precautions when machining workpieces that may cause dust/powder etc.

12. Do not let swarf/chips become a hazard as a result of not cleaning the machining area on a regular basis.

4.8 MANUAL OPERATION PROCEDURE

4.8.1 MANUAL FEED MOTION (SAFETY DOORS CLOSED)

1. Select 【JOG】mode on the main machine control panel to enable this mode.

2. Select the feedrate by adjusting the override rotary switch, then start the feed motion by pressing the relevant axis direction push button.

3. The feed motion continues while the axis direction push button is being pressed. The feed movement stops once the push button is released.

4.8.2 MANUAL FEED MOTION (SAFETY DOORS OPEN)

1. Select 〖 SET UP 〗mode with the Production/Setup Key switch.

2. Select 【JOG】mode on the main machine control panel to enable this mode.

3. Hold handwheel enable button.

4. Select the handwheel axes rotary switch of OFF, X, Y, Z, 4, 5.

5. Select the handwheel increment size of 1, 10, 100. (F1=1, F2=10, F3=100)

6. You can now control the feed motion by turning the relevant handwheel durning Safety door open. The maximum feedrate with the door open is 2 m/min.

4.8.3 MANUAL RAPID TRAVERSE FEED

NOTE !!!
Rapid traverse is only active if the safety doors/guards are closed.

1. Select 【JOG】 mode on the main machine control panel to enable this mode.

2. Press the rapid traverse push button together with the relevant axis direction push button. The rapid feed movement will stop once the rapid push button is released.

4.8.4 RUN SPINDLE IN MANUAL

1. Door must be closed.

2. Select【JOG】mode.

3. Put speed and direction in TSM screen.

4. Press cycle start to run spindle.

4.8.5 MANUAL TOOL CHANGE

Please follow the steps below to change the tool holder under manual mode：

1. Select 【JOG】 mode on the main machine control panel.

2. Ensure the spindle is fully stopped.

3. In door open condition, release the tool by pushing the button. When the button is pressed, a stream of air flows from the spindle hole to clean up the dust on the tool holder. (The button can either clamp or unclamp the tool)

4. Once the tool clamp or unclamp button is pressed, the tool will be released and let out.

5. Ensure to grasp the tool firmly to prevent the falling down. Align the tool holder with the drive key on the spindle then insert the tool onto the spindle taper hole. Hold the tool while clamping the tool before releasing the button. Ensure the tool holder is clamped properly before leaving.

WARNING !!!

Ensure to grasp the tool holder firmly before pressing the button to prevent the tool falling off. Ensure to handle the tool carefully.

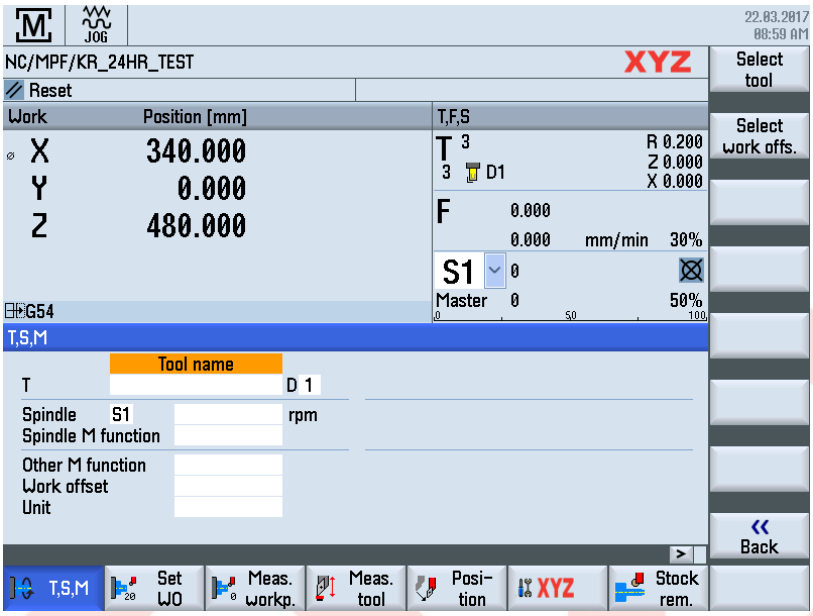
WARNING !!!

For the sake of accuracy, ensure to clean up the tool and the tapering portion of the tool holder before clamping the tool.

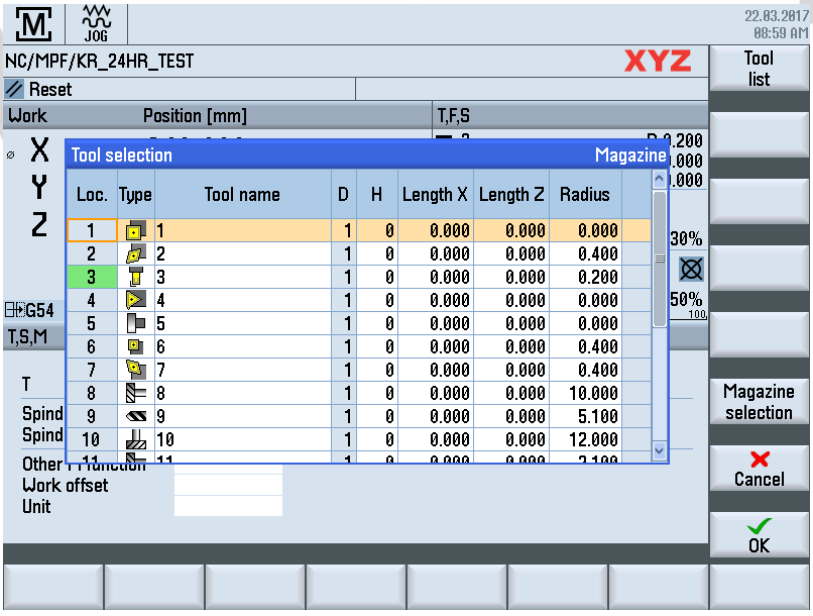
4.8.6 TOOL CHANGE UNDER T.S.M MODE

1. Select 【JOG】 mode on the main machine control panel.

2. Select 【T.S.M】Horizontal Softkey.



3. Select Tool from Tool list and press Enter.



4. Presses on the cycle start button to start the tool exchange process.

4.9 AUTOMATIC OPERATION PROCEDURE

NOTE !!!
With the Production/Setup key switch, the key can only be removed in the Production position. With the key switch locked in 〖PRODUCTION〗 mode it is not possible to move axes/spindle with the safety doors/guards open.

4.9.1 AUTOMATIC MODE

1. There are two modes of automatic operation :
   (a) Auto mode.
   (b) MDI mode.

2. Select 〖PRODUCTION〗 mode with the Production/Setup Key switch.

3. Select 【AUTO】 mode on the main machine control panel to enable this mode.
   It is able to select the correct part program from library.

4. Select 【MDI】 mode on the main machine control panel to enable this mode.
   It is able to write simple program manually.

4.9.2 AUTOMATIC OPERATION PROCESS

The following example illustrates procedures to machine a workpiece under the automatic operation mode：

1. Prepare the workpiece drawings (including both dimensions and materials used), tool sequence schedule, programming codes,....

2. Prepare the workpiece, jig mounting, and fixture equipment.

3. Mount the tools into holder.

4. Mount into the machine tool.

5. Measure the compensating values for the tool length or Z-positioning.

6. Input the compensating value of the tool length or Z-positioniong.

7. Locate the program reference position.

8. Test-run (no load)

9. Cutting test.

10. Measure the workpiece dimensions for further compensation and modification.

11. Normal production.

4.9.3 NO-LOAD TEST RUN

Ensure to test run the new programs before machining the workpiece. Procedures are as follows:

1. Remove the workpiece from the jig mounting.

2. Select switch at the Auto mode.

3. Press on the single block operation button to test the programs block by block.

4. Press on the cycle start button to start the process. Resume the process by pushing on the cycle start button if commands in one single block are correctly. Repeat the same process until all the new programs are tested.

4.9.4 AUTOMATIC CUTTING OPERATION (ISO Programming)

Start the cutting test if everything is good nder the no-load test run.

1. Depending on situations, turn the associated switches or buttons “ON” or “OFF” for special commands such as the skip (/) command, pause (M01) command and cutting fluids command (M08 OR M09 command)

2. Set the feedrate override switch at 100%.

3. Set the spindle speed override switch at 100%.

4. Select 【Auto】mode.

5. Ensure the workpiece is fixed properly.

6. Push the cycle start button to start the process.

7. Push on the feed hold button or the emergency stop button whenever an emergency occurs.

4.10 FINISH

1. Press the Emergency Stop push button on the machine control panel.

2. Turn off the main power supply isolating switch located on the electrical cabinet.

4.11 INSPECTION AFTER FINISH

1. Ensure all the machine parts are in good conditions.
2. Check the centralized lubrication system. Top up or refill the oil if necessary.
3. Ensure there no leakage has occurred from the pipe lines.
4. Ensure all screws are properly secured.
5. Ensure all the gauges and indication meters are in normal condition.
6. Keep the machine and working area clean and orderly.

WARNING !!!
Don't use compressed air to clean up swarf/cutting chips. Only use air to clean part/fixture.

4.11.1 NOTICES

1. Ensure that the power supply is switched off and place "**Under Maintenance. Do not turn on the power supply**" warning signs in visible areas before cleaning the machine or accessories. Ensure that the machine is fully stopped before maintaining the machine.
2. Ensure the machine and its surroundings are cleaned and put everything in order after the machining job is finished. Ensure to put anti-rust oil on the machine bed and all of the moving parts to keep them free from rust and dirt.
3. Check and replace any broken wipers.
4. Check and replace lubricant or hydraulic oil if they are contaminated or emulsified.
5. Check and replace the coolant if it is contaminated.
6. Check and refill the lubricant, hydraulic oil and coolant if necessary.
7. Clean the filters of the lubrication, hydraulic, and cutting coolant systems.
8. Turn off all of the main power circuit breakers when leaving the machine unattended.

4.12 MACHINED SURFACE FINISHES

Many factors effect the surface finish achieved when machining. The following table assumes that good machining practices are followed and that the best possible conditions are available. i.e., machine and equipment are in good condition with tools and components held effectively with optimum rigidity.

The graph shows the effect of toolnose radius combined with feedrate on surface theoretical finish available.

1. Cutting speed

Generally, a low cutting speed leads to a lower shear angle, greater cutting forces and a longer contact time between tool and workpiece. This encourages edge build up, which can lead to tearing and rubbing rather than cutting. Therefore an increased cutting speed can improve surface finish.

2. Rake angle

Particularly when cutting ductile materials a greater rake angle may improve the surface finish. This is achieved due to the increased shear angle and thus the decrease in cutting forces, giving less tendency for the workpiece material to adhere to the cutting edge.

3. Dulled tools

When a tool becomes dull, the flank wear land contact area is increased. This in turn increases the cutting force and heat generation, and may lead to larger flank wear land ripping out fragments of the workpiece. Keep tools sharp, and index them regularly.

4. Coolant

This may improve the surface finish, as it will reduce the tendency of the workpiece material adhering to the tool due to the reduced temperature at the tool-chip interface. However, coolant residue may contaminate the contact surface between the tool and workpiece interfering with the metallurgical reactions which cause the tool to perform erratically.

CHAPTER 5

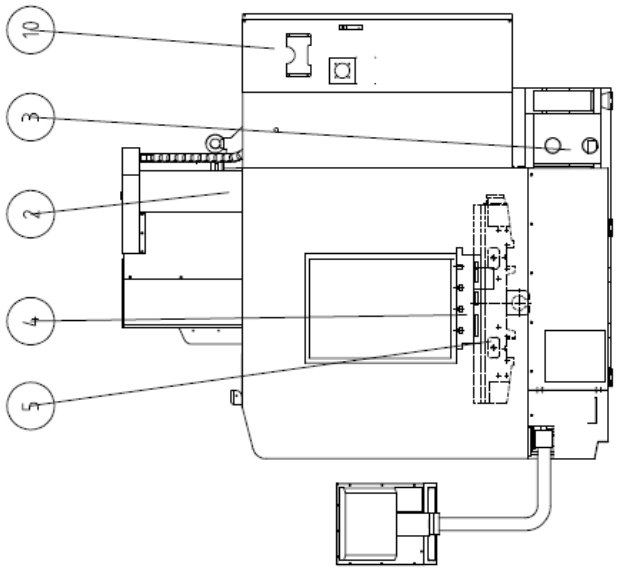
MECHANISM

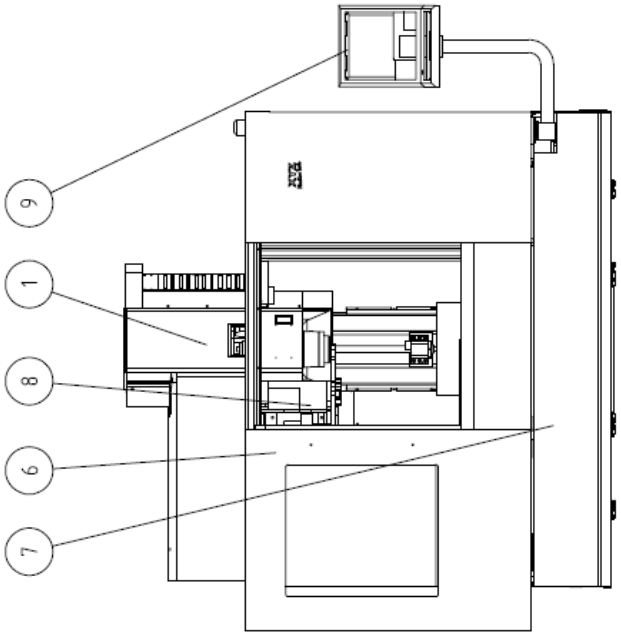
PLEASE READ CAREFULLY BEFORE

INSTALLATION OF THIS MACHINE

5.1 MACHINE MAIN PARTS

Item	Nomenclature
1	HEADSTOCK
2	MAIN COLUMN
3	BED BASE
4	WORKING TABLE
5	SADDLE
6	SHIELD COVER
7	COOLANT TANK
8	TOOL MAGAZINE
9	OPERATION PANEL
10	ELECTRICAL CABINET

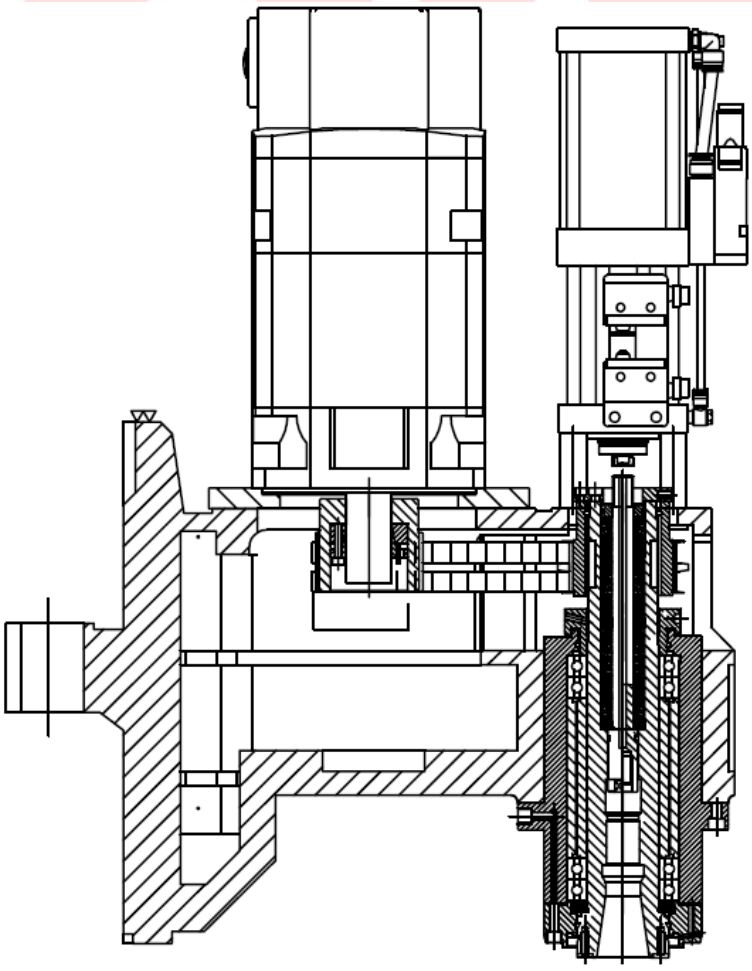




5.2 HEADSTOCK SYSTEM

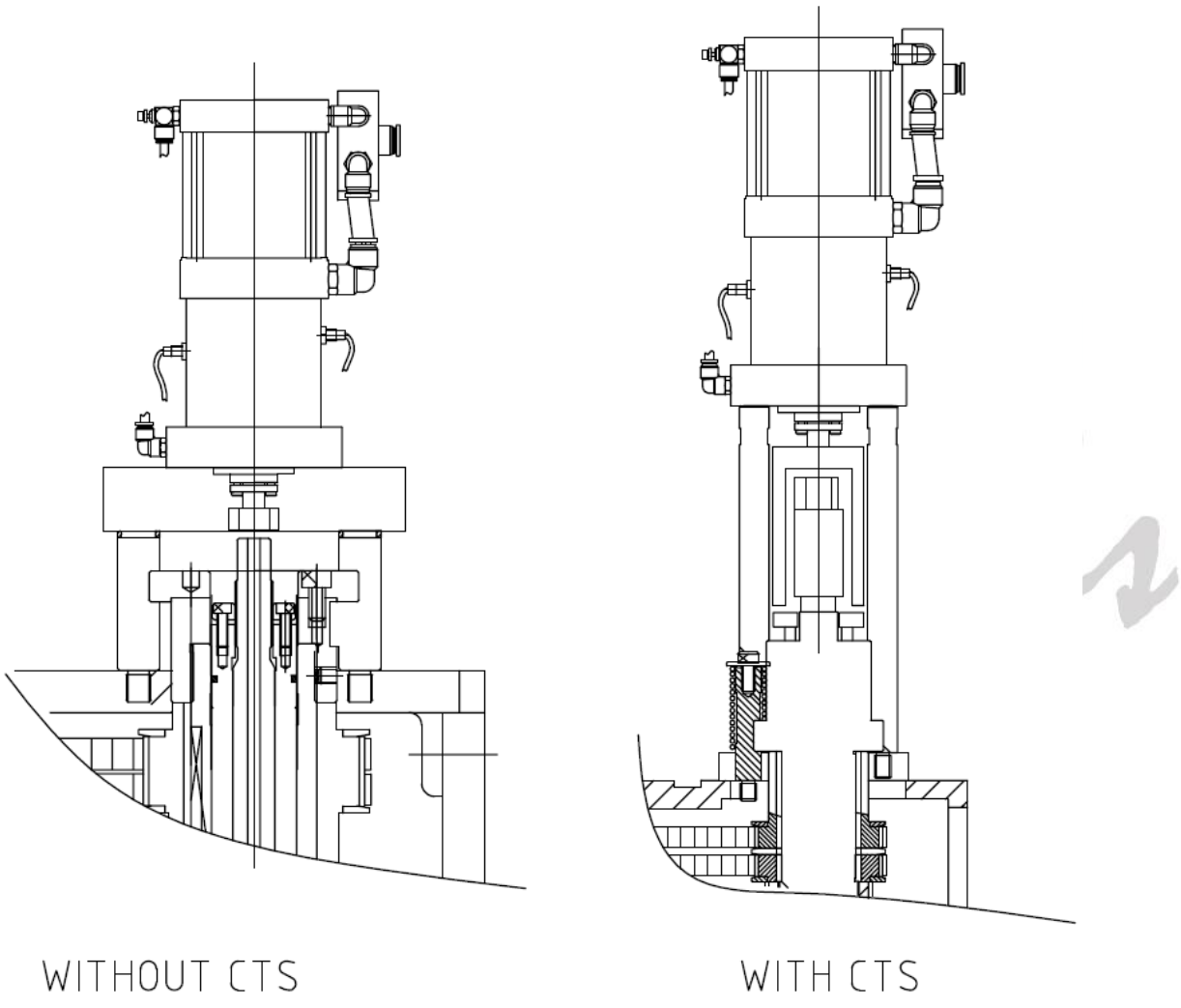
5.2.1 POWER TRANSMISSION MECHANISM

The spindle is driven by the spindle motor through belts and pulleys. The tool clamping and unclamping are accomplished through the use of disk spring, draw bar, and a pneumatic system, as shown below.



