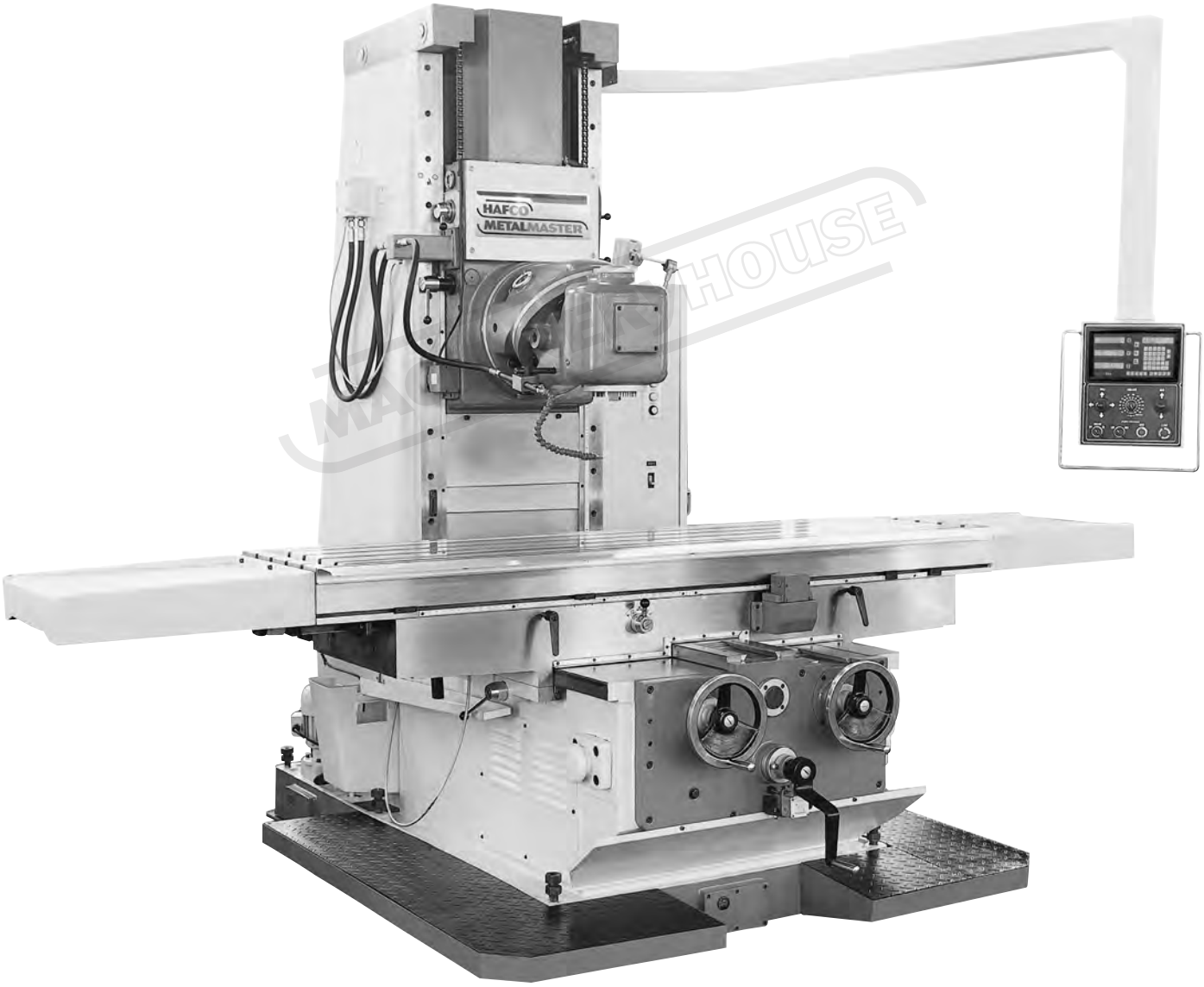
INSTRUCTION MANUAL

BM-1500
Universal Bed Milling Machine (415V)
(X) 1500mm (Y) 670mm (Z) 670mm



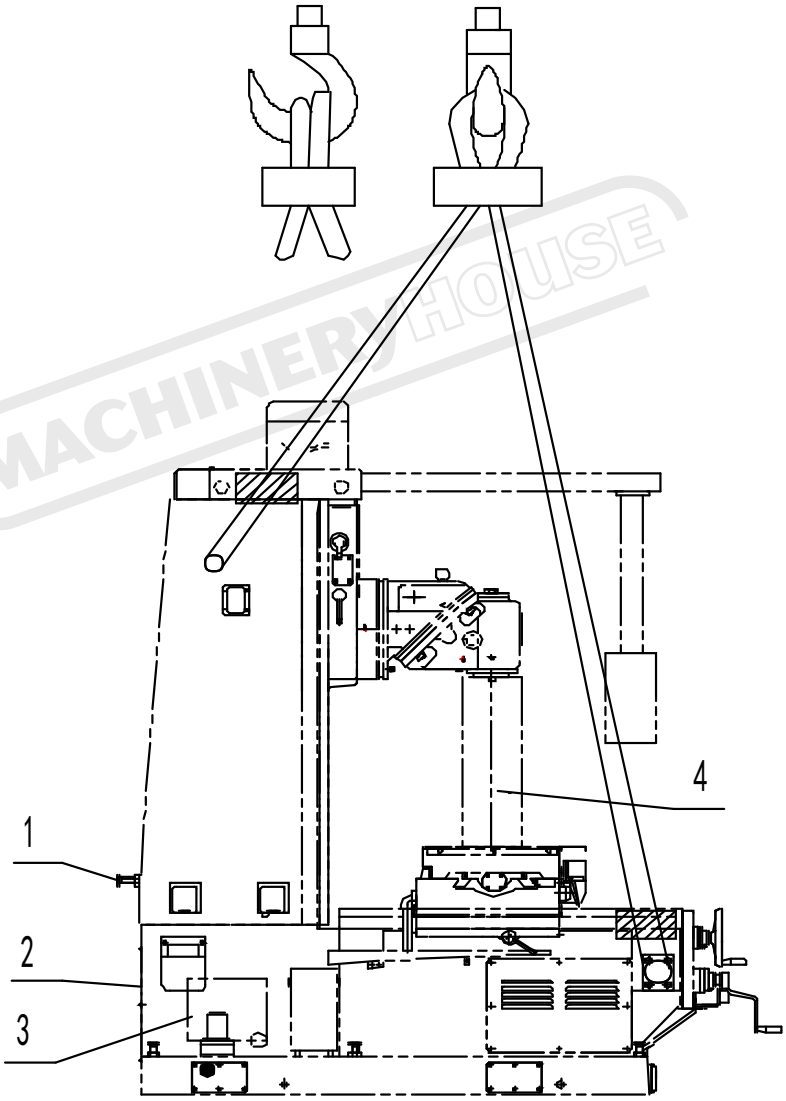
M637D

4. Transport, installation & evenness of the machine

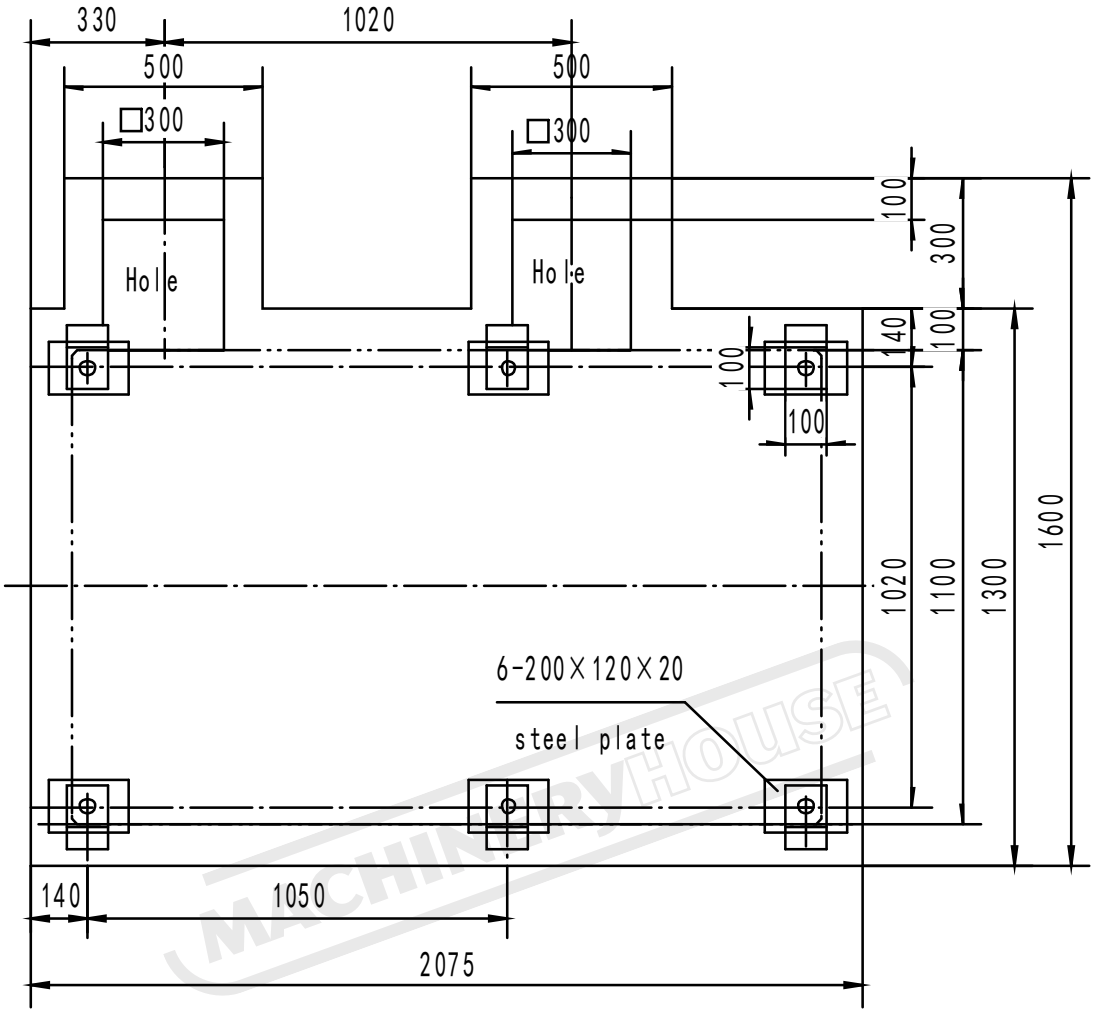
4.1 Loading and unloading (refer to the below figure)