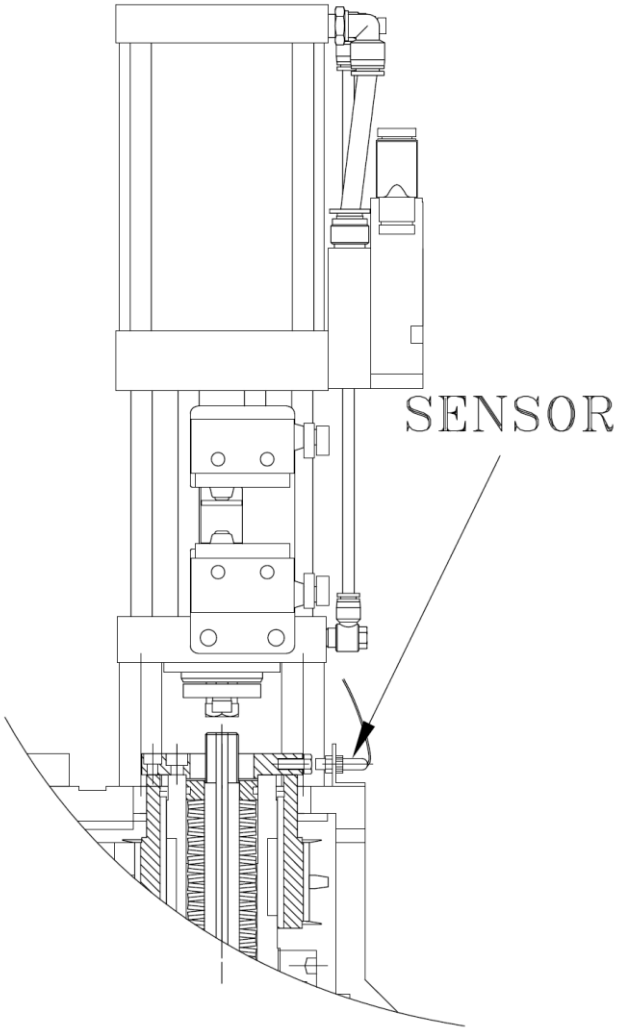
5.2.2 TOOL CLAMPING AND UNCLAMPING MECHANISM

To grip the tool, the draw bar will be pulled up by the disk spring set to close the collet chuck. To release the tool, the collet chuck is pushed off by the pneumatic piston through the draw bar. The tool clamping force applied by the disk spring is approximately 800 kgf. A stream of compressed air will blow through to clean the taper hole and tool.



5.2.3 SPINDLE POSITIONING MECHANISM

The sensor tracks the spindle rotation motion and feeds the positioning signal to the spindle drive motor's controller to control the spindle position precisely.



5.3 FEED-MOTION TRANSMISSION MECHANISM

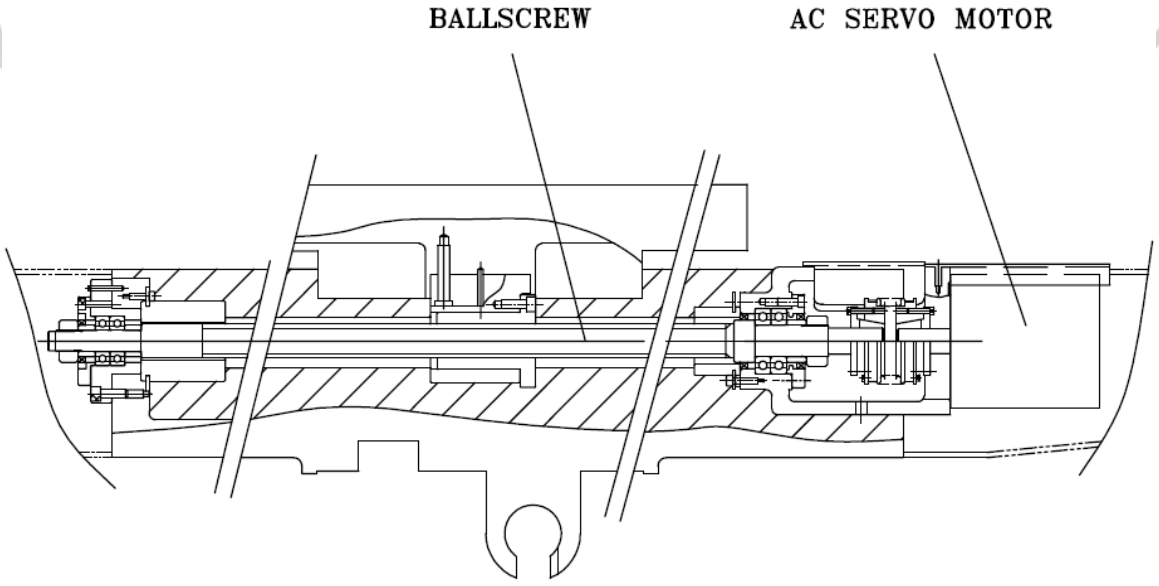
5.3.1 X AXIS FEED-MOTION TRANSMISSION MECHANISM

1. The working table is seated on guide rails of the saddle and driven by the AC servo motor via the connection of a coupling and a ballscrew.

2. Because the AC servo motor is directly connected to the ballscrew through a coupling, alignment problems can be reduced to minimum.

3. The encoder equipped with the AC servo motor is used to track the feed motion positioning. This is only a semi-closed control loop. Otherwise you can select linear scales (optional part) which is a fully closed control loop.

4. The maximum traveling range in the X direction is 1100mm. A safety mechanism is used to prevent the saddle from over-traveling as described below. When the working table travels over the limit, the positioning blocks will touch the limit switch on the saddle. The limit switch transmits the over-travel signal to the AC servo motor's controller to stop the feed motion.



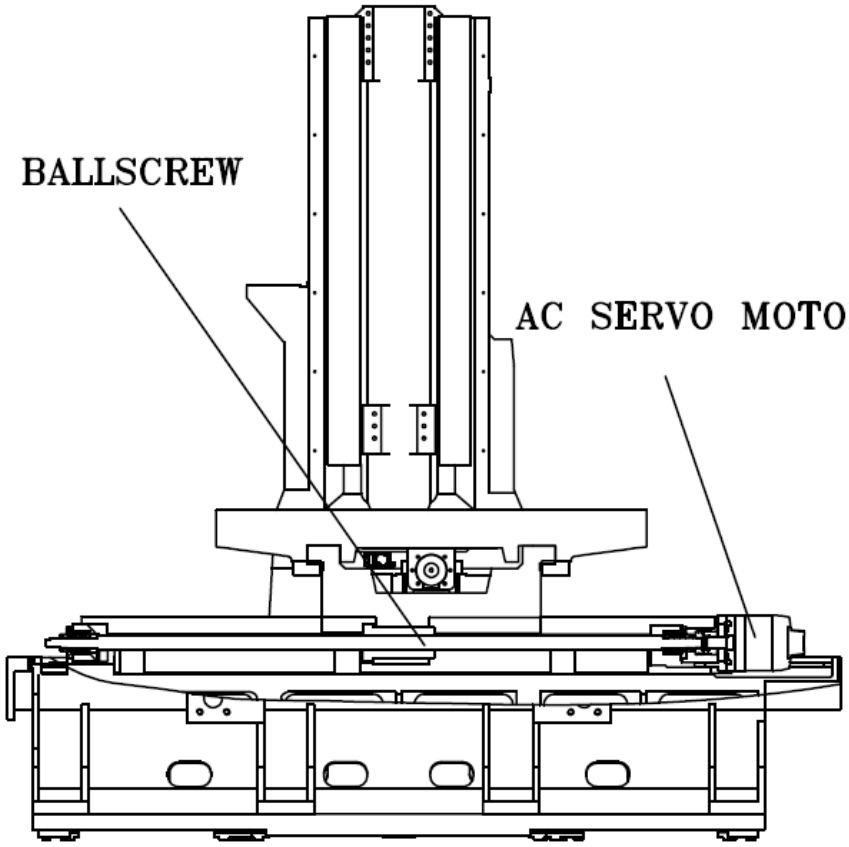
5.3.2 Y AXIS FEED-MOTION TRANSMISSION MECHANISM

1. The saddle is seated on guide rails of the bed base and driven by the AC servo motor via the connection of a coupling and a ballscrew.

2. Because the AC servo motor is directly connected to the ballscrew through a coupling, alignment problems can be reduced to minimum.

3. The encoder equipped with the AC servo motor is used to track the feed motion positioning. This is only a semi-closed control loop. Otherwise you can select linear scales (optional part) which is a fully closed control loop.

4. The maximum traveling range in the Y direction is 610mm. A safety mechanism is used to prevent the saddle from over-traveling as described below. When the saddle travels over the limit, the positioning blocks will touch the limit switch on the saddle. The limit switch transmits the over-limit signal to the AC servo motor's controller to stop the feed motion.



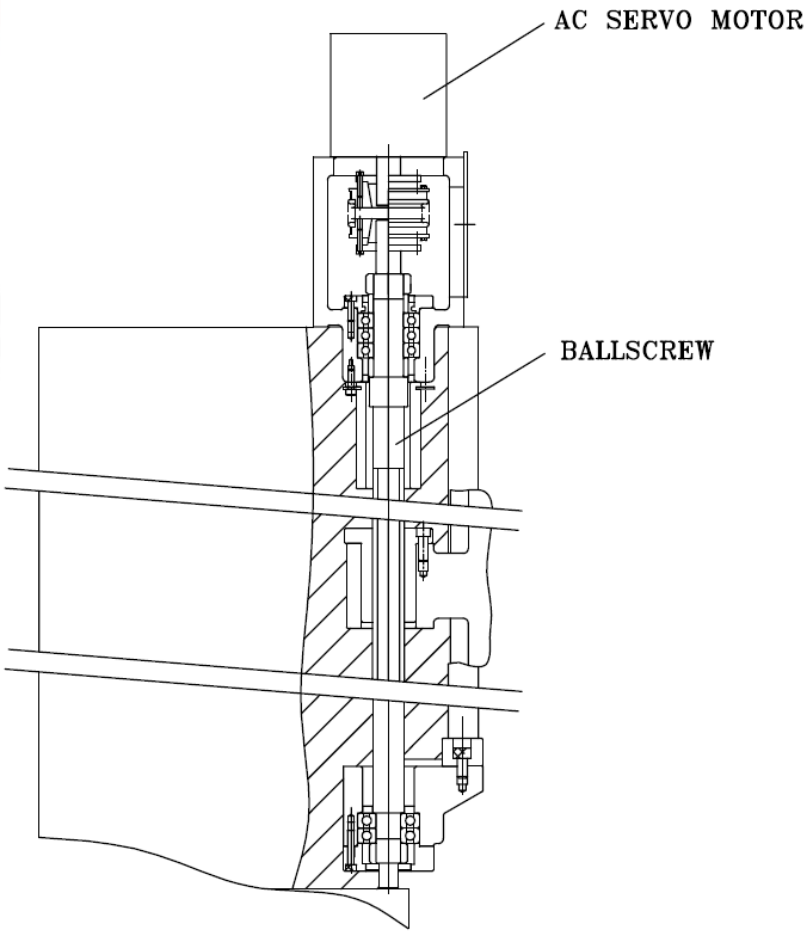
5.3.3 Z AXIS TRANSMISSION MECHANISM

1. The headstock is seated on guide rails of the main column and driven by the AC servo motor via the connection of a coupling and a ballscrew.

2. Because the AC servo motor is directly connected to the ballscrew only through a coupling, alignment problems can be reduced to minimum.

3. The encoder equipped with the AC servo motor is used to track the feed motion positioning. This is only a semi-closed control loop. Otherwise you can select linear scales (optional part) which is a fully closed control loop.

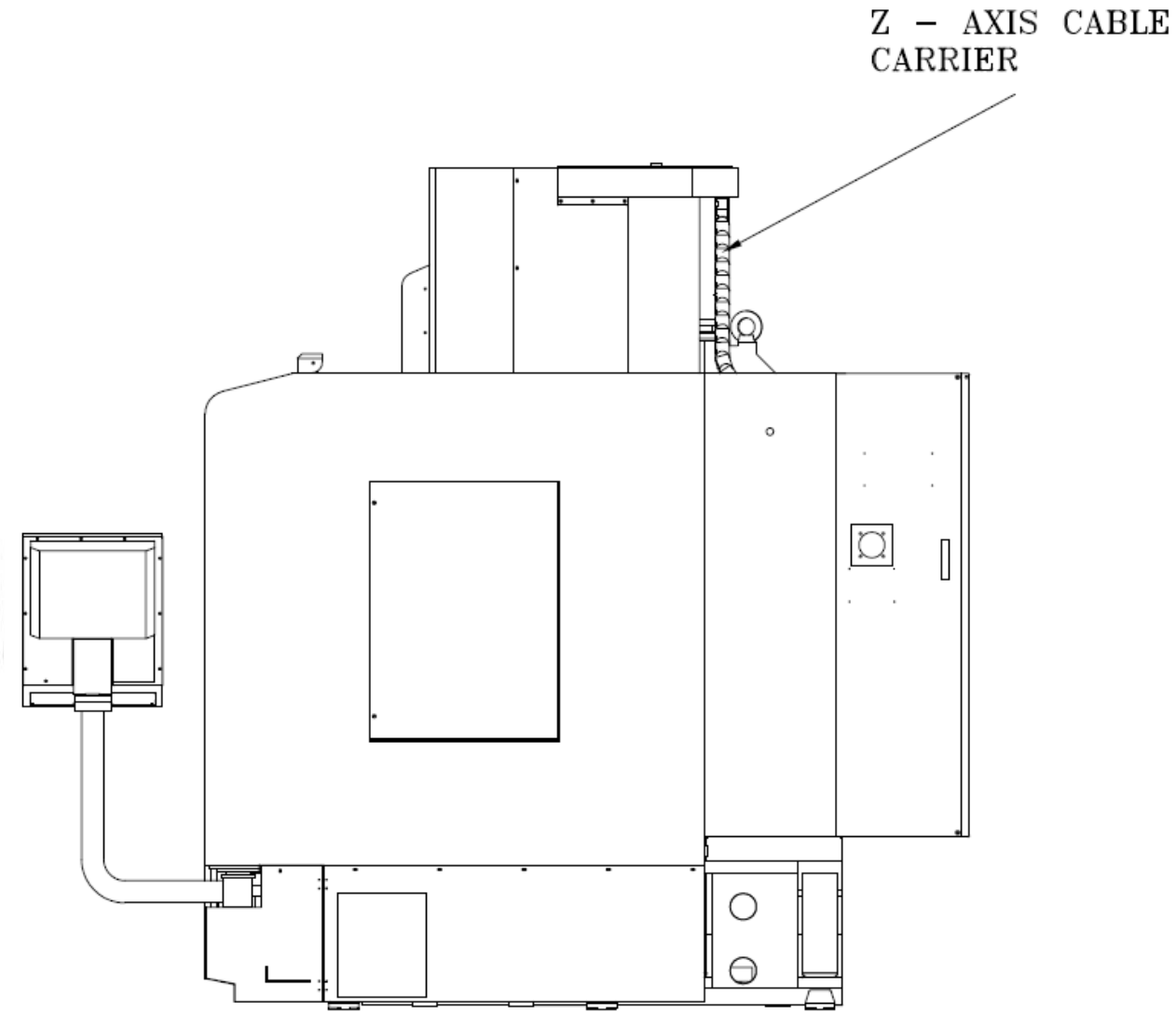
4. The maximum traveling range in the Z direction is 600mm. A safety mechanism is used to prevent the headstock from over-traveling as described below.When the headstock travels over the limit, the positioning blocks will touch the limit switch on the headstock. The limit switch transmits the over-limit signal to the AC servo motor's controller to stop the feed motion.



5.4 Y AND Z AXIS CABLE CARRIER

All the electrical wires and oil hoses connecting between the saddle and guard. These pass through the Y-axis cable carrier, then connect to connectors located on the saddle.

All the electrical wires, air hoses and oil hoses connect between the headstock and the electrical cabinet. These pass through Z-axis cable carrier, then connect to connectors located on the headstock.



5.5 AUTOMATIC TOOL CHANGE (ATC) MECHANISM

5.5.1 ARMLESS CAROUSEL ATC MECHANISM

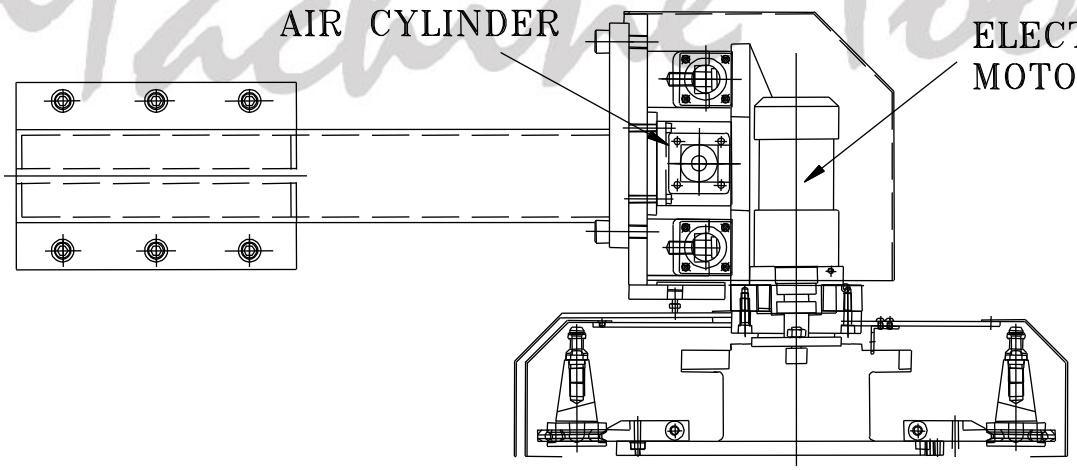
1. The tool magazine is driven by an electrical motor through the gear to drive the swivel disk and make the swivel disk rotate.