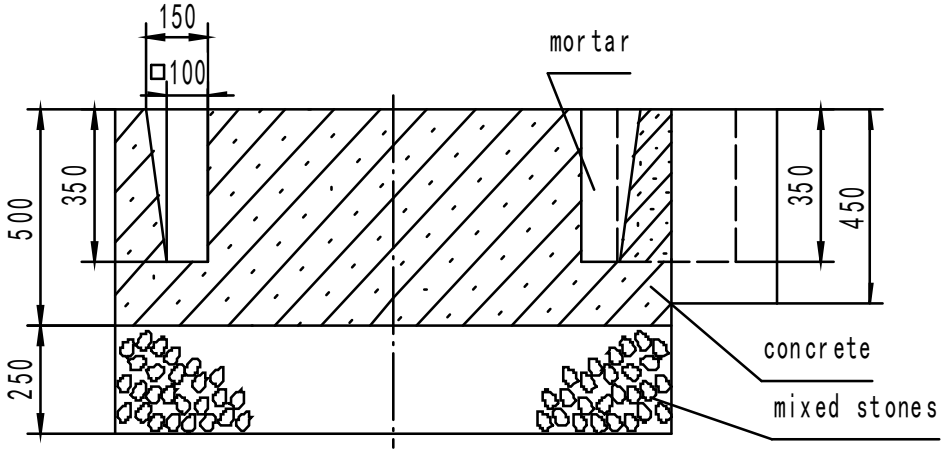
Must loosen the clamping handle of headstock before vertically moving the headstock, then move up the headstock and take out the block 4; remove the cover 2, loosen the nut on the bolt 1 and remove the bolt 1, then move down the headstock and take out the block 3, fix the cover 2 finally.

The capacity of crane is above 8 tons, and the diameter of steel wire is above 18mm.



4.2 Installation the machine foundation





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I . Purpose of machine

The milling machine is a kind of small/medium-sized metal-cutting machine.

Cylindrical milling cutter, metal saw and end milling cutter, angular milling cutter, profiling cutter can be installed on the conical hole of the spindle, which is suitable for working plane surface, grooves, holes and so on. The machine is an ideal machining equipment for machine manufacture, mould, instruments, meters, automobiles and so on.

II .Outside drawing (Fig.1)

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1. Thoroughly read and understand the operation manual before operating machine.

2. Always wear approved safety goggles/face shields while operating the machine.

3. The machine must be grounded! A ground source must be verified.

4. Remove necktie, rings, watches, other jewelry, put the long hair into a safety hat during operation before operating machine no matter operators are men or women. Do not wear gloves, and keep the sleeves and edges of the work uniform tight.

5. Keep the floor around the machine clean and free of debris and chip.

6.Keep machine guards in place at all times during operation. If remove it for maintenance, use extreme caution and replace the guard immediately.

7. Do not overreach. Maintain a balanced stance at all times so that operator do not fall or lean against blades or other moving parts.

8. Adjust or maintain the machine after power supply is off.

9. Use the right tool. Don't force a tool or attachment to do a job which it was not designed for.

10. Make sure the switch of the motor is in the OFF position before connecting the machine with the power svpply.

11. Keep visitors away from the work area.

12. Never attempt to operate or adjust machine when the operation manual is not understood.

13. Keep fingers away from revolving parts and cutting tools while working.

14. Do not attempt to adjust or remove tools during operation.

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15. Always keep cutters sharp.

16. Keep your hands away from the high speed turing handwheel.

17. Must pour the engine oil into the gear box when oil is lower than oil sign.

18. It is forbidden to process flammable and explosive metal, for example: pure aluminum, magnesium and so on.

19. The machine should never be used in flammable, explosive or humid environment.

20. The machine should be conveyed by the lifting mechanism with adequate bearing capacity.

21. Make sure operating site is safe and ventilated. It is recommended that ventilation equipment should be provided on the operating site.

22. The operator must keep clear-headed when operating the machine and pay attention to what he is doing. It is not allowed to operate the machine when the operator is tired, after drinking or taking medicines.

23. Failure to comply with all these warnings may result in serious injury.

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III. Main parameter of machine

No.	Specification \ Model	
1	Spindle taper	7:24 ISO50
2	Distance between spindle axis and table surface.	0～400 (0 ~ 15 - 47/64")mm
3	Distance between spindle axis and the bottom of ram.	175 (6 - 7/8")mm
4	Spindle speed range	58-1800 r.p.m (50HZ) 70-2160 r.p.m (60HZ)
5	Table size	1320×320 mm (51 - 31/32"×12 - 19/32")
6	Table travel (longitudinal, cross , vertical)	1000; 290; 400mm 39-3/8"; 11-3/8" ; 15-3/4"
7	Table longitudinal, cross automatic feed speed	20-360 mm (3/4"-14-1/8") /min rapid feed 1200mm (47-1/4") /min 24-432 mm(15/16"-17")/min (60Hz) rapid feed1440mm(56-5/8")/min(60Hz)
8	T-slot : number--width--distance	5-14 mm(1/2") -63mm (2 - 31/64")
9	Ram travel	500mm (19 - 5/8")
10	Main motor power	4 kW
11	Overall dimension (L×W×H)	2020×1720×1750mm 79-1/2"×67-23/32"×68-29/32"
12	Net weight	2150 Kg

The specifications are subject to the modification and improvements without notice.

Ⅳ. Structure and feature of machine (Fig.1)

The machine consists of body, knee, sliding saddle, table, main transmission, feeding box, ram, coolant, lubrication, electrical equipment and so on.

(1) The machine body consists of a base and a column, the column is fixed on the base.

(2) Knee is in front of the column, which can rise and fall along vertical guideway.

Knee connects with the column by rectangle guideways.

(3) Sliding saddle connects with knee by rectangle guideways.

Worktable connects with the sliding saddle by dovetail guideways. Worktable can be moved in longitudinal and cross directions by lead screw and nut.

(4) Main transmission is driven by gears.

(5) Fixed seat is installed on the column and connects with ram by dovetail ways, hanger is hung at the end of the ram.

(6) Feeding box is under the saddle.

(7) Cooling system consists of cooling pump, cooling tube and tank in the base of the machine.

(8) Lubricating system comprises oil immersed splash lubrication, lubricating pump, hand pump and oil cups and so on.

(9) Electrical box is in the column, and operation panel is on the left of the column, so the operation is convenient.

Table feed mode: Manual feed and automatic feed. Power of longitudinal and cross automatic feed is provided by the feeding box only. Main drive adopts gear speed change mechanism, which can get wide speed change range. Spindle adopts three-bearing supporting mechanism to improve rigidity.

The machine may install special attachment, for example: vertical milling head and so on, which can expands the working range.

V. Transmission system (Fig.2)

1.Spindle transmission system

Spindle transmission system is installed in the column, which is driven by a 4kW flange motor. The motor connects with a drive shaft directly and passes power to the spindle through sliding gears and other gears.

Main transmission: main motor→drive shaft→sliding gears and other gears→spindle.

2.Table feeding transmission system

Power is produced by handwheel and feeding box to realize table longitudinal and cross feed.

3.Knee

Power is produced by handwheel and power elevating mechanism to realize table vertical feed.

4.Ram

Turn gear shaft on the right of the ram with spanner or crank handle to drive ram to the target position after loosening the lock handles on the right of the ram.

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VI. Bearing list (Fig.3)

No.	Name	Model	Size	Qty	Remark
1	bearing	32217	85×150×38.5	1	P5
2	bearing	6209	45×85×19	1	
3	bearing	30311	55×120×31.5	1	P5
4	bearing	6309	45×100×25	1	
5	bearing	6308	40×90×23	3	
6	bearing	6211-2RS	55×100×21	1	
7	bearing	6306	30×72×19	1	
8	bearing	6307	35×80×21	1	
9	bearing	61901	12×24×6	2	
10	bearing	32005	25×47×15	2	
11	bearing	6004-2RZ	20×42×12	1	
12	bearing	6005-2RZ	25×47×12	1	
13	bearing	6004	20×42×12	1	
14	bearing	61904-2RZ	20×37×9	1	
15	bearing	6206	30×62×16	1	
16	bearing	7204C-Z	20×47×14	2	
17	bearing	61904-2RZ	20×31×9	6	
18	bearing	6204-Z	20×47×14	1	
19	bearing	61806-2RZ	30×42×7	2	
20	bearing	6203-Z	17×40×12	5	
21	bearing	6004-Z	20×42×12	5	
22	bearing	6006-Z	30×55×13	1	
23	bearing	61905-2RZ	25×42×9	4	

Ⅶ. Operation of machine

1. Thoroughly read the manual carefully before operating the machine, then check whether function of each hand lever and buttons on the operation panel, coolant & lubricating system and electrical system are normal.

2. Check whether each locking handle is normal before machining workpiece, whether grounding wire is correct and reliable.

3. Switch on power, check each electrical switch is limber and reliable.

The machine adopts centralized control mode, operation panel is on the left of the column. spindle CCW & CW pushbuttons, elevating feed pushbuttons of table, start and stop pushbuttons of table are on the operation panel, which are all marked with visual symbols, so the operation is convenient. There is an inching button on the right side of the column, which is for changing speed well and testing machine.

4. Speed change of spindle

First stop the machine, adjust three speed change handles ③ to target position according to the instruction on the right of the column.

5.Table manual feed

(1). longitudinal table manual feed

First loosen lockhandle ⑩, then adjust handle ⑤ in neutral position and turn handwheel ⑥ to realize the longitudinal table manual feed.

(2). cross table manual feed

First loosen lockhandle ⑨, then adjust handle ⑦ in neutral position, and turn handwheel ④ to realize cross table manual feed.

6.Power feed.

(1) First adjust handles ⑤、⑦ in neutral position.

(2) Start motor of the feeding box to run idle.

(3) It will get target speed to change handles (12).

(4) Complete above steps, then go on operating the machine.

A. Longitudinal table feed

Automatic feed handle ⑤ is in front of the table, turn it left or right to realize the longitudinal table feed.

B. Cross table feed

First pull out handle ⑦, the table will move forward or backward when adjusting automatic feed handle ⑦ up or down.

Warning: Must loosen handles ⑨, ⑩ before manual feed or auotmatic feed.

C. Handle (11) is located in "Work feed" position, the table will be under normal speed state. The table will stop when handle (11) is located in "Stop" position, the table will rapidly feed if handle (11) is located in "Rapid feed" position.

7. table elevating feed

(1) First loosen locking handle ⑧, push handle (13) along the shaft, turning handle (13) to make the table to target position, finally lock locking handle ⑧.

(2) First loosen locking handle ⑧, press elevating buttons on the operation panel to realize the table elevating feed..

Warning: Do not push into handle (13) when knee is rising or falling automatically.

a. Knee can't automatically rise or fall when locking handle (13) is locked.

b. Must loosen the locking handle (13) before elevating movement of the knee.

Ⅷ. Adjustment of machine

1.Adjustment of backlash of spindle bearing. (Fig.4)

Backlash of spindle bearing has been adjusted to appropriate position before the machine leaves the factory. Long time use of machine will cause natural wearing of spindle bearings and backlash will increase. Please ask machinist to adjust it.

First remove plate ① on the right side of the column. Adjust round nut ② to make backlash of spindle bearing proper, then replace plate ①.

2.Adjustment of longitudinal, cross guideways gibs of the table

(1). Longitudinal gib adjustment: First loosen screw ① of gib's small end, adjust screw ② of gib's big end properly, then lock screw ① properly. (Fig.5.a).

(2). Cross gib adjustment: Remove crumb board ②, loosen crew ① of gib's small end, adjust screw ③ of gib's big end to proper position, then replace crumbs board ②.(Fig.5.b).

3.Adjust the backlash between the knee and the vertical guideway.

Remove scrap board ③, loosen screw① of gib's small end, then adjust the other screw ② of gib's big end to proper position, then replace and tighten scrap board ③ (Fig.5.c)

4.Ram adjustment : Ram adjustment is the same as the longitudinal gib adjustment.(Fig.5.d).

5.Adjust the backlash between the lead screw and nut. (Fig.6)

Longitudinal adjustment: First loosen fixed screw, adjust pin-shaft properly, then tighten fixed screw well.

Cross adjustment: First, loosen screw (2), adjust screw (1) to proper position, tighten screw (1) with screw (2) finally.

IX. Coolant and lubrication

1.Coolant is supplied to workpiece by a cooling pump. The cooling pump's flux is 25L/min. Coolant is send to nozzle through cooling pipe.

Adjust the nozzle to spray coolant to cutting area and cutter. Coolant is installed in the base of the machine.

2.Lubrication

To a great extent, life of machine depends on scientific lubrication.

(1). Lubricant oil must be cleaned, nonacid, anhydrous and no hard solid.

(2). Main drive gears adopt oil immersed spraying splash lubrication and set automatic force lubricating mechanism. The mechanism comprise reversible cycloidal lubricating pump and oil pipe. Lubricating pump started too when main motor start, lubricating oil is sprayed to gears.

Power feed gear box also adopts oil spraying lubrication.

In order to make lubricating system work well, lubricating oil tank should be cleaned once 3 months at the beginnig, then once half a year later.

(3). Add oil when oil surface is lower than oil scale in time.

(4). Lubricate lead screws, saddle-table guideways, saddle-knee guideways, knee bed guideways etc, four times per shift.

(5). Hanger adopts oil drop lubrication, often supply oil and clean it per shift.

To need lubrication other parts have installed oil cup, per shift must add oil no less than 4 times.

X. Transportation installation and trial run

1. Transportation

Must load or unload machine complying with outer sign of packing box. Any impact or vibration is prohibited. Must open the box carefully, otherwise it will scratch the paint on the machine surface. After opening the box, check all the accessories according to the packing list, check whether there is something wrong or damaged, please inform dealer or manufacturer in time in order to solve it well, then convey the machine with forklift. Please set a steel wire rope according to Fig.7 when conveying the machine with crane, and insert some pads or soft cloth between the machine surface and the steel wire rope, and ask for help if necessary during the transportation .

Caution:

1. The steel-wire rope should not touch machine surface, each hand lever, handle and handwheel. Do put wood block or soft cloth on the interface between the steel-wire rope and the machine edge to avoid damaging the paint.

2. Before conveying the machine with the crane, move worktable to the front end of the knee, and let the two ends of table on the knee have the same length, tighten the longitudinal & cross locking handles at the same time .

10.2 Installation

In order to make machine steady run and keep the high working accuracy, it must be installed on the concrete foundation, which should be built according to the Fig.8. The foundation should be built on hard soil. The machine will be put on the foundation after it has dried, then fix the bolts on the concrete, must correct it carefully, make sure its level and the allowance is under 0.04/1000 mm in cross and longitudinal directions after tightening the bolts.

10.3 Trial run

10.3.1Before trial run, please clean the antirust oil on some parts of the machine carefully, then coat a thin layer of lubricating oil on the outer surface.

10.3.2 Loosen locking handle in three directions (X, Y, Z) of machine beforethe trial run.

10.3.3 Pour lubricating oil into the gear box and the other lubricating points right, then do an overall check.

10.3.4 Check whether each handwheel and handle of the machine are reliable and flexible.

First start to run idle at the lowest speed for more than 30 minutes, then increase the speed step by step and check whether the handwheels and handles are limber or reliable.

Caution: Care must be taken when loading or unloading the machine during the transportation.

XI. Maintenance of machine

1. Routine maintenance of machine is very important for working accuracy of machine.

2. Add lubricating oil to oil tank in time.

3. Often change working workpiece position on the table.

4. Workpiece and cutter must be tightened before working.

5. Often check electrical equipments, cooling and locking handle levers in time, and remove all dirt in time.

XII. Troubleshooting

1. Adjust round locking nut to eliminate the backlash when the radial runout of spindle is too big.

2. When knee rises or falls unsteadily and strange sound occurs, check whether gib is loose, whether lubricating effect of guideways surface is normal, adjust gib and add oil.