2. The tool selection is accomplished by using the pneumatic system and proximity switch.

3. As the tool exchange command is issued, the swivel disk will be rotated to the selected tool position according to NC or manual commands. A proximity switch is used with the electrical motor to control the magazine's positioning. When the selected tool traces the target location, the electrical motor stop immediately. The tool magazine move by a air cylinder.

4. The rotation direction could be either cw or ccw.

5. The tool is selected randomly based on the shortest path to minimize the tool selection time.

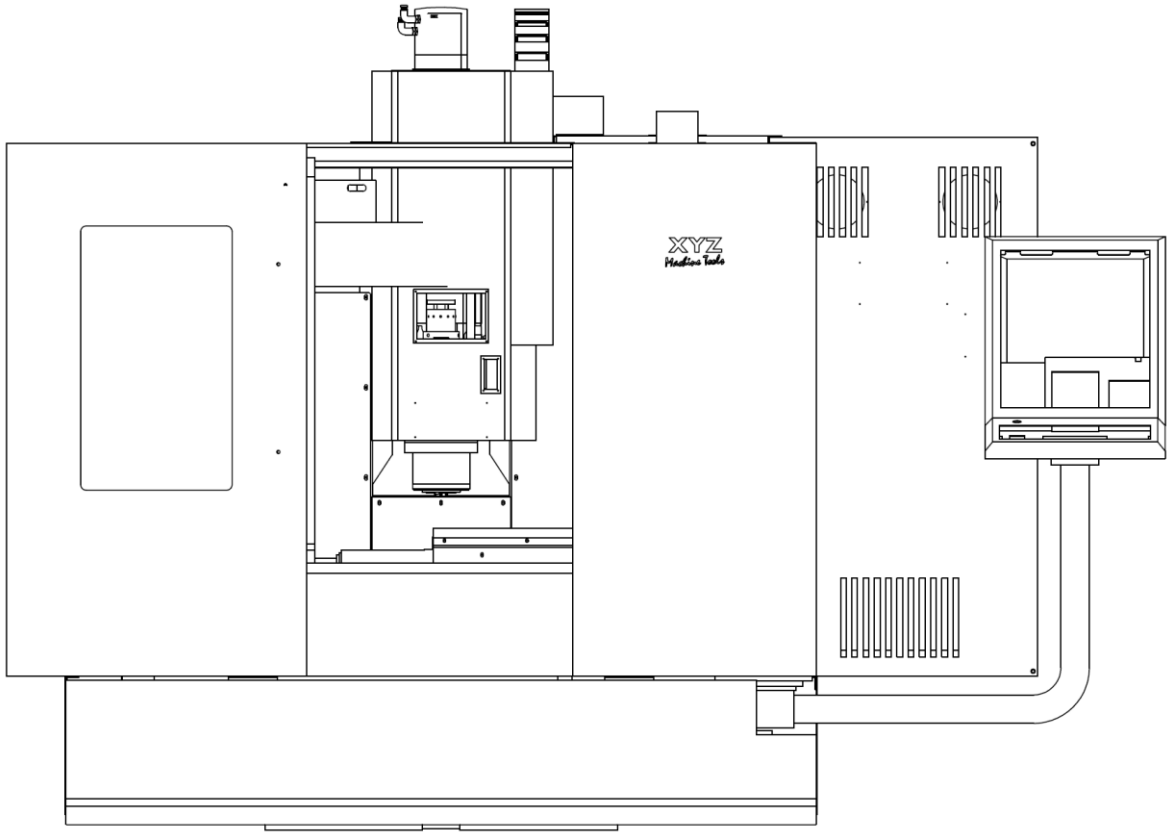


5.6 THE FULLY-ENCLOSED MACHINE GUARD

A full-enclosed sheet metal enclosure is designed to isolate the running machine and the cutting coolant and flying chips it generates from the operator. Chips are conveyed to the chip collecting bucket through the chip conveying tunnel. The circulating cutting coolant is pumped through the coolant filters to the coolant distributors. Ensure to clean the coolant filters frequently. The sheet metal enclosure is designed to have a one-piece front door so that you can inspect the machine or install the workpiece easily.

WARNING !!!

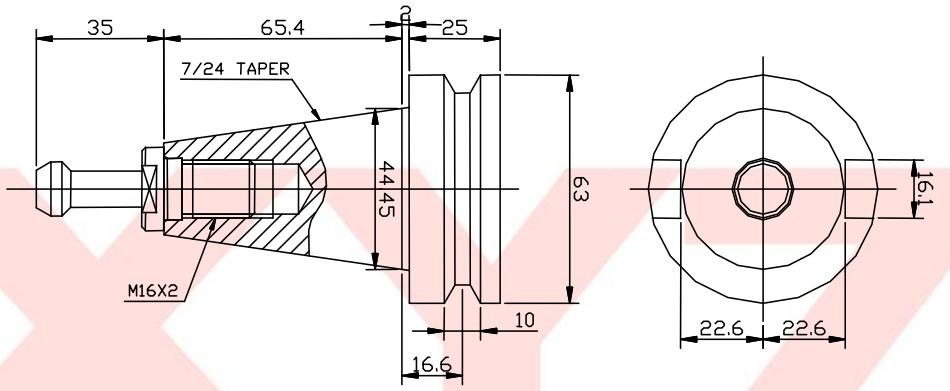
Ensure to close the one-piece front door before starting up the machine. The running machine will be stopped if the front door is opened in order to protect the operator from flying chips, spraying cutting coolant and running machine. Nevertheless, make sure the machine is full stopped before opening the door.



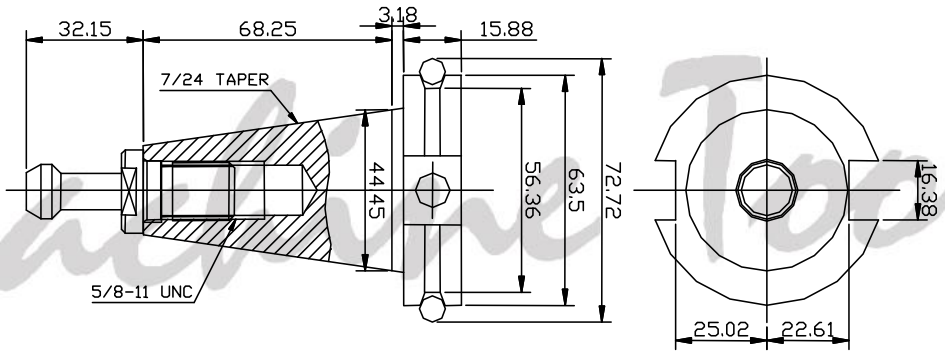
5.7 DIMENSIONS OF THE TOOL HOLDER

5.7.1 BT-40 AND CT-40 AND DIN69871 SPECIFICATION

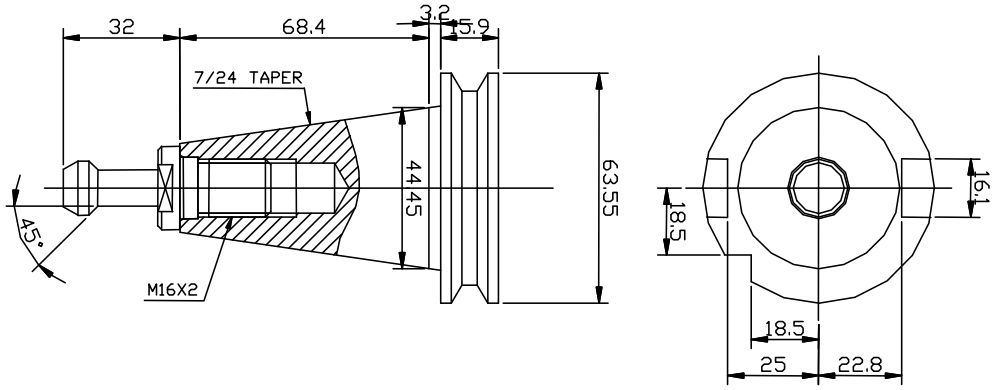
BT−40



CAT−40



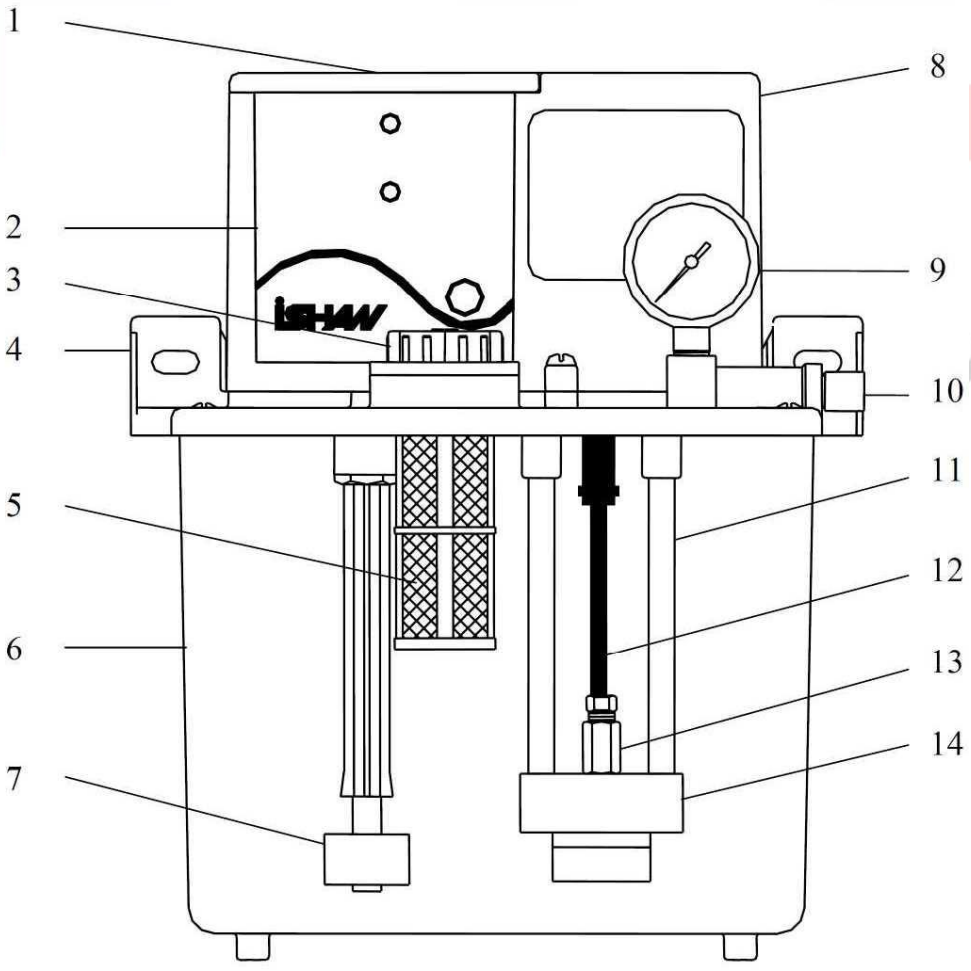
DIN−69871



5.9 LUBRICATOR

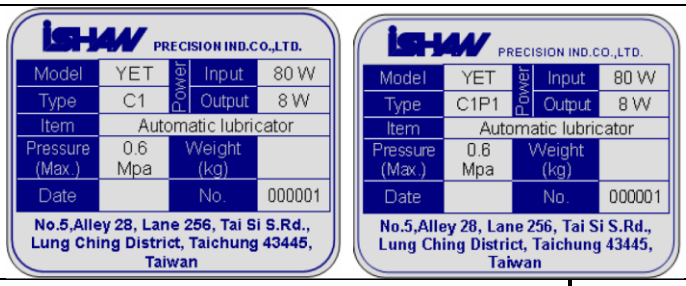
5.9.1 PARTS OF LUBRICATOR

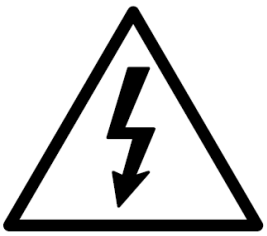
1. Electrical control box cover
2. YET-C control box
3. Oil tank cap
4. Upper lid
5. Inlet filter
6. Oil tank
7. Float switch
8. Electrical control box housing
9. Pressure gauge
10. One-way elbow adapter
11. Lifting rod
12. Shaft set
13. Pressure release valve
14. Gear Pump

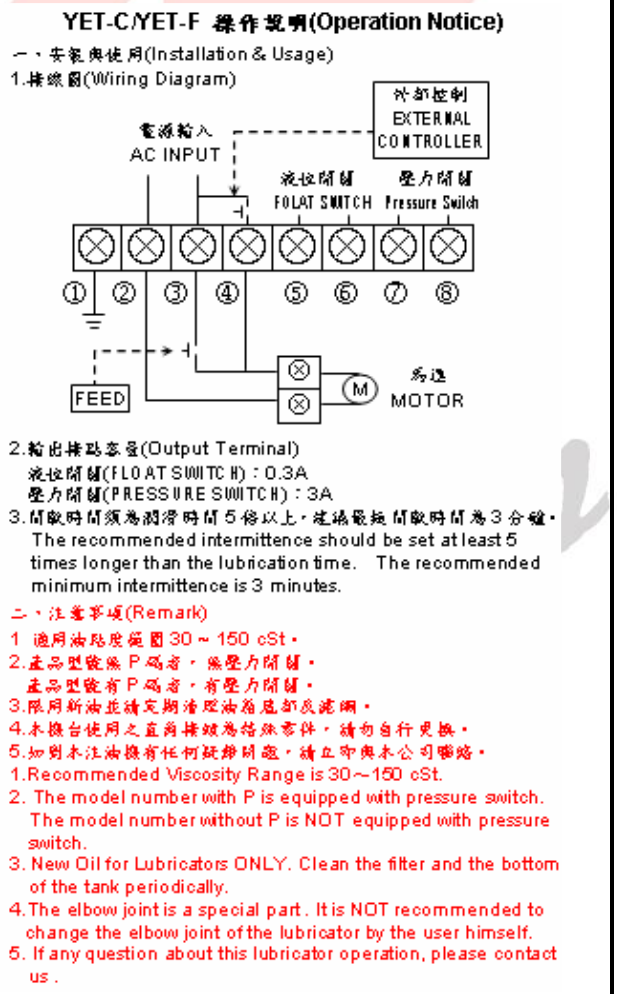


(Fig.1)

5.9.2 LABEL

<table>
<tr><td>Name Plate</td><td>Danger</td></tr>
<tr><td>


</td><td>

</td></tr>
<tr><td>Front side of the electrical control box</td><td>Outside of the electrical control box top cover</td></tr>
<tr><td>Wiring Diageam</td><td>Operation Notice</td></tr>
<tr><td>


</td><td>


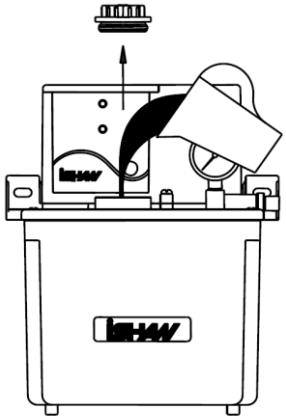
</td></tr>
<tr><td>Inside of the electrical control box</td><td></td></tr>
<tr><td>Time Index Table</td><td></td></tr>
<tr><td>


</td><td></td></tr>
<tr><td>Top right corner of the front side of the oil tank</td><td>Left side of the oil tank</td></tr>
</table>

5.9.3 LUBRICANT FILLING

Remove the oil tank cap and fill the tank with clean lubricant at the level of 80% of the tank height (Fig. 3). Approved lubricant viscosity range is 30~150 cSt.

NOTE !!!
Viscosity higher than 150 cSt may result in the burn out of the lubrication systems.



(Fig.3)

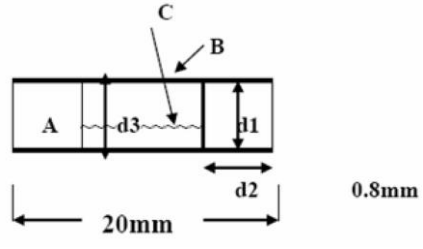
5.9.4 FUSE ON THE CONTROL BOARD

5.9.4.1 THE SPECIFICATION OF THE FUSE

1. TYPE：350204 glass tube fuse slow blow type 5.2*20.

2. Availabe range：For protecting instruments, power supplies, computers, the related equipment of computers and telephone sets.

3. Shape & Size as following illustrations：(Unit：mm)



(a) Structure & shape ：As shown in above figure.
Body size of fuse ：Dia 5.2 mm * L 20mm.
(b) Rated Voltage：250 V AC
(c) Rated Currentl：2A

4. Characteristics of Electrical Appliances：
   (a) Loading Capacity：Loading 110% Listed Electrical Current (i.e. 2.2 A) for flowing,and it's available to let current keep flowing without any melting.
   (b) Temperature：Proceed the preceding test for 1.5 hours, keep testing it with the original current every 10 minutes. Continue to test it 3 times. The temperature is not allowed to be higher. The main temperature rise is below 70℃ by way of Thermocouple Method, while it keeps below 50℃ by way of Thermocouple Method.
   (c) Fuse current characteristics：

Rated Current	1.35 In	1.5 In	2 In	
100mA-10A	MAX.	MAX.	MIN.	MAX.
	60 MINUTE	NON	3 S	120 S

5.9.4.2 FUSE REPLACEMENT

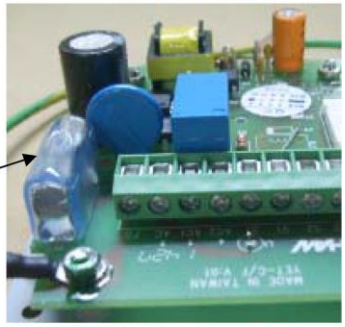
Make sure the power cable is disconnected before the fuse replacement. Remove the electrical control box cover and find the fuse (Fig. 7).

Remove the fuse protection cover (Fig. 8) and replace the fuse with the new one (Fig. 9). Fit-in the fuse cover and close the electrical control box cover.