3. Check whether gear change handle is in place when strange sound occurs in gear box, whether oil is poor, whether shifting fork is damaged. repair it in time and add oil.

4. When the whole machine shakes, check whether each locking handle is locked and in place.

Warning: No repairing on electricity.

XIII. Electrical system

Refer to electrical wiring diagram and electrical parts list.

1.The power supply of the machine is 380V, 50Hz,3PH.

Switch on power supply after having checked the machine.

2. The machine has many protection modes, such as short circuit protection, over current protection, E-stop, power off when opening electrical door, o-voltage and so on.

3. Main power switch and spindle inching pushbutton are set on the electrical door on the right side of the column. Main spindle control and

cooling control pushbuttons, "E-stop" switch, table feed control pushbuttons are set on operation panel. Press "E-stop" pushbutton immediately when malfunction occurs. Restart the machine after obviating malfunction, first clockwise turn "E-stop" button to reset, then return each control switch to "O" position, after having done the above the steps, then operate the machine again.

4.The spindle of machine has automatic brake function. Don't adjust time relay in the electrical box casually, otherwise which will cause failure of brake or main motor burns out.

5.Only professional have the right to repair electrical equipment.

Electrical equipment list

Code	Name	Specification	Qty	Remark
M1	motor	Y112M--4 3PH 380V/50HZ 4KW B5	1	
M2	motor	Y2-712-2 3PH 380V/50HZ 550W B5	1	
M3	coolant pump	AB-25 3PH 380V/50HZ 90W	1	
M4	motor	Y90S-6 3PH 380V/50HZ 750W B5	1	
QS	main switch	JCH-13 20/31	1	
QF1	circuit breaker	DZ47-63(3P 16A)	1	
QF2-QF4	circuit breaker	JCM5-20 (8-12.5A)	1	
		JCM5-20 (1-1.6A)	1	
		JCM5-20 (0.25-0.4A)	1	
QF5	circuit breaker	DZ47—63 (1P 16A)	1	
QF6, QF7	circuit breaker	DZ47—63 (1P 3A)	2	

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Code	Name	Specification	Qty	Remark
TC1	control transformer	JBK4-160 160VA I:0-380V O:0-24V	1	
TC2	control transformer	JBK4-250 250VA I:0-380V O:0-45V, 50V, 55V	1	
KM1	AC contactor	CJX1-32/22 (AC: 24V 50HZ)	1	
KM2--KM6	AC contactor	CJX1-12/22 (AC: 24V 50HZ)	5	
KT	time relay	JS14A-5(AC:24V), (0.5-5S)	1	
SB1	E-stop button	LAY7-11MZS /1 (red)	1	
SB2	Button	LAY7-11BN/ (red)	1	
SB5	Button	LAY7-11BN/2 "T" (green)	1	
SB3, SB7 SB9, SB10	Button	LAY7-10BN (green)	4	
SB4, SB11	Button	LAY7-10BN (white)	2	
SB6 ,SB8	Button	LAY7-01BN (red)	2	
V1	Bridge rectifier	RBPC2005 (IE:20A)	1	
SQ1	Micro switch	LXW6-11DL	1	
SQ2	Limit switch	LXP1-1200G/G	1	
SQ3	Limit switch	LXW6-11ZL	1	
SQ4	Limit switch	LXK3-20H	1	
HL	Sign lamp	AD11-22/20 (DC:24V) (white)	1	
EL	working lamp	JC-38(AC:24V 50W)	1	
XT	Terminal bar	TD20-6+TD15-30	1	
XB	Grounding terminal copper bar	JDG-DG4(2)	1	

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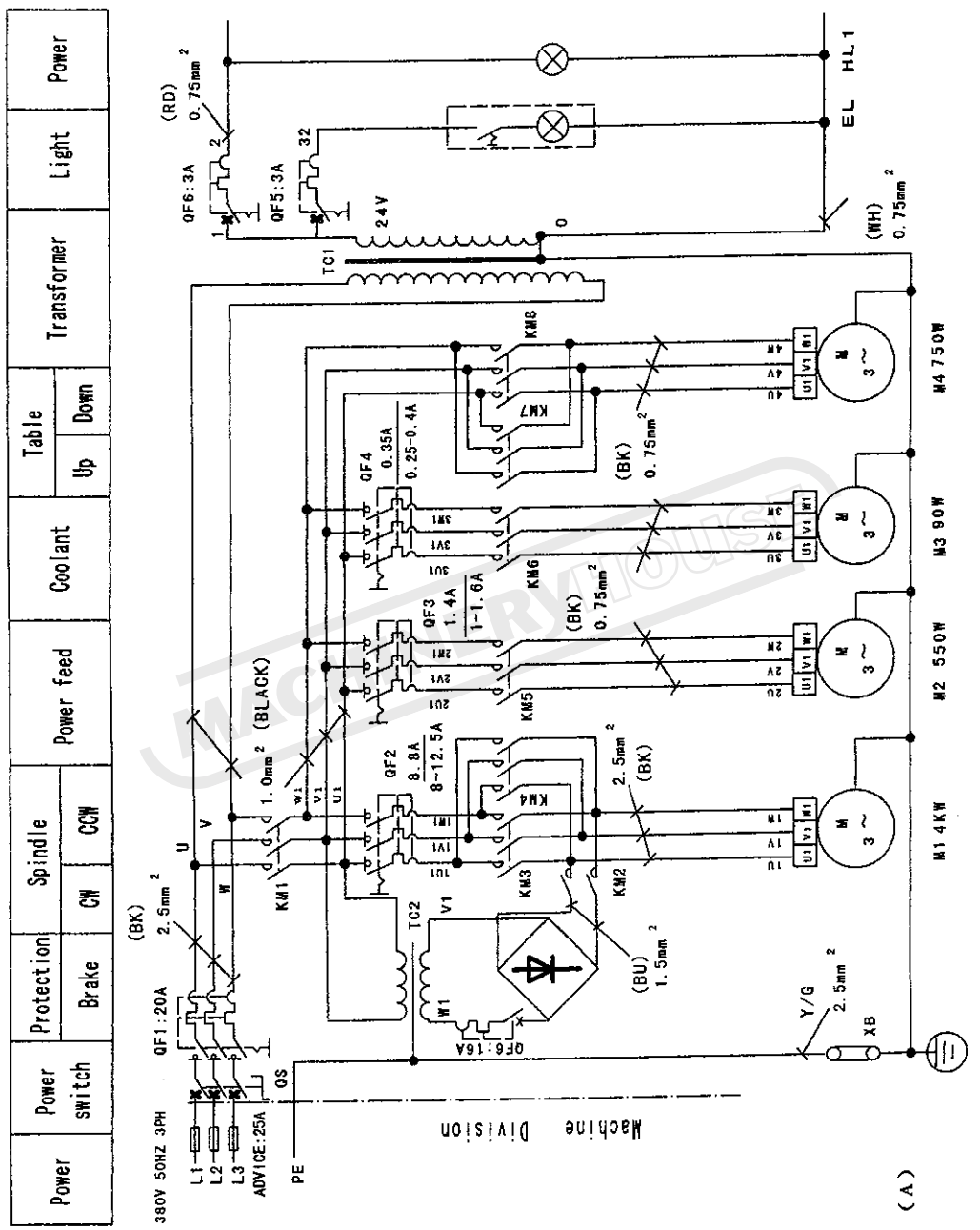

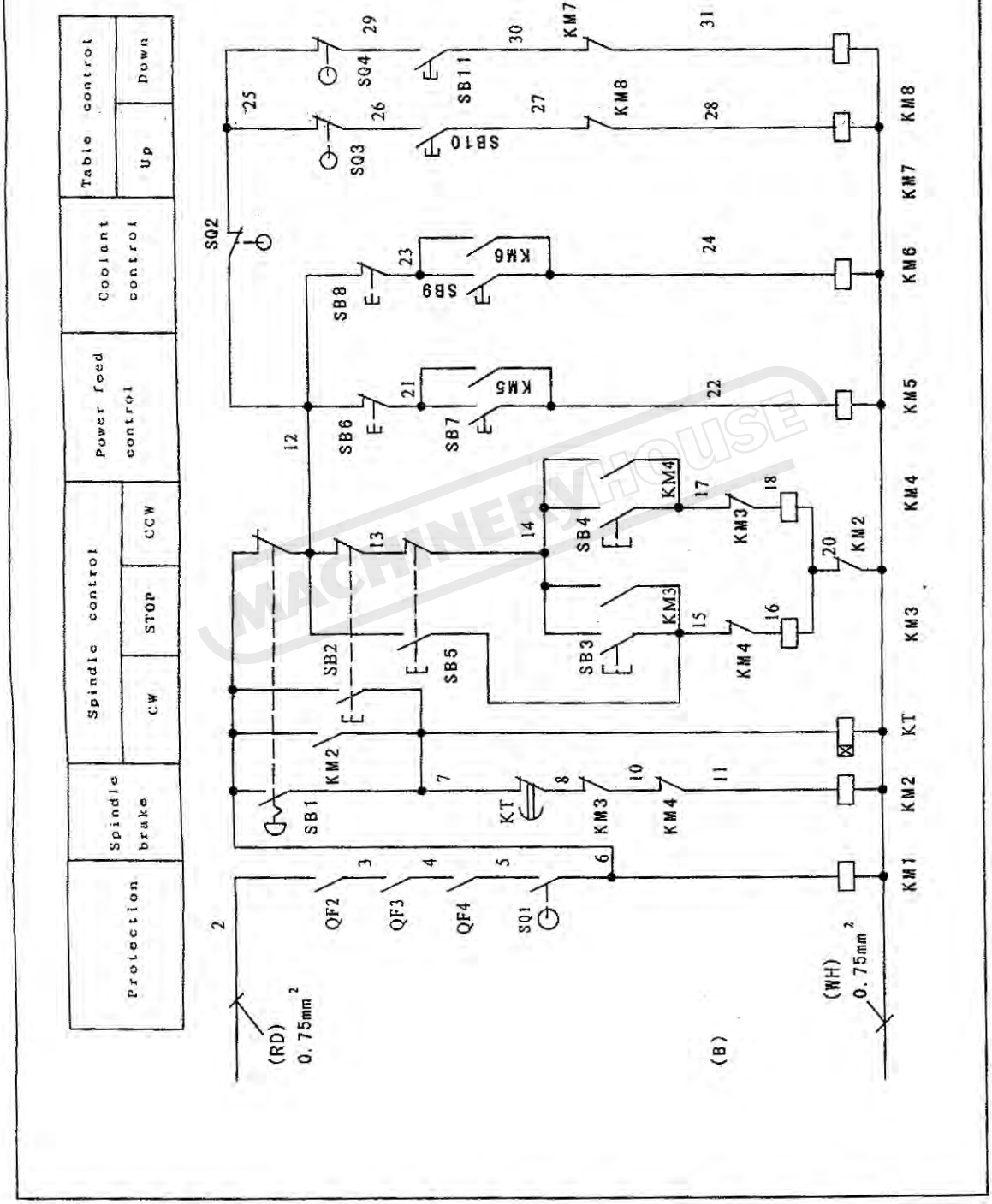
Table control
Down
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Coolant control
Power feed control
Spindle control
CCW
STOP
CW
Spindle brake
Protection
SQ2
SQ4
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KM7
KM8
SB8
SB9
KM6
SB6
SB7
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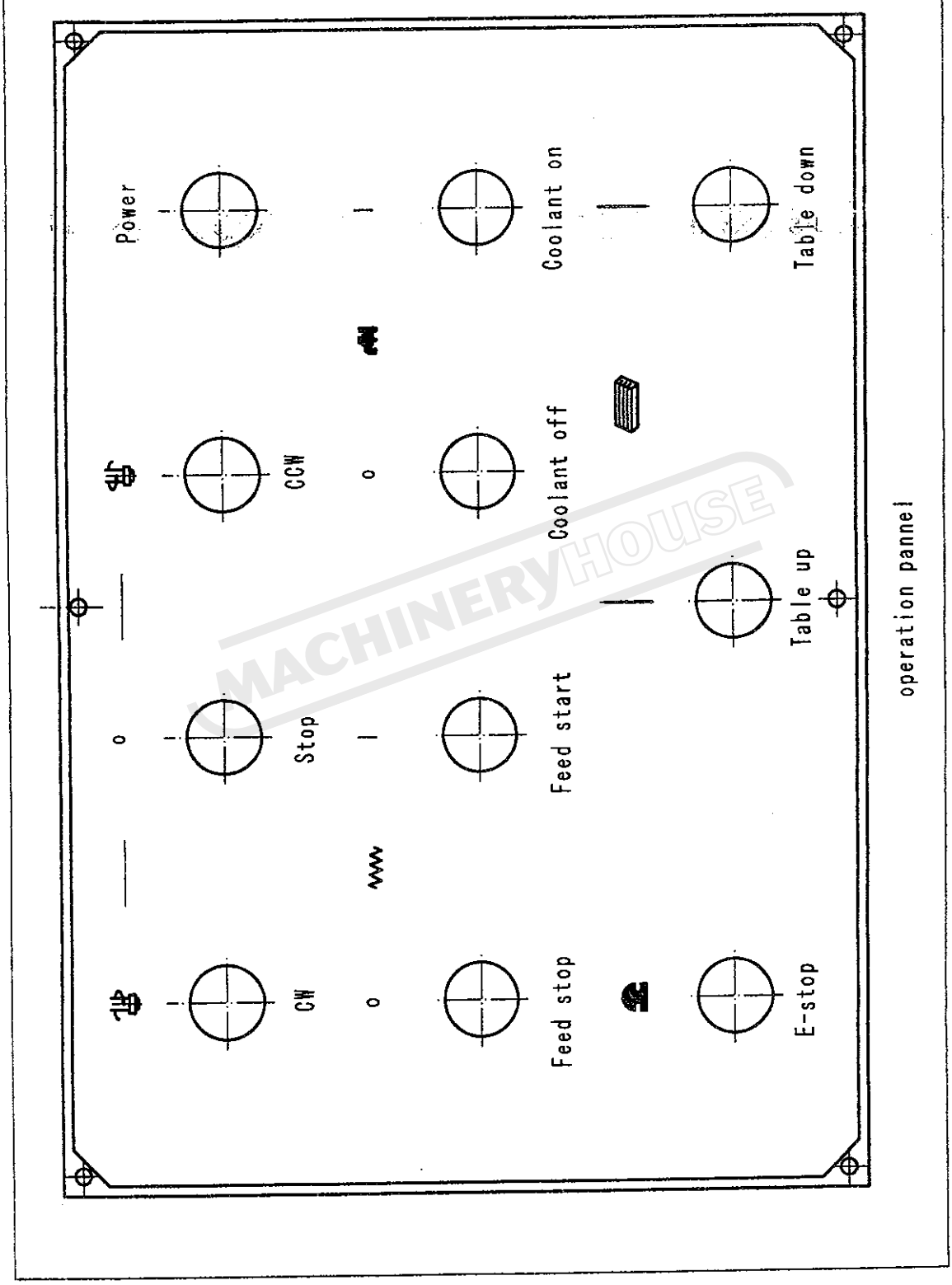

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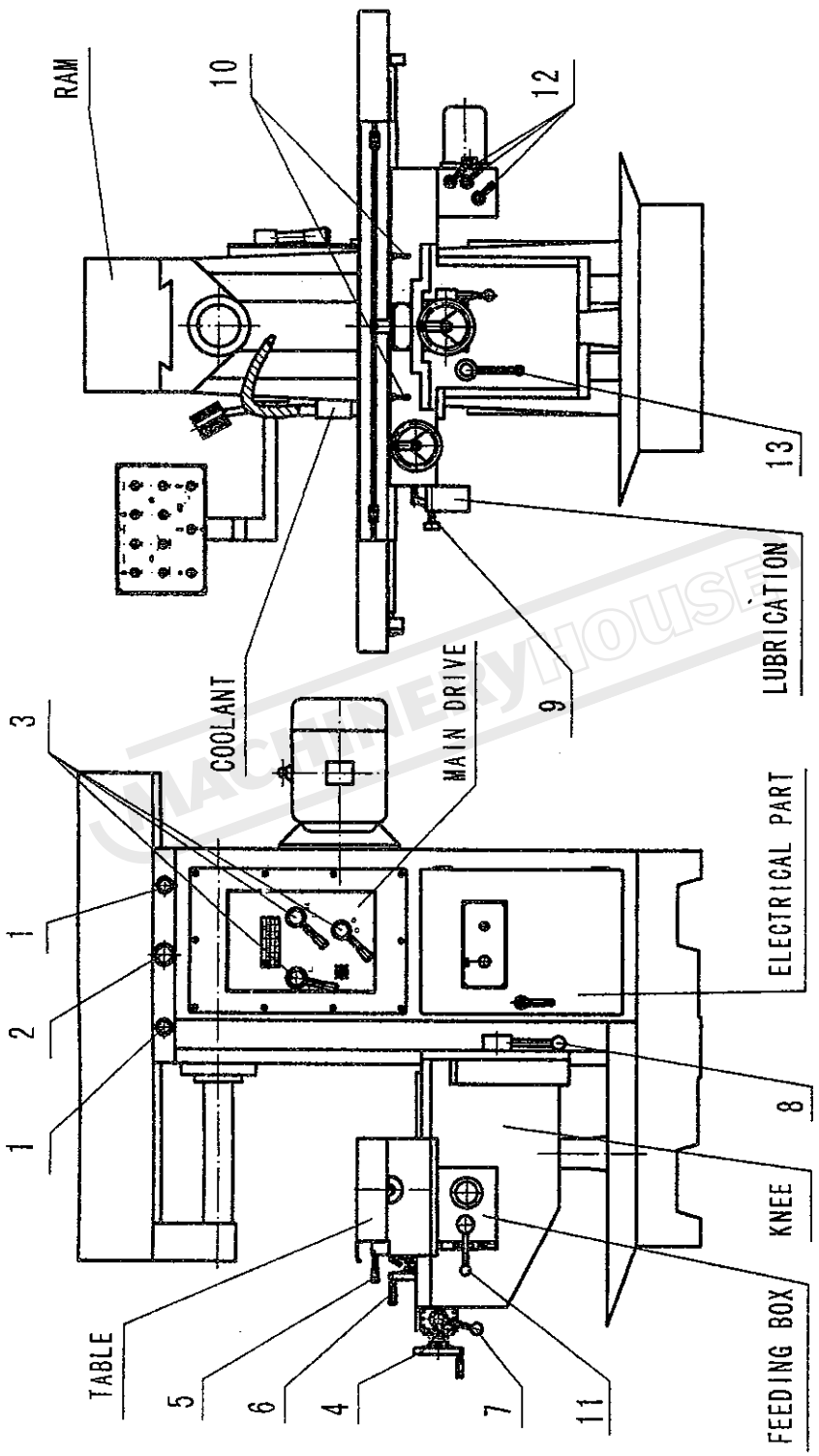