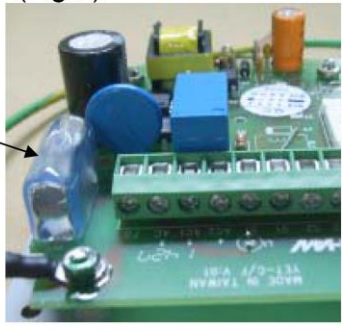
NOTE !!!

No contact with other components during the replacement.

The fuse should be of the original parts. Please refer to 5.9.4.1 The Specification of the Fuse.



(Fig.7)

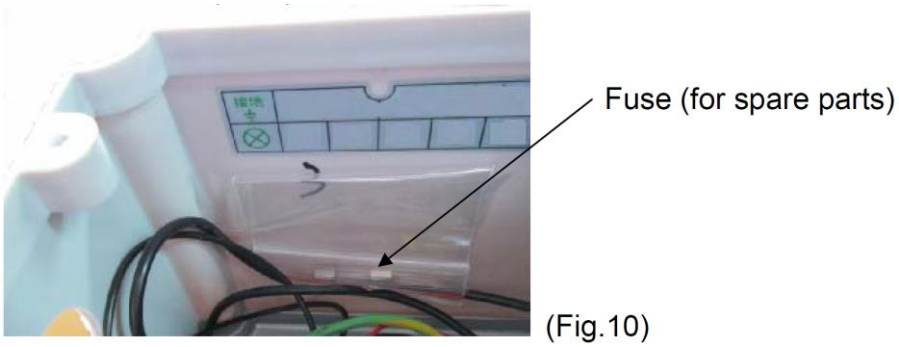


(Fig.8)

(Fig.9)

5.9.4.3 EXTRA FUSE FOR SPARE PARTS

One extra fuse for spare parts is attached inside the electrical control box.



(Fig.10)

5.9.5 LUBRICATOR MAINTENANCE

iSHAN centralized lubrication systems are of low maintenance. However, the related connection needs to be reviewed if properly fitted to secure the proper function of the system. Please clean periodically the oil tank of iSHAN centralized lubrications. If the user wants to clean the bottom of the tank, please TURN OFF the system first and remove the bolts on the tank to separate the tank for cleaning. After cleaning the tank, please fasten the bolts to fix the tank. Please follow below requirements：

(a) ALWAYS Turn ON the power after more than 20 seconds of turning OFF to protect the lubricator.
(b) It is prohibited for changing to non-original set-up to avoid malfunction.
(c) The outlet of YET-C1/YET-C1P1 is a one-way adapter. It is prohibited to revise into other adapters.

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CHAPTER 6

ADJUSTMENT

PLEASE READ CAREFULLY BEFORE ADJUSTMENT

OF THIS MACHINE

6.1 MECHANICAL ADJUSTMENT

Ensure main power supply is turned off and put warning signs on visible spots before inspecting the belt tension. Do not touch or reach over the pulleys and the belts if the power is still on. Otherwise this might result in injury.

6.1.1 NOTICES

1. Check the pressure readings regularly to make sure all the system pressure settings are normal.
2. Observe regularly if there is any abnormal noise arising inside the rotating motors and other moving or rotating parts.
3. Moving or rotating parts are lubricated properly.
4. Ensure all the safety guards and safety equipment are installed properly.
5. Adjust the belt tension based on the tension value given in the maintenance manual.

6.2 SPINDLE TRANSMISSION BELT TENSION

Check the main drive belt tension half-yearly. Follow steps below to adjust the belt tension：

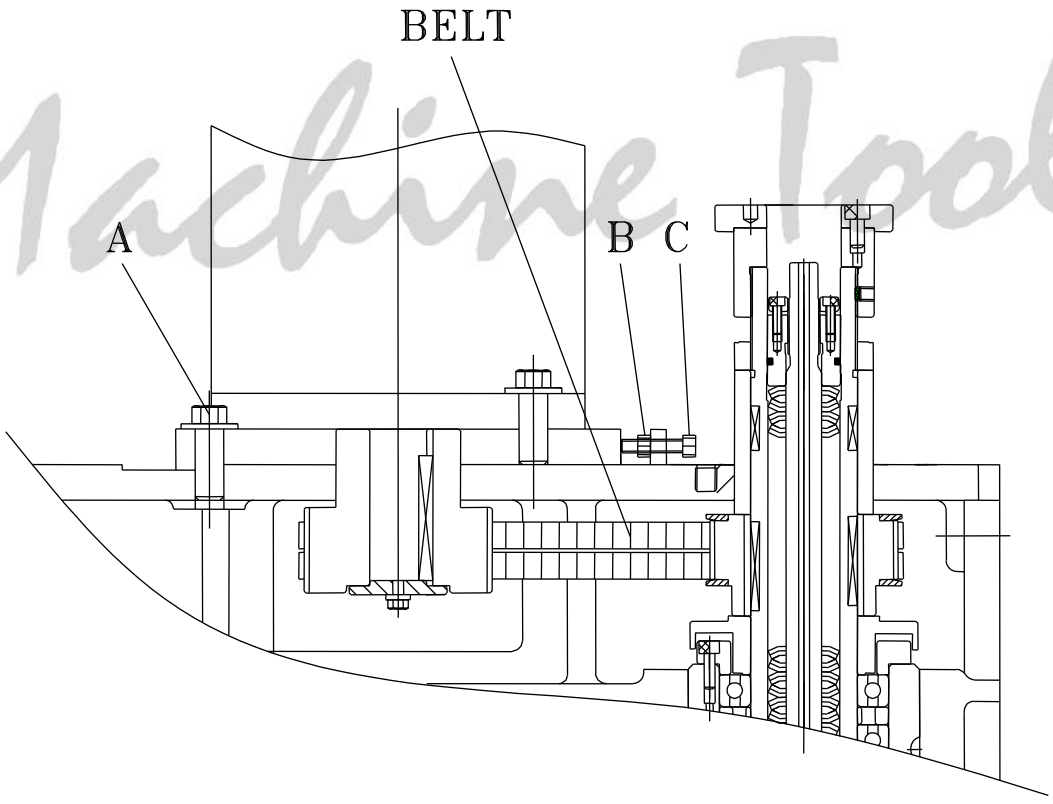
1. Loosen the four fastening screws “ A ” on the motor stand (without gear box) and the nut “ B ”.

2. Turn screw “ C ” to adjust the belt until the tension is adequate.

3. Set the nut “ B ” and four fastening screws “ A ”.

WARNING !!!

Ensure to have a proper tension value for the spindle transmission belt. If you can not ensure the proper tension value, please do not adjust the belt tension. Please contact local agent or us if you have any problem.



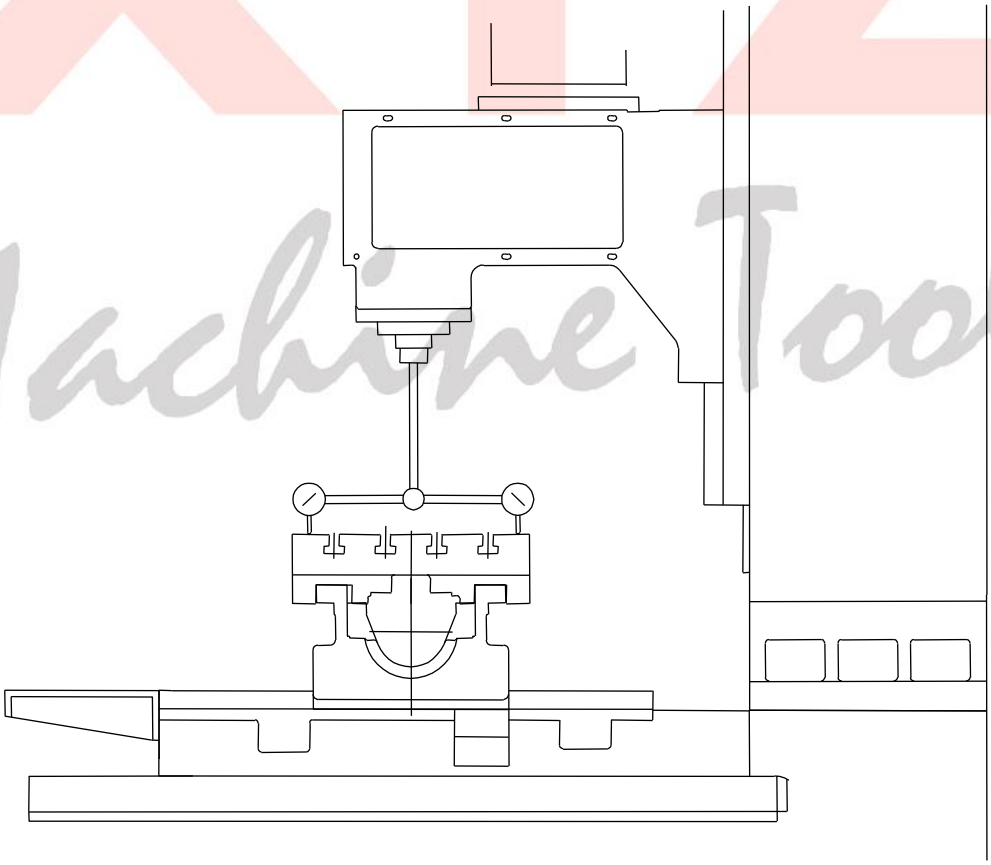
6.3 ADJUST THE SQUARE BETWEEN THE SPINDLE CENTERLINE AND THE TABLE SURFACE

1. Hold the dial gauge set directly under the spindle.

2. Ensure the distance between the dial gauge finger and spindle centerline is around 160mm.

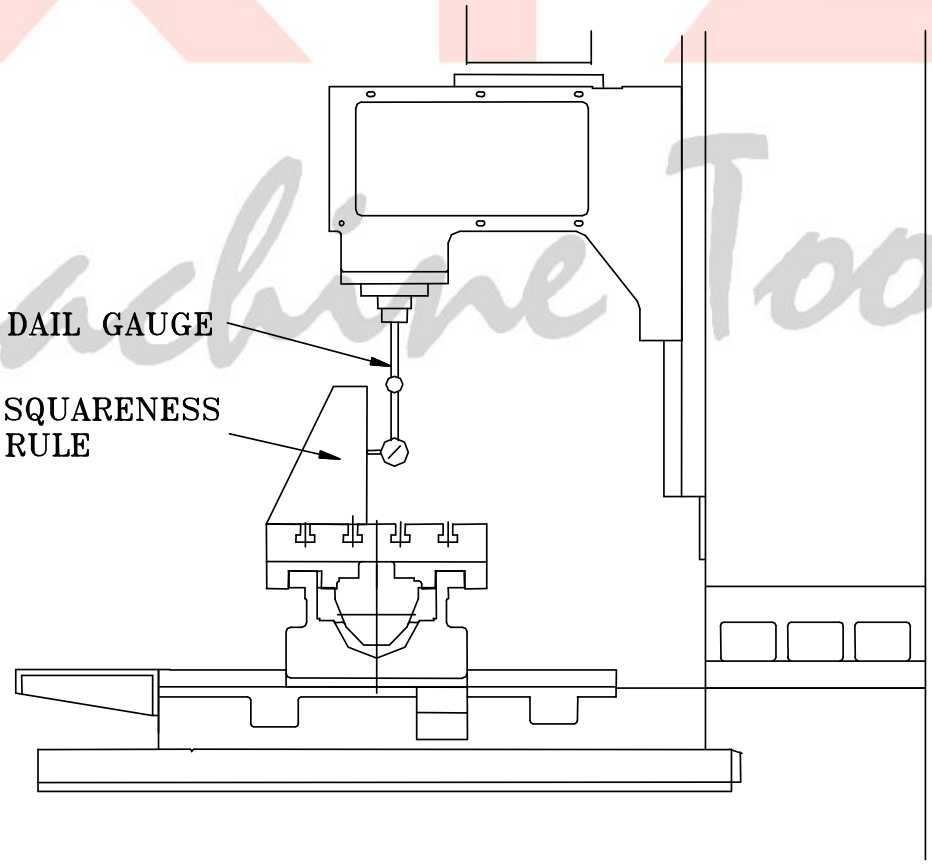
3. Move the headstock along the Z direction until the dial gauge finger touches the working table surface.

4. Rotate the spindle and measure the value. If any value is over the standard value, please adjust the machine.



6.4 ADJUST THE SQUARE AMONG THREE ORTHOGONAL

1. Prepare the dial gauge set and granite square.
2. Place the granite square on the working table.
3. Hold the dial gauge set directly under the spindle.
4. Move X, Y and Z direction to level the machine until readings at both ends are the same.
5. Measure the square among three orthogonal. If the values are over the standard value, please adjust the machine.



6.5 ATC CAM UNIT

6.5.1 RECOVERING FROM POWER FAILURE OR SYSTEM INPOSITION ALARM

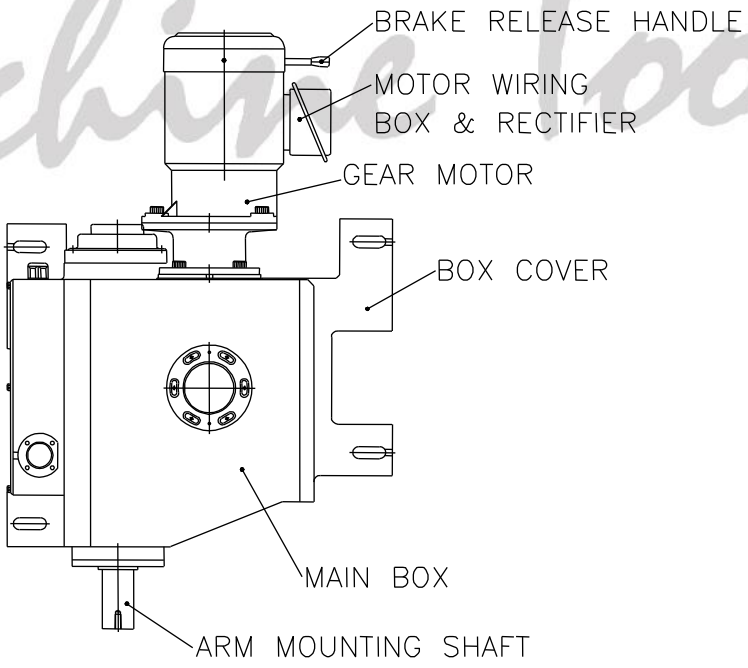
If cutoff the power while A.T.C. running may cause, this system stop at any position and CNC control will show A.T.C. inposition alarm. Under this condition you have to follow instructions below in order to get system back to home position.

1. Shut off the main power switch

2. Release the motor brake system through manual release handle. (Refer to Fig. 6.5.1)

3. Rotate the motor shaft screw (at top of the motor) and bring the A.T.C. system back to home position. (Check home position sensor at Fig. 6.5.3 is worked)

【Fig 6.5.1】 Arm Type ATC Motor Position picture



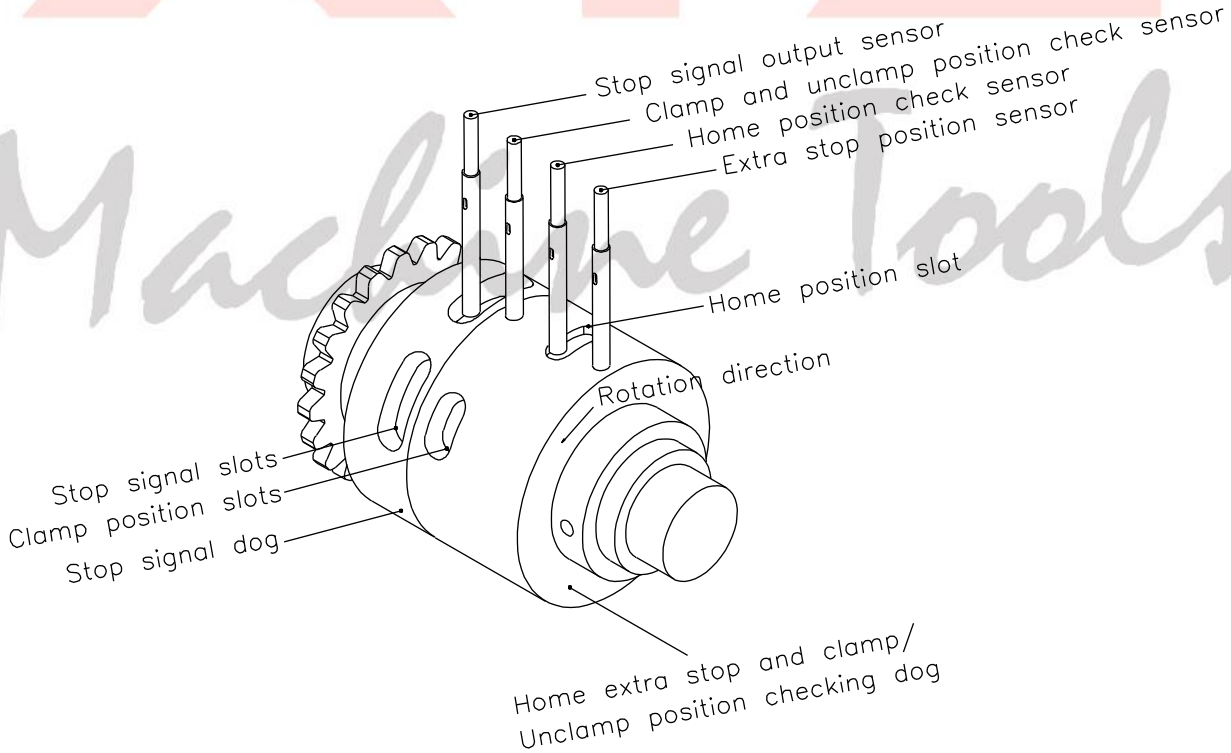
6.5.2 DOG ADJUSTMENT

1. The two dogs were pre-set in our factory. But it is may need to readjust if the A.T.C. showing inposition alarm under normal operation. To adjust both dogs need to loosen two set screws on each dog. Usually, only need to adjust the stop signal output dog forward due to deviation of stop position overrun. (Refer to Fig.6.5.3).

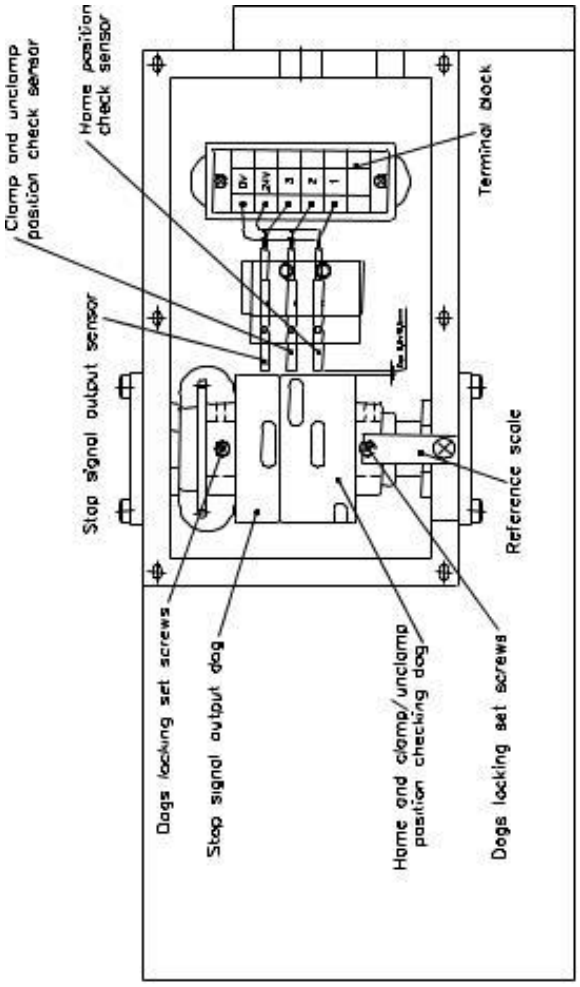
2. Home position dog usually not necessary to readjust.

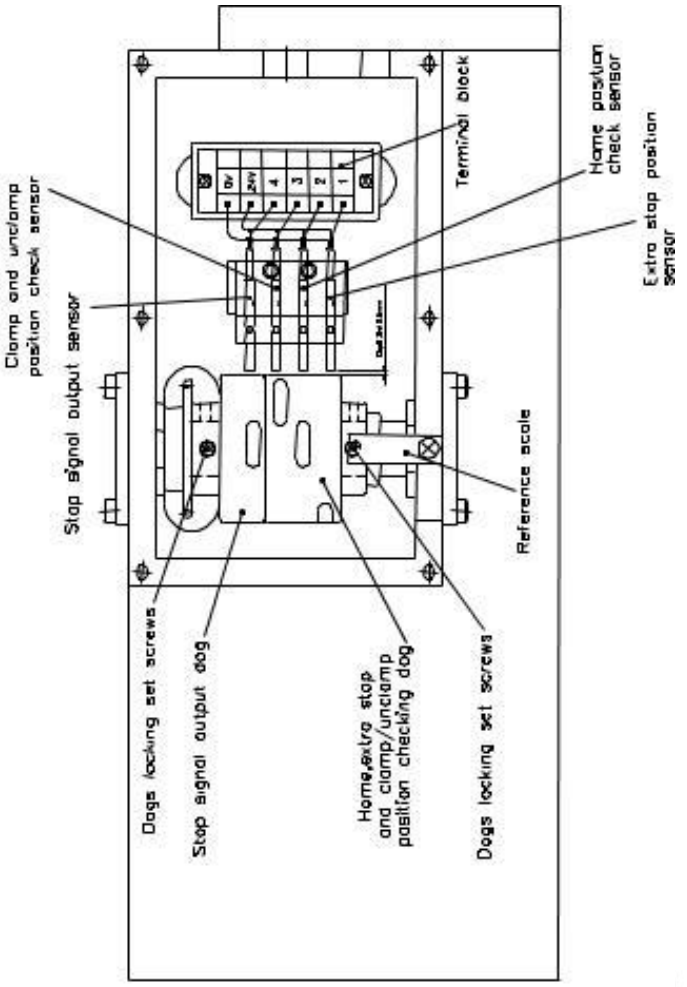
6.5.3 REPLACE THE PROXIMITY SWITCH

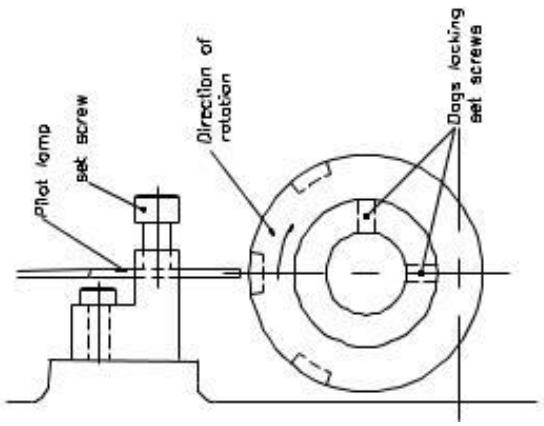
Loose the tighten screws of sensor (Refer to Fig 6.5.3) and you can remove the sensors. Take the correct type of sensor to replace. Please check the gap between sensors and dogs must keep within 0.3 ~0.5 mm.



【Fig 6.5.3】 Arm Type ATC Sensor Position picture







CHAPTER 7

MACHINE MAINTENANCE

PLEASE READ CAREFULLY BEFORE MAINTENANCE

ON THIS MACHINE

7.1 PREPARATION BEFORE MAINTENANCE

1. Fully Understand all the safety instructions illustrated in the manual.
2. Always maintain the machine under the supervisors instruction.
3. Prepare all the necessary spare parts, such as washer, O ring, seal, etc., in advance.
4. Fully understand all the maintenance procedures written in the maintenance manual.
5. Follow the maintenance procedures and be sure to establish the maintenance records after work.

7.2 LUBRICATION SYSTEM

Running conditions of this machine depend heavily on the lubrication management. Ensure to check the lubrication system frequently to keep this machine in a good service condition. The following describes how to lubricate various machine parts properly. Recommended lubrication oil used in the pneumatic system, lubrication grease and cutting coolant are listed in the oil guide table.(see 7.3.4)

7.2.1 WARNING SYSTEM FOR THE CENTRALIZED LUBRICATION SYSTEM

A warning system is designed to notify users of checking and filling up the slideway lubrication system. The lubrication frequency has been set by factory. Please make sure it is adequate for the machine if you change the lubrication frequency.

Please fill the oil tank with oil immediately when the warning alarm message is shown on the control. The warning alarm will remain if the warning status is not cleared even though the power is turned off / on. Ensure to check the centralized lubrication system weekly at least, and fill up the tank if necessary. Recommended lubrication oil is listed in the oil guide table.

WARNING!!!
If there is a lack of oil, please fill the oil tank with oil immediately.

7.3 LUBRICATION

7.3.1 LUBRICATION FOR THE X, Y AND Z AXIS BEARINGS

Grease is used to lubricate bearings of X-axis, Y-axis and Z-axis. The recommended grease (Nbu 15) can be used in high working temperature conditions. It has a good abrasive property and does not change consistency.

7.3.2 LUBRICATION FOR THE X, Y AND Z AXIS BALLSCREWS

The cross-saddle, saddle are traveled along the X, Y and Z directions respectively. Either the X-axis, Y-axis or Z-axis movement is driven by an AC servo motor via the connection of a coupling and a ball screw. All the ball screws are pre-tensioned and lubricated with proper oil to avoid positioning error resulting from thermal deformation.

7.3.3 LUBRICATION FOR THE SPINDLE SYSTEM

1. Grease is used to lubricate spindle bearings. The recommended grease (Nbu 15) could be used in high working temperature conditions. It has a good abrasive property, and does not change consistency.

2. Ensure to maintain an adequate lubrication cooling oil in the cooling system. Fill it up if necessary.

3. The spindle cooler (optional equipment) is used to cool the spindle bearings to prevent the spindle system from thermal deformation.

7.3.4 THE OIL GUIDE TABLE (V2.7)

7.3.4.1 OIL GUIDE TABLE A (For all machine type)

Lubricant Position	**Lubrication Tank** Slideway and Ballscrew	**Cutting Coolant**	
Lubricant Characteristic	◎Viscosity ISO VG68 ◎Anti-wear, Extreme-pressure	◎Good Heat conduction ◎Good lubricant performance	
Lubrication Method	Centralized Lub	Circulating Lub	
Replace& add Period	Daily As needed	As needed	
Tank Capacity	3 Litres	100 Litres ※Depend on Model	
Recommended Grade of Oil	◎BP Macurrat D 68 ◎Mobil Vactra No.2 ◎Shell Tonna S2 M68 ◎BECHEM Staroil CGLP 68 MF	◎CPC Cutting Oil 31C ◎Shell Dromus B or Macron 32 ◎BECHEM AVANTIN	

****** It is recommended to use ISO68 grade of oil for Slideway and Ballscrew if this machine is located in a plant with ambient temperature of under 25°C.**

7.3.4.2 OIL GUIDE TABLE B (FOR VMC)

Lubricant Position	**Tool Release Drawbar**	**Spindle Oil Cooler Tank**	**ZF Gearbox (Option)**
Lubricant Characteristic	◎Viscosity ISO VG32 ◎Anti-rust, anti-oxidation ◎Good Stability	◎Viscosity ISO VG32 ◎Anti-rust, anti-oxidation ◎Good Stability	◎Viscosity ISO VG32 ◎Anti-rust, anti-oxidation ◎Good Stability
Lubrication Method	Centralized Lub	Circulating Lub	Circulating Lub
Replace & add Period	Once Weekly As needed	One year	One year
Tank Capacity	---	※Depend on Model	※Depend on Model
Recommended Grade of Oil	◎BP Energol HLP 32 AW ◎Mobil DTE Light ◎Shell Tellus 32 ◎Chevron Hydraulic Oil AW32 ◎BECHEM Staroil NR 32	◎BP Energol HLP 32 AW ◎Mobil DTE Light ◎Shell Tellus 32 ◎Chevron Hydraulic Oil AW32 ◎BECHEM Staroil NR 32	◎BP Energol GR-XP 32 ◎Mobil Gear XMP 32 ◎Shell Omala 32 ◎Chevron Ultra Gear 32 ◎BECHEM Staroil G 32 ◎CPC HD32 ◎BP Energol HLP 32 AW ◎Mobil DTE Light ◎Shell Tellus 32 ◎Chevron Hydraulic Oil AW32 ◎BECHEM Staroil NR 32

WARNING!!!

Ensure to use the recommended fluids as listed in the oil guide table.

7.4 THE ATC CAM UNIT MAINTENANCE

7.4.1 THE OIL LEVEL CHECKING

1. Check oil level: In order to keep whole system run smoothly, need to check the lubrication oil through oil gauge in front of this system. Always maintain oil level at visible level.

2. Home position check: The unit was designed only may start from the home position. If system stops out of home position, the CNC control may interlock the system. The process to move this unit back to home position (please refer to CH 7.4.2).

7.4.2 THE OIL GUIDE TABLE

1. Under normal operation, this unit we strongly recommend to change oil every 12 months. But need to check oil lever every week. If oil lever lower than normal, it need to fill up.

BRAND NAME	TYPE	QUANTITY
MOBIL	Gear 626	About 5 liters
ESSO	EP68	About 5 liters
SHELL	Omala 81	About 5 liters

NOTE !!!

Ensure to use the recommended fluids as listed in the oil guide table.

7.5 THE MACHINE MAINTENANCE

Ensure to turn off the main power switch, the power switch of the machine panel and main power circuit breaker and put **"Under maintenance, Do not touch any power switch"** warning signs on visible spots before starting the maintenance work.

7.5.1 NOTICES

1. Only qualified engineers are allowed to maintain or install the electrical equipment.
2. Do not remove or alter any over-traveling limit switch or related mechanical parts without permission.
3. Always use ladders when working in high places.
4. Ensure all the appliances, such as fuses, cables, etc., are reliable.

7.5.2 CLEANING RULE

1. Ensure to clean the anti-rust treatment with kerosene or diesel on the contact surfaces of the moving machine parts. Don't clean up the anti-rust solvent on other places than where mentioned above.
2. Do not clean the machine with organic solvent.
3. Do not use compressed air to remove dust on the machine, which might damage sliding parts surfaces.
4. Remove all the anti-moisture substances placed inside the enclosures.
5. Always clean up the working area and machine after the maintenance is done. Keep the machine and work area neat, clean, dry and orderly.
6. Remove all the garbage and leftovers after the maintenance work is done.
7. Always keep the maintenance records and inspection results.
8. Report to our local dealer or us if any abnormal condition was found during maintenance. Do not disassemble the machine by yourself.

7.6 PREVENTIVE MAINTENANCE

To keep the machine in good service conditions, please follow the procedures below to maintain the machine.

7.6.1 DAILY MAINTENANCE

1. Check to see if the oil quantity in the automatic lubricator is sufficient.
2. Check to see if the cutting fluid quantity in the fluid tank is sufficient.
3. Clean up the machine and working area after finishing the work. Ensure to put a layer of rust-preventative oil on exposed sliding surfaces.
4. Turn the power source switch off when you finish the work.
5. Release the water accumulated in the air filter cap.
6. Remove chips from the machine every day after the job is finished.
7. Check the spindle taper bore after finishing using the machining. Clean up the spindle taper bore with the spindle taper bore cleaner, as illustrated in the following chapter.
8. Stop the machine immediately and find out sources of any problems if any part of the machine is overheated.
9. Stop the machine immediately and fix any problems before resuming machining if any electrical part, such as the connector, switch, electrical socket and electrical wire, is out of order.
10. Ensure there is no abnormal noise when the machine is running.

7.6.2 WEEKLY MAINTENANCE

1. Ensure all the pumps work well.
2. Ensure the tool exchange system could be operated smoothly.
3. Ensure the swivel disk of the tool magazine could be rotated smoothly.

7.6.3 MONTHLY MAINTENANCE

1. Check gibs on the bed and cross slide. If necessary, adjust gibs according to the instructions in “GIB ADJUSTMENT” .
2. Clean the cutting fluid pipes and lubrication oil pipes.
3. Clean up the cutting oil tank, and then fill up the tank with recommended oil.
4. Check ball screws and clean them.
5. Ensure any nuts and screws are tight.

7.6.4 HALF-YEARLY MAINTENANCE

1. Ensure the spindle run out and bearing clearance are within the specified precision’s.
2. Ensure there are no loose nuts and screws.
3. Ensure all the electrical parts, such as connectors, switches, cables, are in normal service conditions.
4. Check out all the insulation resistors. Ensure to keep a record.
5. Ensure the tool exchanger do not interfere with the spindle.

7.6.5 YEARLY MAINTENANCE

1. Ensure the push buttons and switches on the control panels work properly.

2. Remove all the carbon deposited on the electrical relay points, then clean all the electrical relay points with alcohol liquid.

3. Check if the balance chains are in good service conditions.

4. Clean the hydraulic system, including the oil tank, and refill the oil tank. Ensure all the setting pressures are normal.

5. Check the machine leveling and adjust if necessary.

6. Check all electric wire connections for looseness.

7. Replace oil of the spindle cooler system, if you have this equipment.

7.7 HOW TO ORDER REPLACEMENT PARTS

1. Quote component part numbers and description, against each part's illustration for all component parts required.

2. Some parts are standard items, which can generally be purchased locally- e.g. nuts, bolts, screws, washers, etc.

3. Always quote the machine serial number in all parts orders or technical inquiries. This number can be found on the nameplate on the machine bed.

CHAPTER 8

APPENDIX

8.1 TROUBLE SHOOTING

8.1.1 TABLE A

PROBLEM	PROBABLE CAUSES	CORRECTION
MACHINE START FAILURE	1. Fuse in control circuit burnt out 2. Incorrect power source 3. Overload thermal relay tripped	1. Replace 2. Correct it 3. Reset
INSUFFICIENT POWER OR MOTOR OVERHEATING	1. Loss of phase 2. Overload cutting 3. Poor magnetic contractor	1. Correct 2. Reduce load 3. Replace
TOOL CHATTERING	1. Workpiece not clamped securely 2. Improper tool type or material	1. Clamp it securely 2. Use correct tool only
NO LUBRICANT DELIVERY	1. Lubrication pump failed 2. Lack of oil 3. Filter clogged	1. Check and correct it 2. Fill up oil 3. Clean it

8.1.2 TABLE B (FOR LUBRICATOR)

Problem	Diagnostics	Troubleshooting
Indication light does not work	Power cable is not connected	Check the power cable
	Indication light fails to work	The repair needs to be done by authorized personnel.
	Incorrect power connection to burn out the inside wiring.	Check if power cable is connected in mistake or incorrect power input.
	Impermissible lubricant to cause the motor burnt out.	Replace with a new motor and revise to the lubricant of suitable viscosity 30~150cSt.
	The broken control board	Replace a new control board. The repair needs to be done by authorized personnel.
Indication light is ON but no lubricant is discharged from the system	Insufficient lubricant	Refill the tank
	Float switch fails to work	Replace with a new float switch.The repair needs to be done by authorized personnel.
	Motor fails to work.	Replace with a new motor The repair needs to be done by authorized personnel.
	Incorrect input power at low voltage	Ensure the input power
	Oil suction set is blocked.	Clean the suction set
	Impermissible lubricant	Revised to the lubricant of suitable viscosity 30~150cSt.
Leaking at the connection of the pipe and the lubricator	Incorrect installation	The pipe must be inserted into the compression sleeve and at least 1mm over the end of the compression sleeve further into the adapter.
No lubricant discharging when pushing FEED button.	1. Incorrect wiring or input power	Check the wiring diagram and the input power.
	2. Insufficient lubricant (Abnormality Indication light become RED)	Refill the tank
	3. The fuse of the control board is broken(Indication light does not work when the power is connected).	Replace the fuse of the control board
	4. The control board is damaged(If all the checking shows normal, the control board could be broken)	Replace with a new motor. The repair needs to be done by authorized personnel.

Problem	Diagnostics	Troubleshooting
Motor runs but no lubricant is discharged at the lubrication points	Disassemble the pipe connecting with the output bore and check if the lubricant is discharged from the lubricator.	
	If YES, the lubricator is at normal condition.	The piping layout could be blocked or broken. Find out and replace the part of the pipe with problem.
	If NO, the problem is at the lubricator. The causes could be：	
	1. Air in the pipe	Please disassemble the pipe connecting with the output bore and keep the motor running for minutes to discharge the air in the pipe. Assemble again when the lubricant is discharging
	2. Jammed gear pump	The gear pump could be jammed because of dirty lubricant.The repair needs to be done by authorized personnel
	3. The motor runs but not in normal condition.	Replace with a new motor. The repair needs to be done by authorized personnel.

WARNING !!!

(a) Only original iSHAN centralized lubrication systems spare parts are used for iSHAN centralized lubrication systems. It is prohibited for changing to non-original spare parts.

(b) TURN OFF the power before any checking or maintenance Faults / Fault finding.

(c) If the lubricator is sent for repair, please ensure the lubricant is completely removed to protect the electronics from remainder of lubricant.

Working on products that have not been disconnected from the power supply can cause serious injury or death to persons. Installation, maintenance, and repair work may only be carried out by qualified experts on products that have been disconnected from the power supply. The supply voltage must be turned off before any product components are open.