Fig. 1

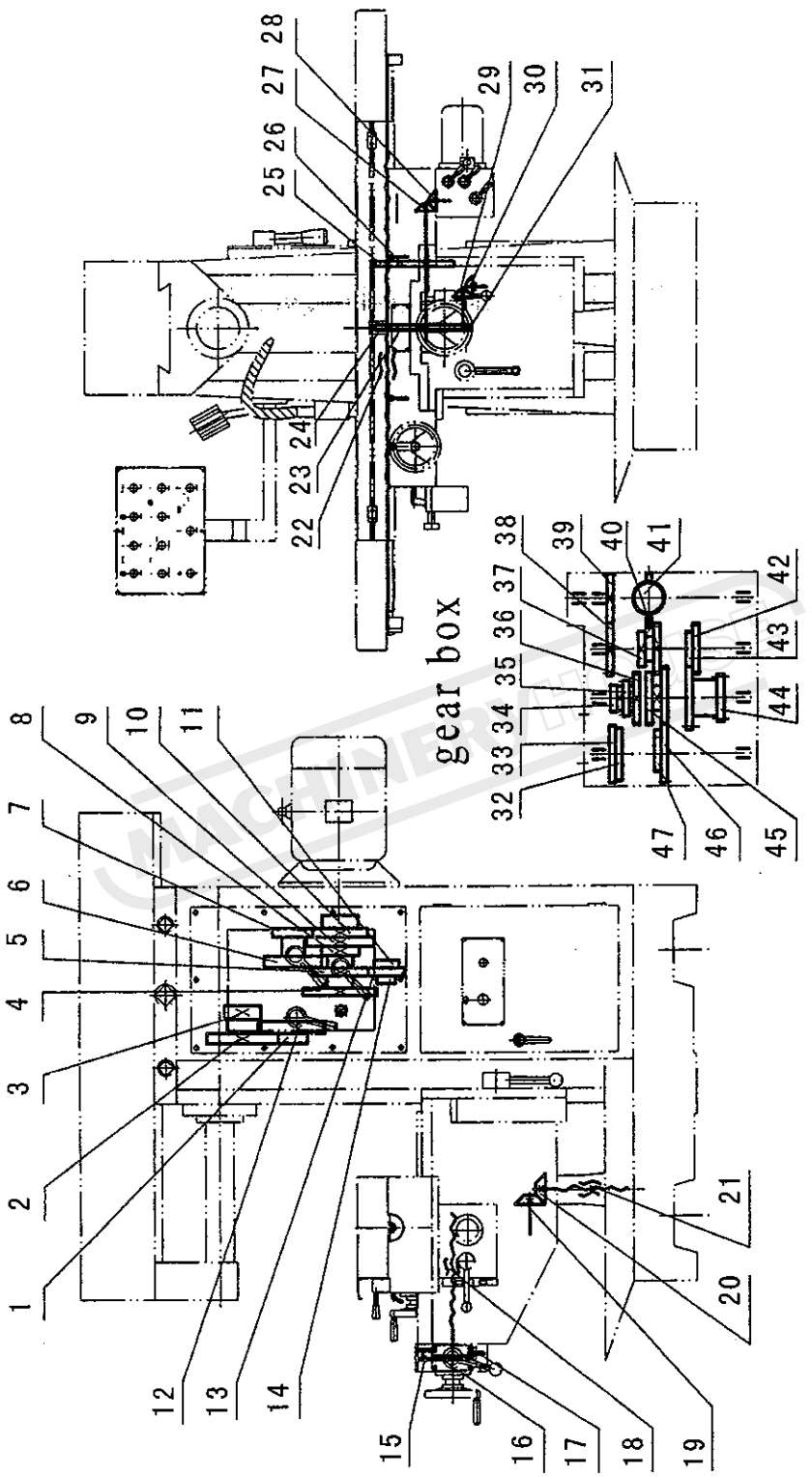
gear box
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Fig.2

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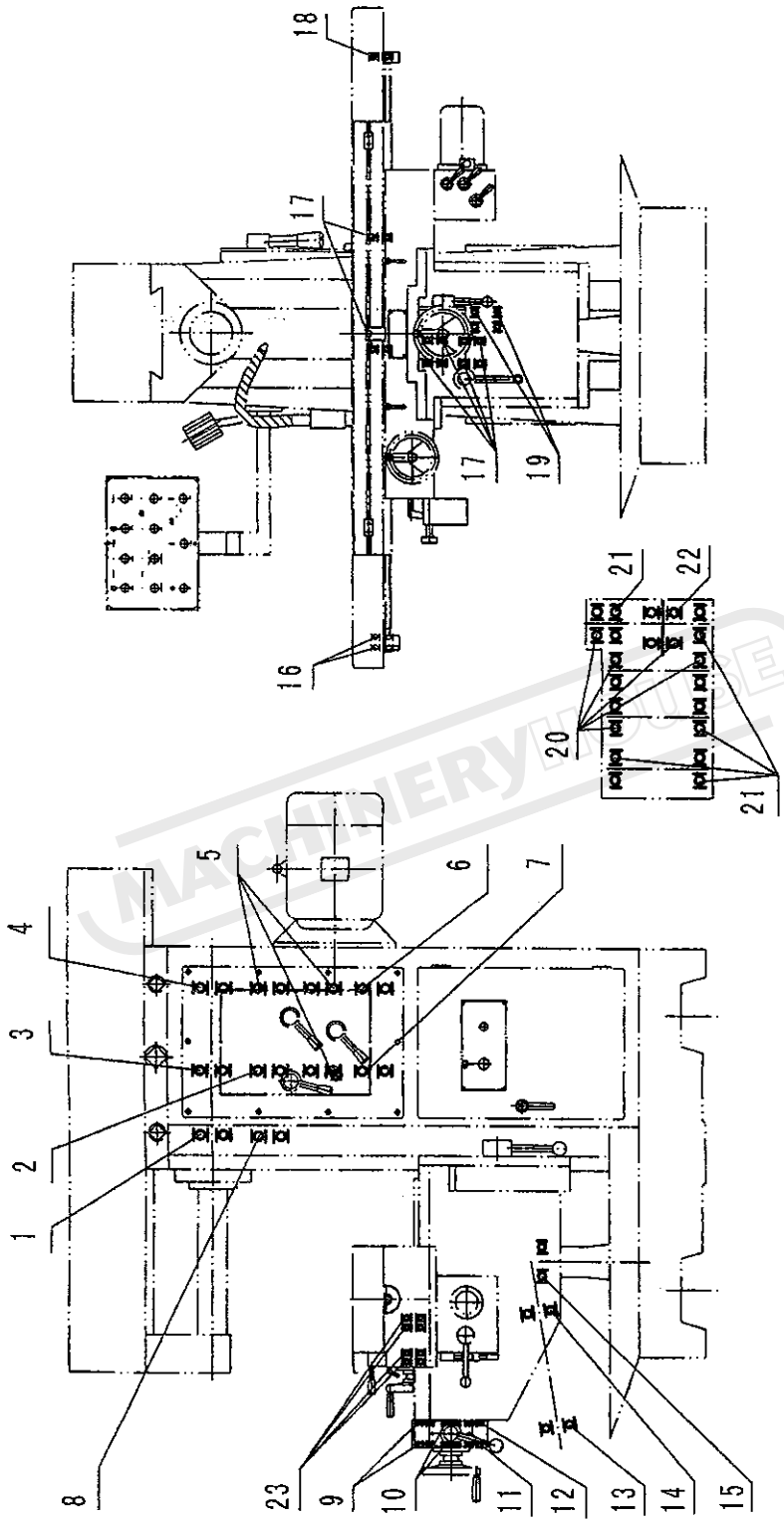