8.2 ISO METRIC THREAD DATA

O. Dia.	Core Dia.	Pitch	Depth	Flat	Effective	Tapping	Clear
3.0	2.3866	0.5	0.3067	0.0625	2.675	2.5	3.1
4.0	3.1412	0.7	0.4294	0.0875	3.545	3.3	4.1
5.0	4.0184	0.8	0.4908	0.1	4.48	4.2	5.1
6.0	4.7732	1.0	0.6134	0.125	5.35	5.0	6.1
8.0	6.4664	1.25	0.7668	0.15625	7.188	6.8	8.2
10.0	8.1596	1.5	0.9202	0.1875	9.026	8.5	10.2
12.0	9.8530	1.75	1.0735	0.21856	10.836	10.2	12.2
16.0	13.5462	2.0	1.2269	0.25	14.701	14.0	16.25
20.0	16.9328	2.5	1.5336	0.3125	18.376	17.5	20.25
22.0	18.9328	2.5	1.5336	0.3125	20.376	19.5	22.25
24.0	20.3194	3.0	1.8403	0.375	22.051	21.0	24.25
30.0	25.7060	3.5	2.147	0.4375	27.727	26.5	30.5

8.3 WASP FUNCTION (spindle/axis warm up)

SUBJECT	WASP (spindle/axis warm up)	MODEL	HD VMCs with 828D
		CLASSIFY	Service & Commissioning

DESCRIPTION

On VMC HDs with 828D PPU291 & Touch screen from PLC V1.1DS the following features are added/revised.

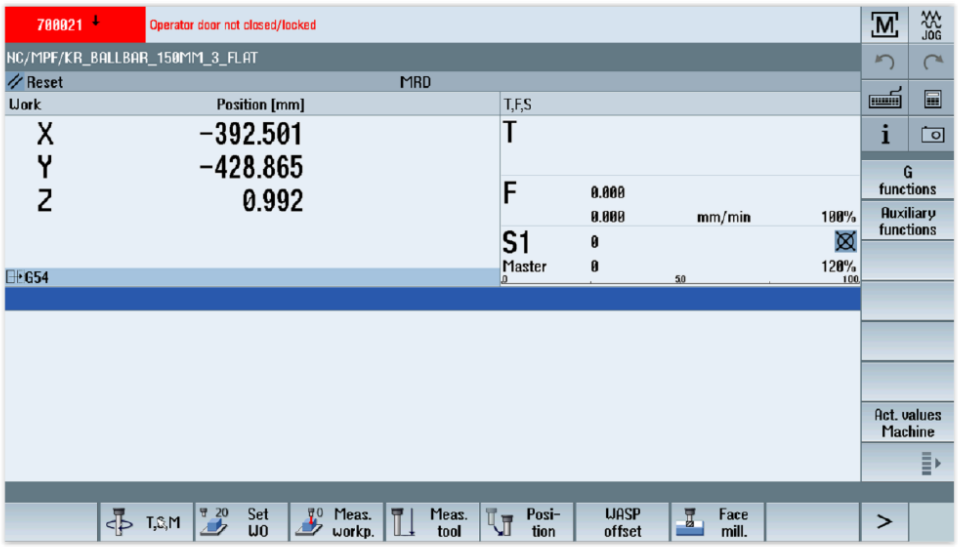
WASP (Spindle and Axis Warm Up)

The cycle WASP is used for spindle warm up and spindle warm up with axis movement.

At Power On if the spindle has been stationary for longer than 8 hours then an Alarm will appear saying that WASP must be executed in MDA mode. The length of the spindle warm up is dependent upon how long the spindle was stationary.

Within WASP there are Daily, Weekly and Monthly warm up sections for 8K, 10K, 12K and 15K spindles.

It is also now possible to warm up the axes as well as the spindle.



With Spindle warm up and axis movement there is no daily/weekly/monthly cycle. Spindle warm up with axis movement will run for approximately 12 minutes depending upon machine size.

If warm up including axes movement is required press the "WASP offset" softkey, then the display below will appear.

SUBJECT	WASP (spindle/axis warm up)	MODEL	HD VMCs with 828D
		CLASSIFY	Service & Commissioning

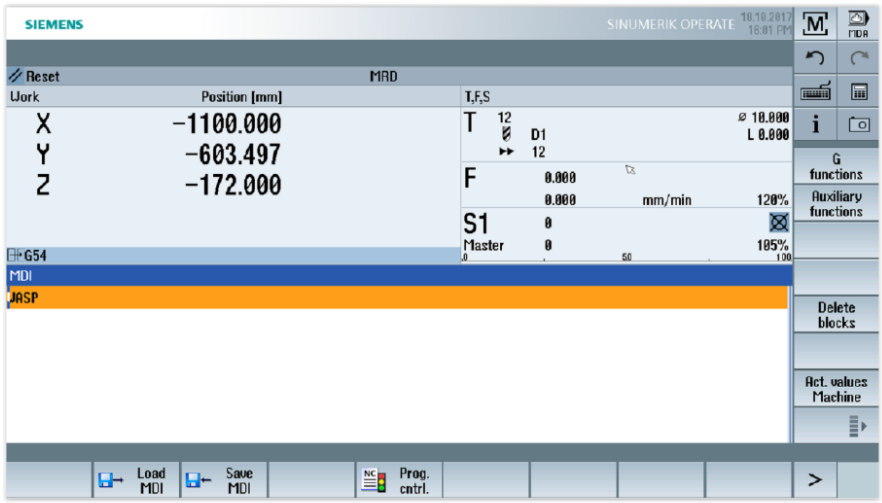
The toggle key should be used to select WASP with Axis Motion.

The Z axis should then be moved to a safe position and the vertical softkey "SET WASP POS" pressed. This will record the position for the Z axis negative direction travel for the WASP cycle.

NOTE:- The settings are reset after power off/on.

The program "WASP" should be then be selected and executed in "MDA" mode as shown below.

It is also possible to run the WASP cycle at any time in MDA mode.



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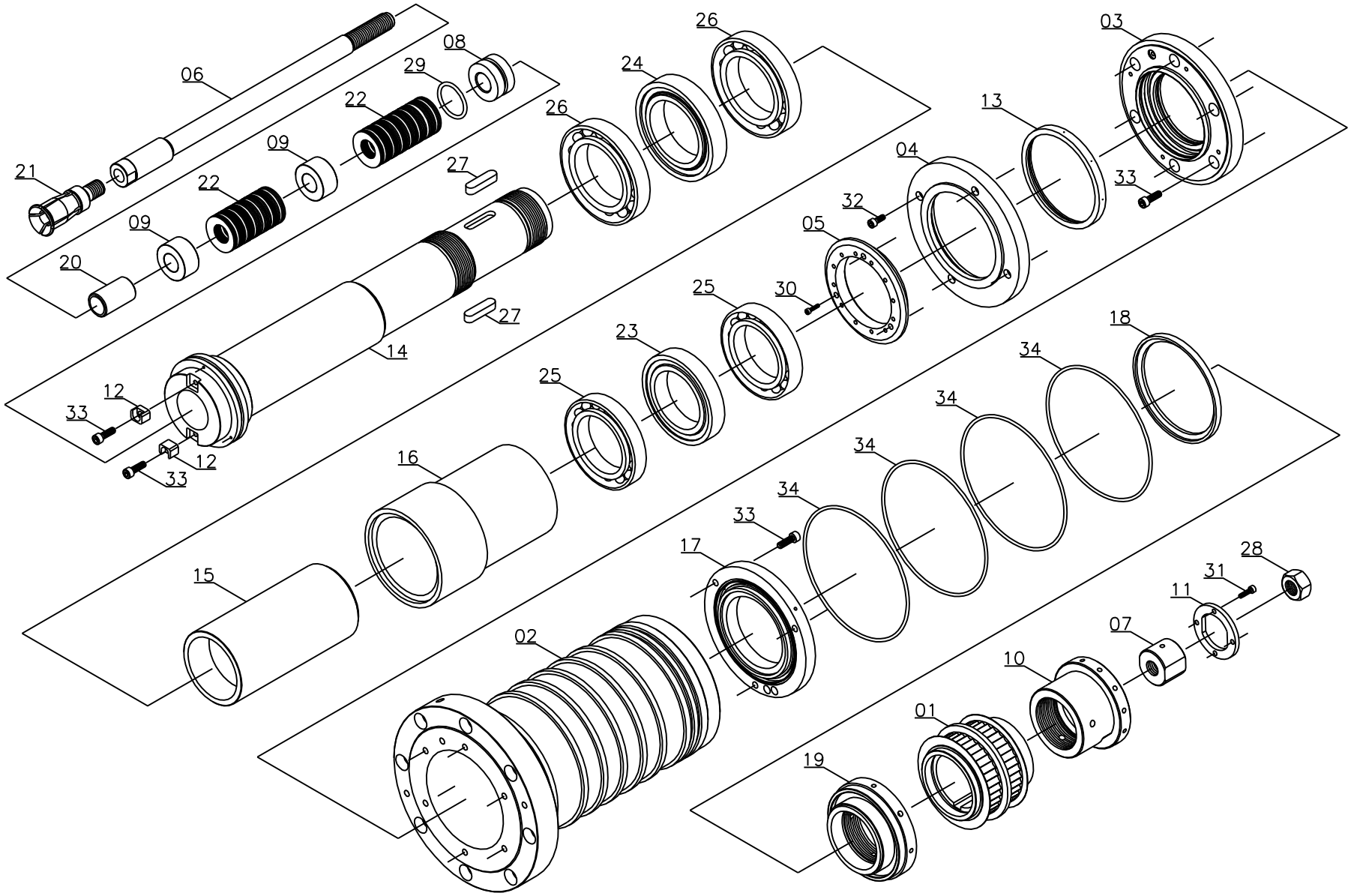
CHAPTER 9

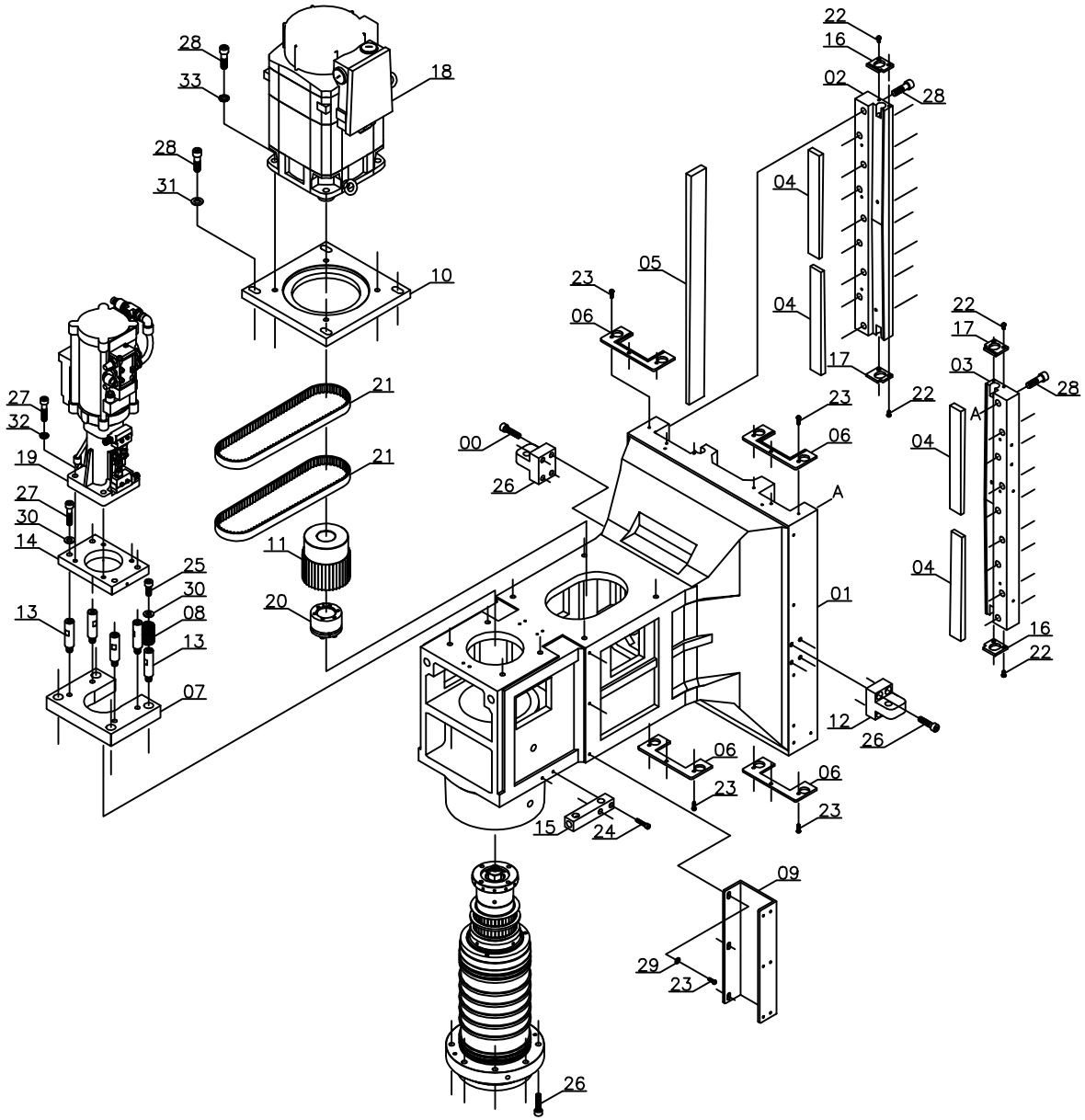
PARTS LIST



SPINDLE ASSEMBLY

SPINDLE ASSEMBLY

No	Part Number	Description	Q'ty	Remarks
1	MK010031	SPINDLE PULLEY	1	same as 1060HS
2	MK010053	SPINDLE HOUSING	1	same as 1060HS
3	MK010061	FRONT BEARING COVER	1	same as 1060HS
4	MK010330	COVER	1	same as 1060HS
5	MK010420	RING	1	same as 1060HS
6	ML010161	RULL ROD	1	
7	ML010172	LOCK NUT	1	
8	ML010250	SPACER	1	
9	ML010260	SPACER	2	
10	ML020083	NUT	1	
11	ML020092	FIXED PLATE	1	
12	MT010220	DOG	2	same as 710
13	MT010340	AIR TIGHT RING	1	same as 710
14	MU010012	SPINDLE	1	same as 1020VMC
15	MU010101	SPACER	1	same as 1020VMC
16	MU010111	SPACER	1	same as 1020VMC
17	MU010140	BEARING COVER	1	same as 1020VMC
18	MU010150	RING	1	same as 1020VMC
19	MU010351	NUT	1	same as 1020VMC
20	S0000019	SPACER	1	
21		GRIPPER	1	
22		DISH SPRING	78	
23	A-501-030-7013	SPACER	1	
24	A-501-031-7014	SPACER	1	
25	AB7013	BEARING	2	7013
26	AB7014	BEARING	2	7014
27	AK1008040	KEY	2	10×8×10L
28	ANM115018	NUT	1	M18x1.5
29	AOR350034	OIL RING	1	Ø34 x3.5
30	ASM603014	HEXAGON SOCKET CAP HD SCREW	3	M3x14L
31	ASM604016	HEXAGON SOCKET CAP HD SCREW	4	M4x16L
32	ASM605020	HEXAGON SOCKET CAP HD SCREW	4	M5x20L
33	ASM606020	HEXAGON SOCKET CAP HD SCREW	11	M6x20L
34	AOR311444	OIL RING	1	Ø144.4 x3.1(G145)
35				
36				
37				
38				



HEAD ASSEMBLY

HEAD ASSEMBLY

No	Part Number	Description	Q'ty	Remarks
1	MP020010	HEAD STOCK	1	
2	MP020020	GIB SEAT	1	
3	MP020030	GIB SEAT	1	
4	MP020040	GIB	4	
5	MP020050	GIB	1	
6	MP020060	HEAD WIPER	4	
7	MP020070	TOOL EJECTOR BRACKET	1	
8	MP020180	SPRING	4	
9	MP420280	HEAD BRACKET	1	
10	MS010040	MOTOR BRACKET	1	
11	MK010022	MOTOR PULLEY	1	
12	MK030230	CYLINDER BRACKET	2	
13	MT020110	BOLT	8	
14	MT020201	UNCLAMP CYLINDER PANEL	1	
15	MX360010	DIVERTER SEAT	1	
16	MO050070	WIPER-LEFT	2	
17	MO050070	WIPER-RIGHT	2	
18		MOTOR	1	
19		UNCLAMP CYLINDER	1	
20		SLEEVE	1	SD-38
21	ABE0900824	BELT	2	S8M-824-19W
22	ASM105010	BUTTON HEAD CAP SCREW	8	M5x10L
23	ASM105016	BUTTON HEAD CAP SCREW	15	M5x16L
24	ASM606030	HEXAGON SOCKET CAP HD SCREW	2	M6x30L
25	ASM610025	HEXAGON SOCKET CAP HD SCREW	4	M10x25L
26	ASM610040	HEXAGON SOCKET CAP HD SCREW	16	M10x40L
27	ASM610045	HEXAGON SOCKET CAP HD SCREW	8	M10x45L
28	ASM612040	HEXAGON SOCKET CAP HD SCREW	26	M12x40L
29	AWMT01005	BRIGHT WASHER	3	M5
30	AWMT01010	BRIGHT WASHER	8	M10
31	AWMT01012	BRIGHT WASHER	4	M12
32	AWMS01010	SPRING WASHER	4	M10
33	AWMS01012	SPRING WASHER	4	M12
34				
35				
36				
37				
38				