Fig. 3

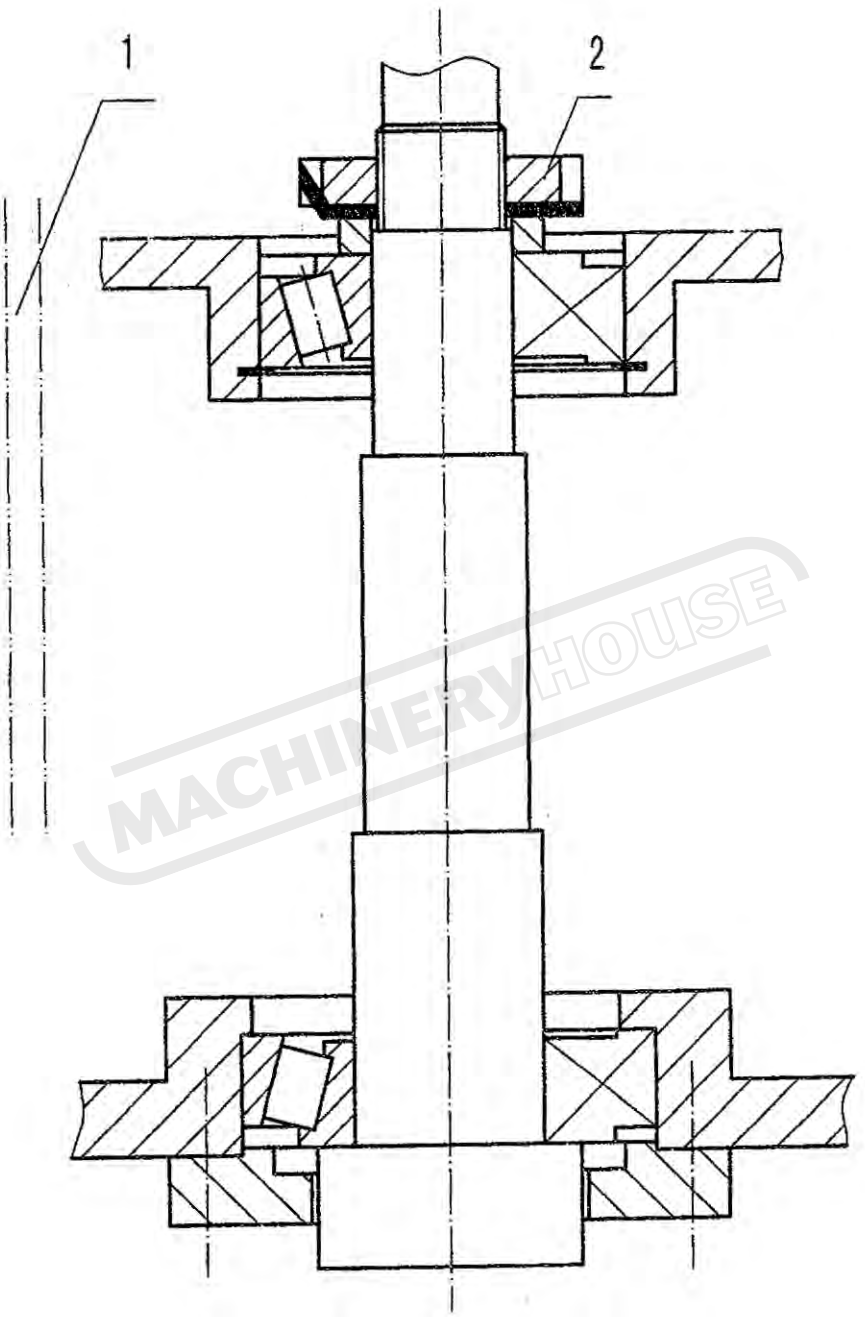


Fig. 4

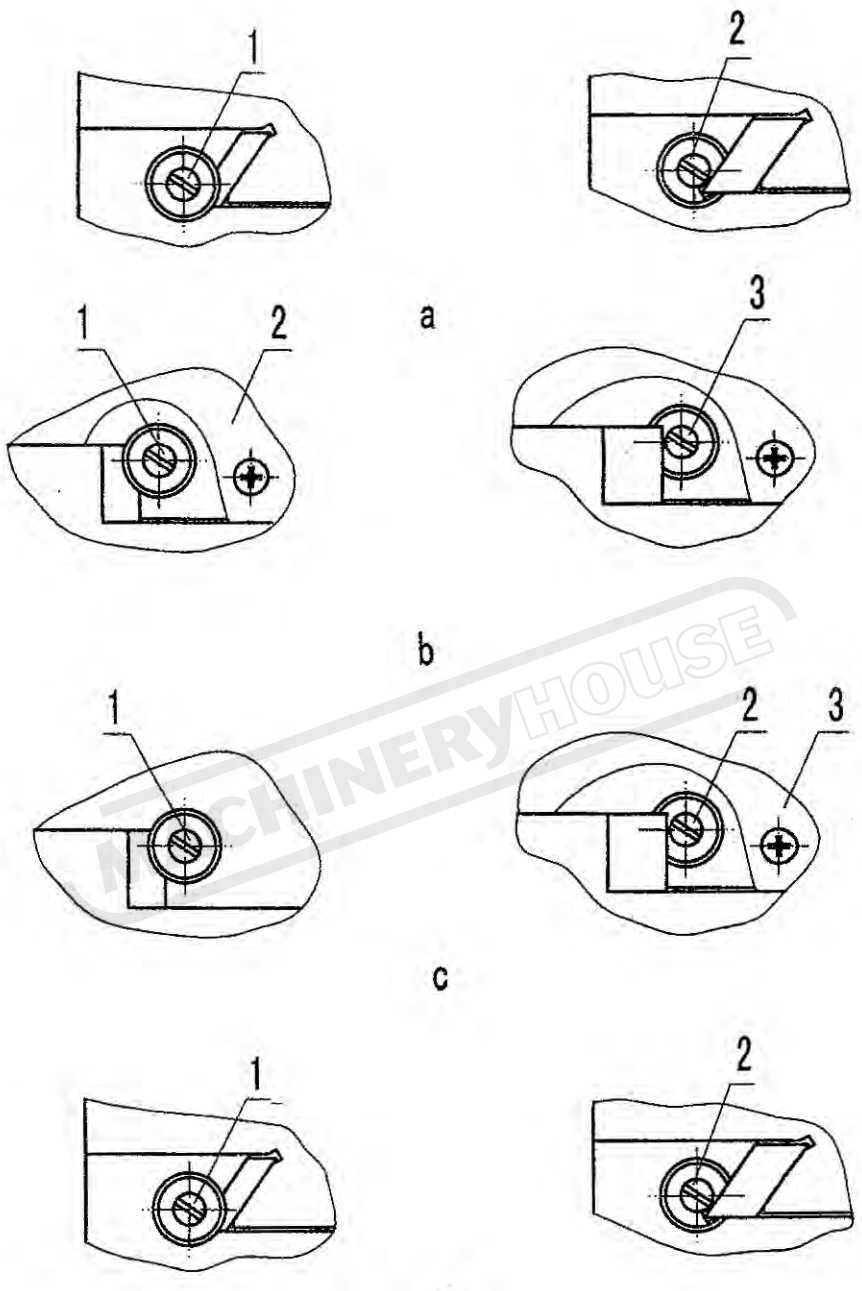
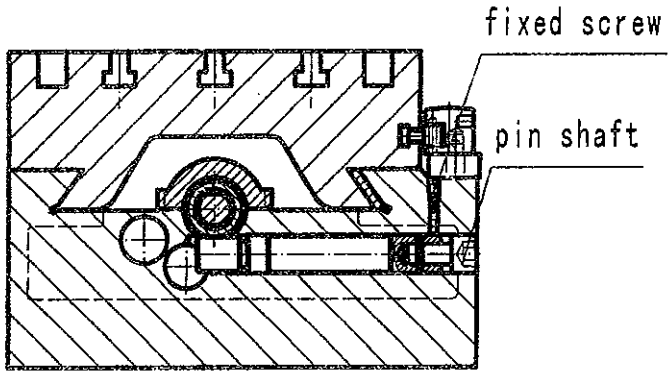
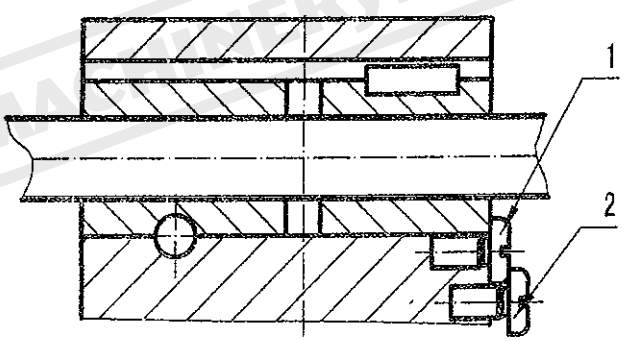