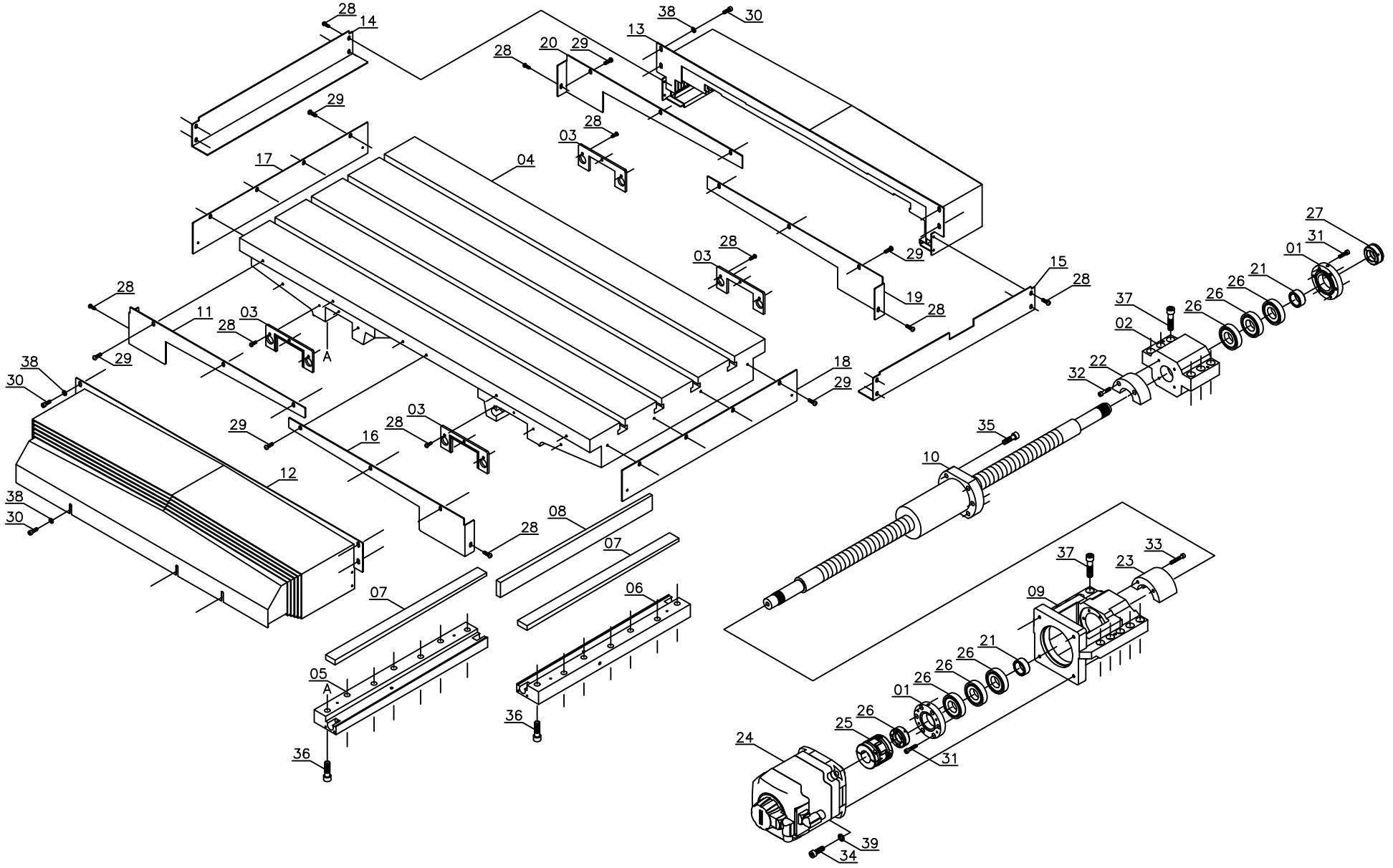
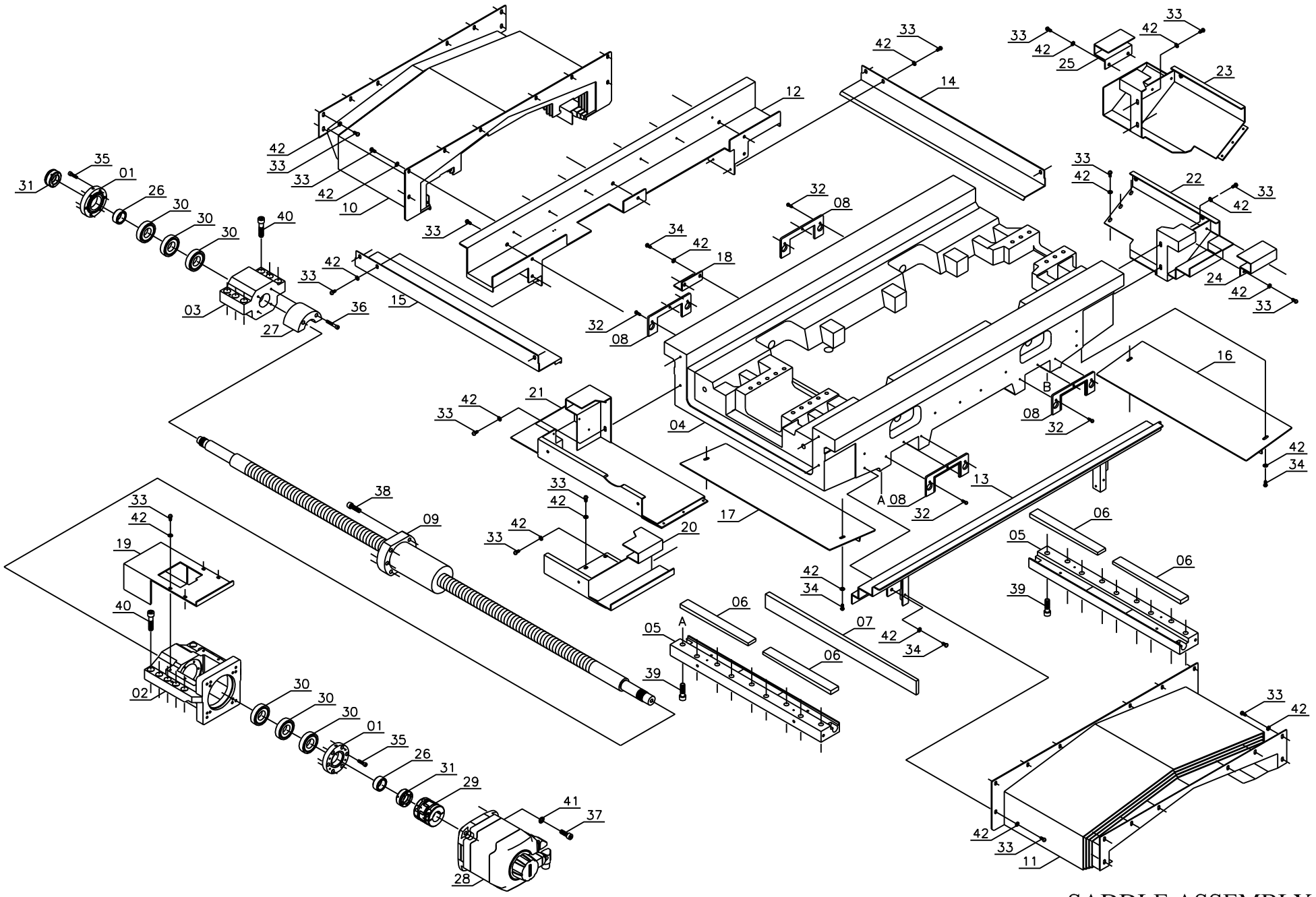


TABLE ASSEMBLY

TABLE DRIVE ASSEMBLY

No	Part Number	Description	Q'ty	Remarks
1	HE110030	BEARING COVER	2	
2	MO110040	BEARING HOUSING - X AXIS	2	same as 800HD
3	MP020060	SLIDE WIPER	4	
4	MP060010	WORKING TABLE	1	
5	MP060020	SQUARING PLATE - LEFT	1	
6	MP060030	SQUARING PLATE - RIGHT	1	
7	MP060040	GIB	2	
8	MP060050	GIB	1	
9	MP110020	MOTOR BRACKET	1	
10	MP110010	BALL SCREW - X AXIS	1	
11	MP420111	GUARD DUST	1	
12	MP442011	STRETCH COVER - HEAD	1	
13	MP442021	STRETCH COVER - TAIL	1	
14	MP442060	CONTINUOUS PLATE	1	
15	MP442070	CONTINUOUS PLATE	1	
16	MP442101	GUARD DUST	1	
17	MP442120	GUARD DUST	1	
18	MP442120_MIR	GUARD DUST	1	
19	MP442131	GUARD DUST	1	
20	MP442141	GUARD DUST	2	
21	MS130081	BUSH	1	same as 560
22	MT110121	RIGHT BUSH - X AXIS	1	same as 710
23	MU110130	LEFT BUSH - X AXIS	1	same as 1020VMC
24		MOTOR	1	
25		COUPLING	1	
26	AB3062	BEARING	6	
27	ANN115030	LOCK NUT	2	
28	ASM105016	BUTTON HEAD CAP SCREW	24	
29	ASM106020	BUTTON HEAD CAP SCREW	20	
30	ASM606020	HEXAGON SOCKET CAP SCREW	11	
31	ASM606025	HEXAGON SOCKET CAP SCREW	12	
32	ASM606030	HEXAGON SOCKET CAP SCREW	2	
33	ASM606040	HEXAGON SOCKET CAP SCREW	2	
34	ASM610030	HEXAGON SOCKET CAP SCREW	4	
35	ASM610035	HEXAGON SOCKET CAP SCREW	6	
36	ASM612040	HEXAGON SOCKET CAP SCREW	14	
37	ASM612050	HEXAGON SOCKET CAP SCREW	16	
38	AWMT01006	WASHER	11	
39	AWMS01010	SPRING WASHER	4	



SADDLE ASSEMBLY

SADDLE ASSEMBLY

No	Part Number	Description	Q'ty	Remarks
1	HE110030	BEARING COVER	2	
2	MP110020	MOTOR BRACKET	1	
3	MO110040	BEARING HOUSING - X AXIS	1	same as 800HD
4	MP050010	SADDLE	1	
J5	MP050020	SQUARING PLATE	2	
6	MP050040	GIB	4	
7	MP050050	GIB	1	
8	MP050060	SLIDE WIPER	4	
9	MP120010	BALL SCREW - Y AXIS	1	
10	MP441010	STRETCH COVER	1	
11	MP441020	STRETCH COVER	1	
12	MP441060	STRETCH COVER FRAME - LEFT	1	
13	MP441070	STRETCH COVER FRAME - RIGHT	1	
14	MP441100	GUARD DUST	1	
15	MP441110	GUARD DUST	1	
16	MP441120	GUARD DUST	1	
17	MP441120_MIR	GUARD DUST	1	
18	MP441140	GUARD DUST	1	
19	MP441260	MOTOR COVER	1	
20	MP442040(前右)	X AXIS MOTOR BRACKET - FRONT RIGHT	1	
21	MP442040(前左)	X AXIS MOTOR BRACKET - FRONT LEFT	1	
22	MP442050(後右)	X AXIS MOTOR BRACKET - BACK RIGHT	1	
23	MP442050(後左)	X AXIS MOTOR BRACKET - BACK LEFT	1	
24	MP442050-A	MOTOR BRACKET COVER	1	
25	MP442050-B	MOTOR BRACKET COVER	1	
26	MS130081	BUSH	2	same as 560
27	MU110130	LEFT BUSH - X AXIS	1	same as 1020VMC
28		MOTOR	1	
29		COUPLING	1	
30	AB3062	BEARING	6	
31	ANN115030	LOCK NUT	2	
32	ASM105016	BUTTON HEAD CAP SCREW	12	
33	ASM106014	BUTTON HEAD CAP SCREW	66	
34	ASM106016	BUTTON HEAD CAP SCREW	4	
35	ASM606025	HEXAGON SOCKET CAP SCREW	12	
36	ASM606040	HEXAGON SOCKET CAP SCREW	2	
37	ASM610030	HEXAGON SOCKET CAP SCREW	4	
38	ASM610035	HEXAGON SOCKET CAP SCREW	1	
39	ASM612040	HEXAGON SOCKET CAP SCREW	18	

SADDLE ASSEMBLY

No	Part Number	Description	Q'ty	Remarks
40	ASM612050	HEXAGON SOCKET CAP SCREW	10	
41	AWMS01010	SPRING WASHER	4	
42	AWMT01006	WASHER	66	
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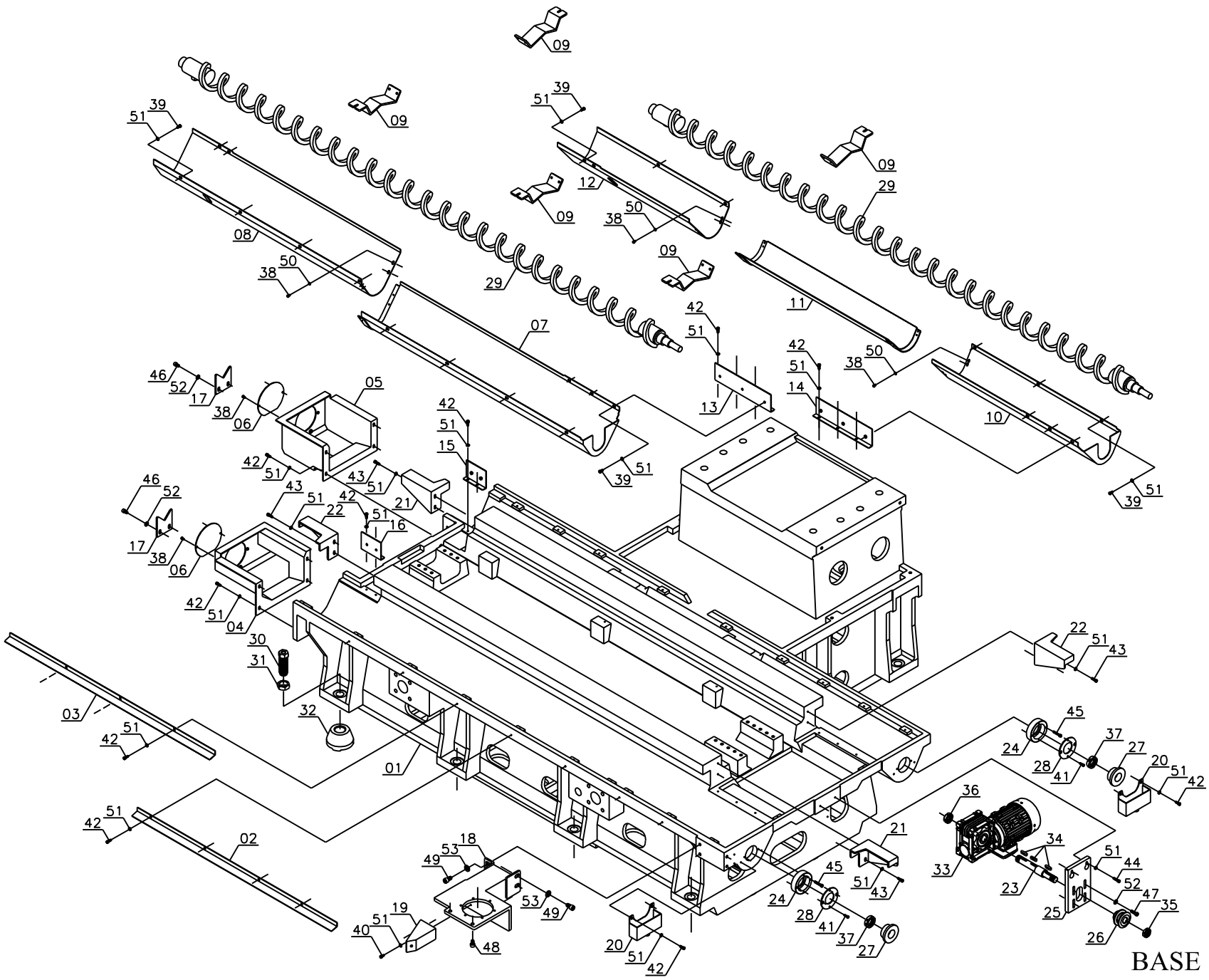

BASE ASSEMBLY

BASE ASSEMBLY

No	Part Number	Description	Q'ty	Remarks
1	MP040010	BASE	1	
2	MP420550	DRAIN BOARD	1	
3	MP420560	DRAIN BOARD	1	
4	MP420580	FIXED BRACKET(FRONT)	1	
5	MP420590	FIXED BRACKET (BACK)	1	
6	MP420590-B	COVER	2	
7	MP420610	CHIP FLUTE-FRONT(RIGHT)	1	
8	MP420610-A	CHIP FLUTE-FRONT(LEFT)	1	
9	MP420610-B	PRESS PLATE	5	
10	MP420620	CHIP FLUTE-BACK(RIGHT)	1	
11	MP420620	CHIP FLUTE-BACK(MIDDLE)	1	
12	MP420620	CHIP FLUTE-BACK(LEFT)	1	
13	MP420660	FIXED BRACKET	1	
14	MP420670	FIXED BRACKET	1	
15	MP420680	FIXED BRACKET	1	
16	MP420690	FIXED BRACKET	1	
17	MP420800	STRUT PANEL	2	
18	MP420930	BRACKET	1	
19	MP420930-A	SUPPORT	1	
20	MP430140	WATER PROOF GROOVE	2	
21	MP441080	BRACKET	2	
22	MP441090	BRACKET	2	
23	MP460080	SHAFT	1	
24	MP460090	SEAT, FRENCH	2	
25	MP460100	MOTOR BRACKET	1	
26	MP460110	CHAIN PULLEY	1	
27	MP460120	CHAIN PULLEY	2	
28	MP460130	COVER	2	
29	MP460210	CUTTING SCREW	2	
30	MK040040	BOLT	12	
31	MK040050	NUT	12	
32	ML040070	BLOCK	12	
33		FINAL DRIVE GEAR	1	
34	AK0807030	KEY	3	8×7×30L
35	ANN415022	LOCK NUT	1	MR M22×1.5
36	ANN415025	LOCK NUT	1	MR M25×1.5
37	ANN415030	LOCK NUT	2	MR M30x1.5
38	ASM105010	BUTTON HEAD CAP SCREW	16	M5×10L

BASE ASSEMBLY

No	Part Number	Description	Q'ty	Remarks
39	ASM106014	BUTTON HEAD CAP SCREW	23	M6x14L
40	ASM106016	BUTTON HEAD CAP SCREW	2	M6x16L
41	ASM605016	HEXAGON SOCKET CAP HD SCREW	4	M5x16L
42	ASM606016	HEXAGON SOCKET CAP HD SCREW	29	M6x16L
43	ASM606020	HEXAGON SOCKET CAP HD SCREW	4	M6x20L
44	ASM606025	HEXAGON SOCKET CAP HD SCREW	2	M6x25L
45	ASM606035	HEXAGON SOCKET CAP HD SCREW	4	M6x35L
46	ASM608014	HEXAGON SOCKET CAP HD SCREW	4	M8x14L
47	ASM608025	HEXAGON SOCKET CAP HD SCREW	4	M8x25L
48	ASM610016	HEXAGON SOCKET CAP HD SCREW	2	M10x16L
49	ASM612020	HEXAGON SOCKET CAP HD SCREW	4	M12x20L
50	AWMT01005	BRIGHT WASHE	16	M5
51	AWMT01006	BRIGHT WASHE	64	M6
52	AWMT01008	BRIGHT WASHE	8	M8
53	AWMT01012	BRIGHT WASHE	4	M10
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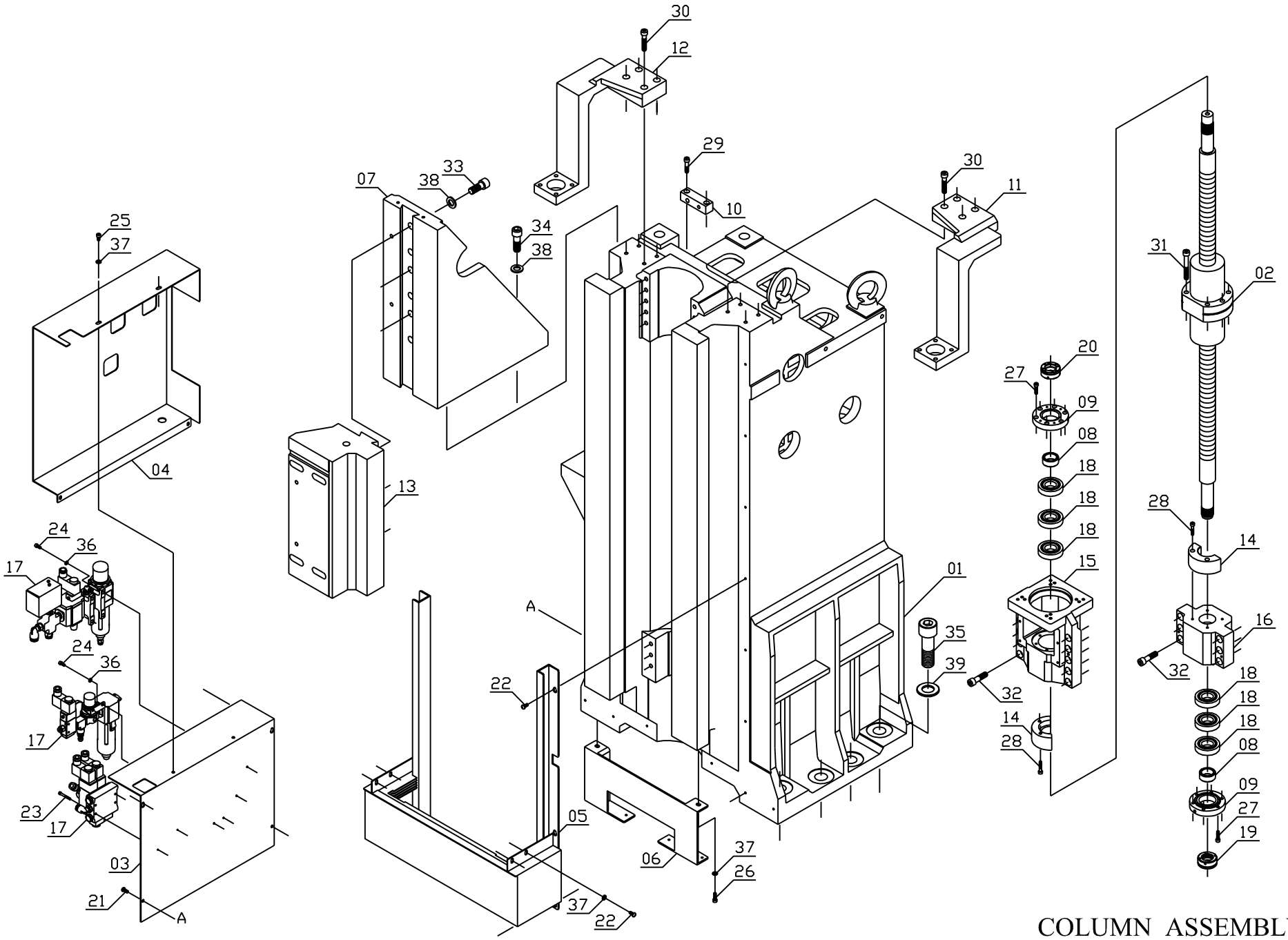

COLUMN ASSEMBLY

COLUMN ASSEMBLY

No	Part Number	Description	Q'ty	Remarks
1	MP030010	COLUMN	1	
2	MP130010	Z AXIS BALL SCREW	1	
3	MP420940	FIXED SUPPORT	1	
4	MP420940-A	COVER	1	
5	MP443010	Z AXIS STRETCH COVER	1	
6	MP443350	BRACKET	1	
7	MP530010	TOOL MAGAZINE BRACKET	1	
8	MS130081	SPACER	2	
9	HE110030	BEARING COVER	2	
10	MD530050	ADJUSTING BLOCK	1	
11	MK030030	RIGHT BRACKET, CYLINDER	1	
12	MK030040	LEFT BRACKET, CYLINDER	1	
13	MK530021	FIXED SUPPORT	1	
14	ML110131	SPACER	2	
15	MP110020	MOTOR BRACKET	1	
16	MO110040	BEARING BRACKET	1	
17		AIR CONDITIONING UNIT	1	GFR30010AF2
18	AB3062	BEARING	6	3062
19	ANN515025	LOCKJNUT	1	M25x1.5
20	ANN515030	LOCK NUT	1	M30x1.5
21	ASM106014	BUTTON HEAD CAP SCREW	2	M6x14L
22	ASM106016	BUTTON HEAD CAP SCREW	8	M6x16L
23	ASM604035	HEXAGON SOCKET CAP HD SCREW	2	M4x35L
24	ASM605012	HEXAGON SOCKET CAP HD SCREW	4	M5x12L
25	ASM606012	HEXAGON SOCKET CAP HD SCREW	2	M6x12L
26	ASM606020	HEXAGON SOCKET CAP HD SCREW	2	M6x20L
27	ASM606025	HEXAGON SOCKET CAP HD SCREW	12	M6x25L
28	ASM606030	HEXAGON SOCKET CAP HD SCREW	4	M6x30L
29	ASM608035	HEXAGON SOCKET CAP HD SCREW	2	M8x35L
30	ASM610050	HEXAGON SOCKET CAP HD SCREW	8	M10x50L
31	ASM610075	HEXAGON SOCKET CAP HD SCREW	6	M10x75L
32	ASM612045	HEXAGON SOCKET CAP HD SCREW	16	M12x45L
33	ASM616040	HEXAGON SOCKET CAP HD SCREW	3	M16x40L
34	ASM616050	HEXAGON SOCKET CAP HD SCREW	6	M16x50L
35	ASM630100	HEXAGON SOCKET CAP HD SCREW	8	M30x100L
36	AWMT01005	WASHER	4	M5
37	AWMT01006	WASHER	8	M6
38	AWMT01016	WASHER	9	M16

COLUMN ASSEMBLY

No	Part Number	Description	Q'ty	Remarks
39	AWMH01030	WASHER	8	M30
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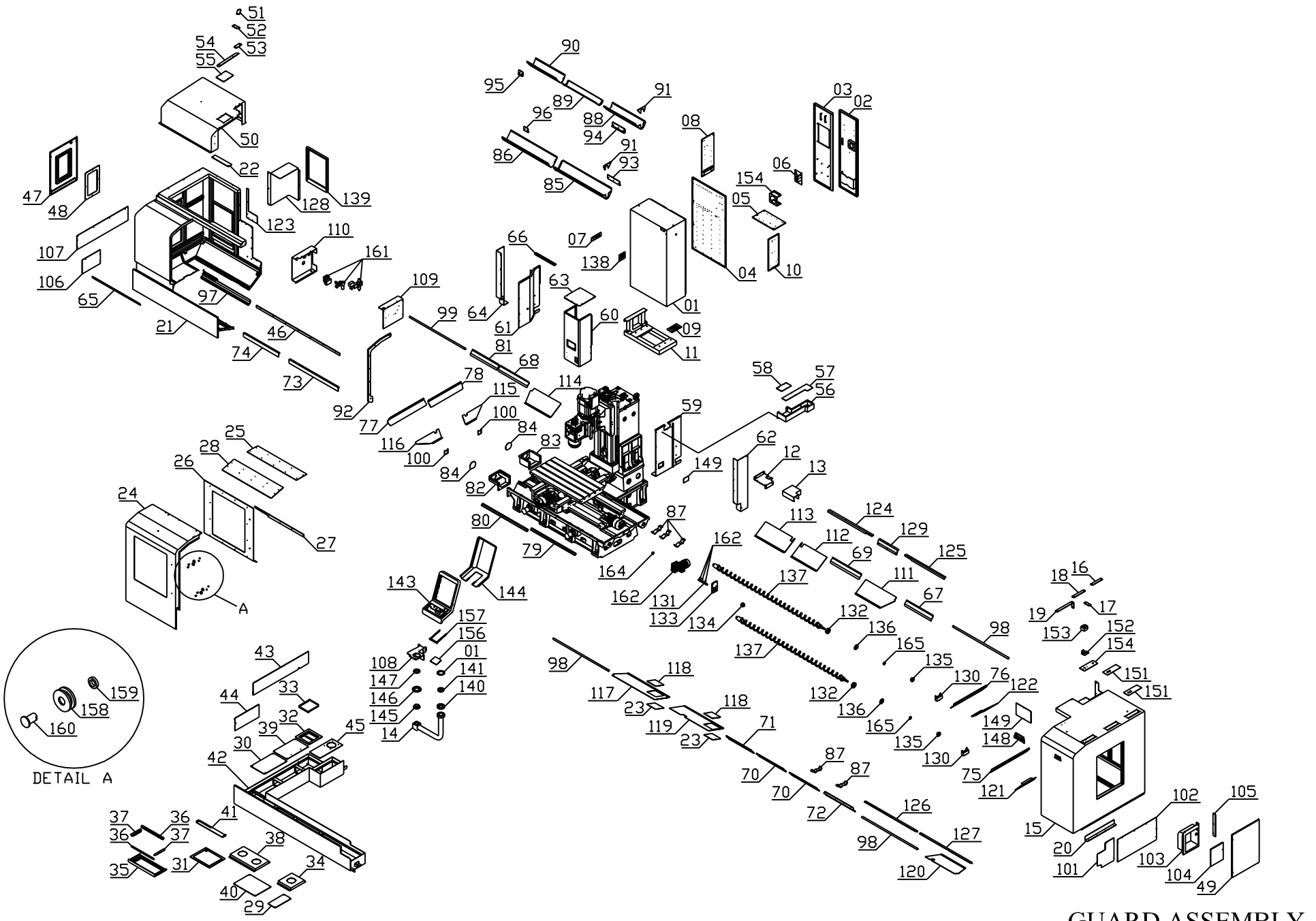

GUARD ASSEMBLY

GUARD

No	Part Number	Description	Q'ty	Remarks
1	MP410010	ELECTRIC CABINET	1	
2	MP410010-左	DOOR-LEFT	1	
3	MP410010-右	DOOR-RIGHT	1	
4	MP410010-A	BASE PLATE FOR SIEMENS	1	
5	MP410010-B	UNDER PLATE FOR SIEMENS	1	
6	MP410010-E	POWER SWITCH BASE	1	
7	MP410010-F	COVER	1	
8	MP410010-G	RIGHT PLATE	1	
9	MP410010-H	COVER	1	
10	MP410010-J	LEFT PLATE	1	
11	MP410060	ELECTRIC CABINET BRACKET	1	
12	MP410090	ELECTRIC CABINET PLATE	1	電氣箱連接板
13	MP410100	ELECTRIC CABINET PLATE	1	電氣箱連接板蓋板
14	MP410111	ROCKER ARM	1	
15	MP420010	GUARD(RIGHT)	1	
16	MP420010-A	GUARD PLATE	1	右罩上壓板
17	MP420010-B	GUARD PLATE	1	右罩上壓板
18	MP420010-C	GUARD PLATE	1	右罩上壓板
19	MP420010-D	GUARD PLATE	1	右罩上壓板
20	MP420010-F	GUARD SUPPORT BRACKET	1	支架
21	MP420020	GUARD(LEFT)	1	
22	MP420020-A	COVER	1	
23	MP420020-B	COVER	2	
24	MP420030	SLIDING DOOR	1	
25	MP420040	SLIDING DOOR COVER	1	
26	MP420050	SLIDING DOOR COVER	1	
27	MP420060	GUARD PLATE	1	下遮屑板
28	MP420070	SLIDING DOOR COVER	1	
29	MP420100-A	COVER	1	
30	MP420100-B	COVER	1	
31	MP420100-C	METAL FILTER	1	過濾網
32	MP420100-D1	METAL FILTER BOX	1	水箱過濾盒
33	MP420100-D1-A	COOLANT TANK PLATE	4	水箱過濾盒壓板
34	MP420100-E	PUMP BRACKET	1	
35	MP420100-F	METAL FILTER BOX	1	水箱過濾盒
36	MP420100-G	TANK PLATE	2	壓板
37	MP420100-H1	TANK PLATE	2	壓板
38	MP420100-I	PUMP BRACKET	1	

GUARD

No	Part Number	Description	Q'ty	Remarks
39	MP420100-J	COVER	1	
40	MP420100-L	COVER	1	
41	MP420100-T	COVER	1	
42	MP420102	CISTERN TANK	1	
43	MP420102-P	COVER	1	
44	MP420102-Q	COVER	1	
45	MP420102-S	COVER	1	
46	MP420220	DOOR TRACK	1	門軌道
47	MP420230	DOOR-LEFT	1	
48	MP420230	PLATE	1	左側門壓板
49	MP420241	DOOR-RIGHT	1	
50	MP420250	GUARD-LEFT	1	左罩上蓋
51	MP420250-A	PLATE	1	左罩上蓋壓板
52	MP420250-B	PLATE	1	左罩上蓋壓板
53	MP420250-C	PLATE	1	左罩上蓋壓板
54	MP420250-D	PLATE	1	左罩上蓋壓板
55	MP420250-E	COVER	1	
56	MP420260	TUBE FITING BRACKET	1	方型護管固定座
57	MP420260-A	COVER	1	
58	MP420260-B	COVER	1	
59	MP420300	COVER	1	頭部右護蓋
60	MP420310	COVER	1	頭部護蓋
61	MP420320	COVER	1	頭部左護蓋
62	MP420330	COVER	1	雙氣缸右護蓋
63	MP420340	PLATE	1	頭部上蓋板
64	MP420350	COVER	1	雙氣缸左護蓋
65	MP420380	PLATE	1	遮水板
66	MP420390	PLATE	1	頭部板金連接板
67	MP420400	COVER	1	右罩後遮板
68	MP420410(左)	COVER	1	右罩後遮板
69	MP420410(右)	COVER	1	右罩後遮板
70	MP420430	COVER	2	左罩前遮板
71	MP420440	COVER	1	左罩前遮板
72	MP420450	COVER	1	右罩前遮板
73	MP420490	COVER	1	
74	MP420500	COVER	1	
75	MP420510	COVER	1	右罩遮水板(右前)
76	MP420520	COVER	1	右罩遮水板(右後)

GUARD

No	Part Number	Description	Q'ty	Remarks
77	MP420530	COVER	1	左罩遮水板(左前)
78	MP420540	COVER	1	左罩遮水板(左後)
79	MP420550	COVER	1	遮水板
80	MP420560	COVER	1	遮水板
81	MP420570	COVER	1	右罩後遮板
82	MP420580	AUGER FITING BRACKET	1	除屑螺桿固定架(前)
83	MP420590	AUGER FITING BRACKET	1	除屑螺桿固定架(後)
84	MP420590-B	COVER	2	COVER
85	MP420610	PLATE	1	倒屑槽-右
86	MP420610-A	PLATE	1	倒屑槽-左
87	MP420610-B	PLATE	5	捲屑螺桿壓板
88	MP420620-A	PLATE	1	後倒屑槽(右)
89	MP420620-B	PLATE	1	後倒屑槽(中)
90	MP420620-C	PLATE	1	後倒屑槽(左)
91	MP420630	PLATE	2	倒屑槽遮蓋
92	MP420650	PLATE	1	壓板
93	MP420660	PLATE	1	倒屑槽固定座
94	MP420670	PLATE	1	倒屑槽固定座
95	MP420680	PLATE	1	倒屑槽固定座
96	MP420690	PLATE	1	倒屑槽固定座
97	MP420730	COVER	1	擋屑板
98	MP420760	SPRINKLER PIPE	3	噴水管
99	MP420780	SPRINKLER PIPE	1	噴水管
100	MP420800	PLATE	2	除屑螺桿支撐架
101	MP420860(右前)	PLATE	1	右罩下側板(前)
102	MP420860(右)	PLATE	1	右罩下側板(後)
103	MP420860(右後)	LUBE GUARD	1	注油機箱
104	MP420860-門	PLATE	1	注油機箱門
105	MP420860-A	PLATE	1	壓板
106	MP420870	PLATE	1	左罩下側板(前)
107	MP420881	PLATE	1	左罩下側板(後)
108	MP420930	BRACKET	1	BRACKET
109	MP420940	PLATE	1	三點組合支架
110	MP420940-A	COVER	1	三點組合護蓋
111	MP420950	PLATE	1	右罩除屑板(後右)
112	MP420960	PLATE	1	右罩除屑板(後左)
113	MP420970	PLATE	1	左罩除屑板(後右)
114	MP420980	PLATE	1	左罩除屑板(後左)

GUARD

No	Part Number	Description	Q'ty	Remarks
115	MP420990	PLATE	1	左罩除屑板(左後)
116	MP430010	PLATE	1	左罩除屑板(左前)
117	MP430020	PLATE	1	左罩除屑板(前左)
118	MP430020-A	COVER	2	
119	MP430030	PLATE	1	左罩除屑板(前右)
120	MP430040	PLATE	1	右罩除屑板(前)
121	MP430050	PLATE	1	右罩除屑板(右前)
122	MP430060	PLATE	1	右罩除屑板(右後)
123	MP430071	COVER	1	刀庫遮板
124	MP430080	COVER	1	遮板
125	MP430090	COVER	1	遮板
126	MP430100	COVER	1	遮板
127	MP430110	COVER	1	遮板
128	MP430120	COVER	1	刀庫護蓋
129	MP430130	COVER	1	遮板
130	MP430140	COVER	2	防水槽
131	MP460080	BAR	1	軸心
132	MP460090	FLANGE HOLDER	2	法蘭座
133	MP460100	MOTOR BRACKET	1	
134	MP460110	CHAIN	1	雙層鏈輪
135	MP460120	CHAIN WHEEL	2	鏈輪
136	MP460130	COVER	2	
137	MP460210	AUGER	2	除屑螺桿
138	MT410010-G	COVER	1	
139	MB420070	DOOR	1	
140	MK410170	SLEEVE-SWIVEL TABLE	1	
141	MK410180	CONTROL BOX SWIVEL TABLE	1	
142	MK410190	COVER	1	
143	MN410033	CONTROL BOX	1	
144	MN410033-A	COVER	1	
145	MN410170	SLEEVE-ROCKER ARM	1	
146	MN410180	ROCKER ARM SWIVEL TABLE	1	
147	MN410190	COVER	1	
148	MN420010-A	BRACKET	1	
149	MN420010-B	COVER	1	
150	MN420300-A	COVER	1	
151	MN420640	COVER	2	
152	MN420660	BRACKET	1	

GUARD

No	Part Number	Description	Q'ty	Remarks
153	MN420670	BRACKET	1	
154	MN420810	COVER	1	
155	TA410010-L2	BRACKET	1	
156	TP410033-B	COVER	1	
157	TP410033-C	BRACKET	1	操作箱支架
158	LW410300	DOOR ROLLER	4	
159	LW410300-A	SPACER	4	
160	LW410300-B	AXIS	4	
161		AIR CONDITIONING UNIT		三點組合
162		MOTOR	1	NMRV050-MS712-4P-B14
163	AK080730	KEY	3	8x7x30L
164	ANN415025	LOCK NUT	1	MR M25x1.5
165	ANN415030	LOCK NUT	2	MR M30x1.5
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