Fig. 5

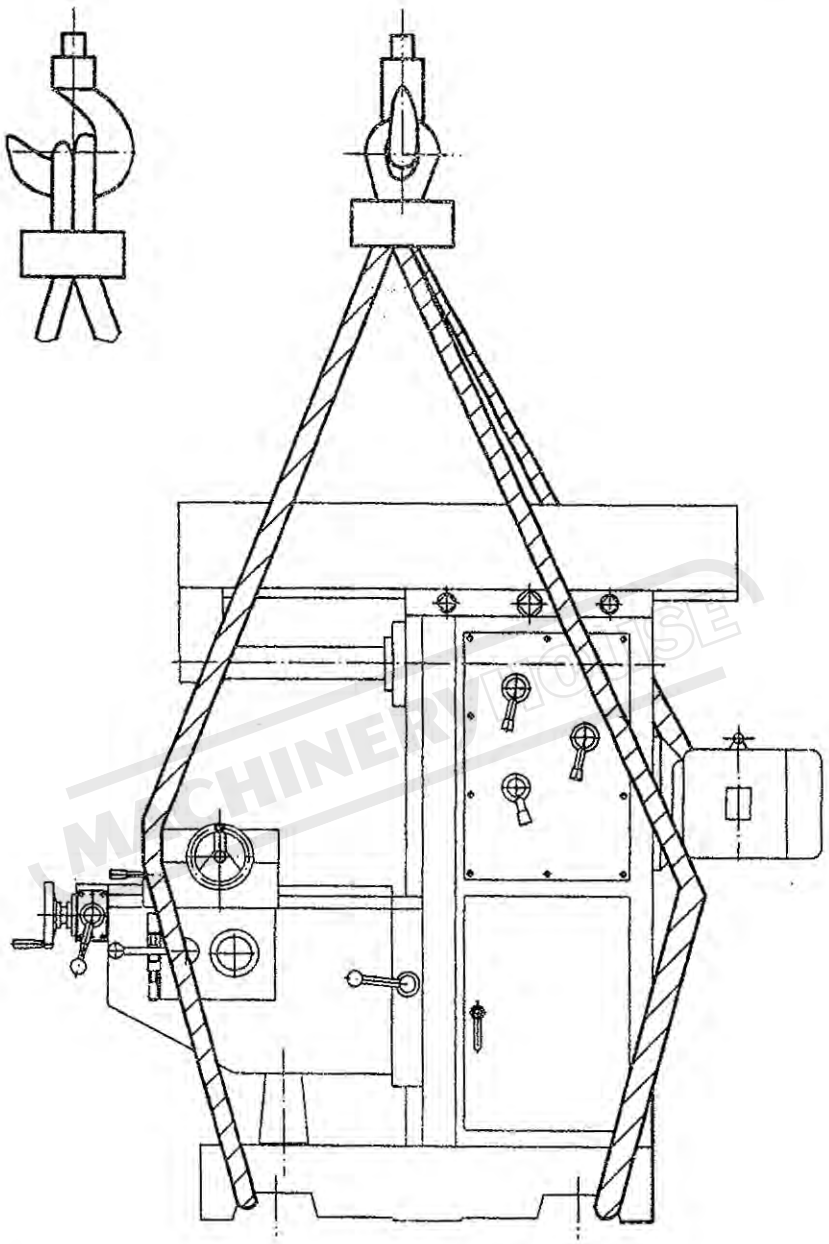


LONGITUDINAL



CROSS

Fig. 6



Notice: Clamp the table before conveying it.(longitudinal & cross)

Fig. 7

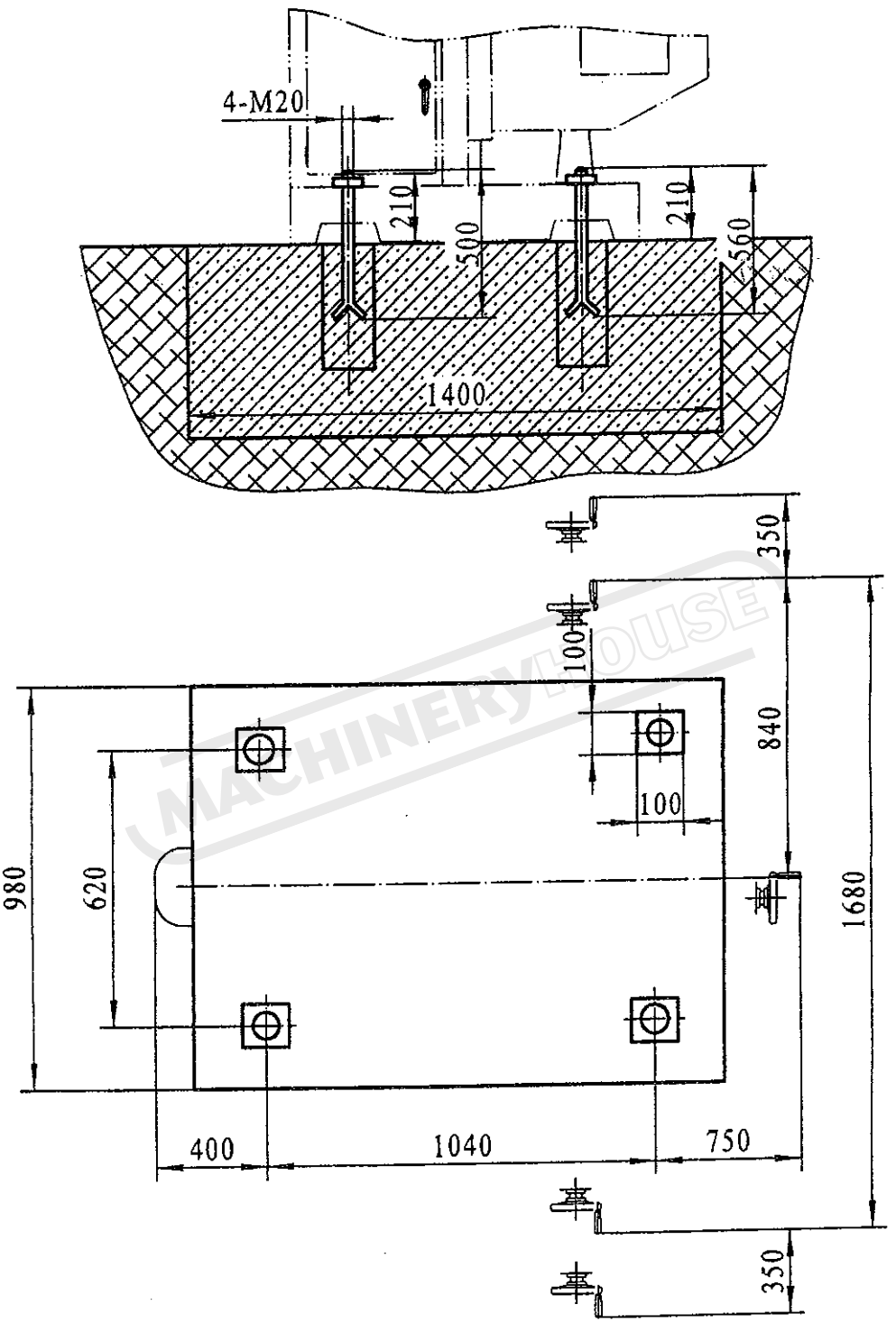

4-M20
210
500
210
560
1400
350
100
840
100
980
620
1680
400
1040
750
350

Fig. 8

ACCURACY TESTING LIST

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No.	Test item	Allowance(mm)	Value
1	Linearity of the vertical movement of knee.	A:cross ver. plane 0.05/300	
		B:longitudinal ver. plane 0.05/300	
2	Perpendicularity between vertical guideway and table surface.	A:cross ver. plane 0.05/300 a≤90°	
		B:longitudinal ver. plane 0.05/300	
3	Flatness of table.	0.04/500	
4	Parallelism between movement of table and surface of table.	A:cross 0.05/300	
		B:longitudinal 0.05/300	
5	Spindle axial kick.	0.02	
6	Radial runout of spindle bore.	spindle nose 0.01	
		300mm to spindle end 0.03	
7	Parallelism between horizontal spindle rotation axis and worktable.	0.05/300 (only down)	
8	Parallelism between cross movement of table and horizontal spindle rotation axis.	A:vertical plane 0.05/300 (only down)	
		B:horizontal plane 0.05/300	
9	Linearity of datum T-slot.	0.03/300 Max. 0.05	
10	Perpendicularity between spindle rotation axis and table datum T- slot.	0.05/300	
11	Parallelism between longitudinal movement of table and datum T-slot.	0.03/300 Max. 0.06	
12	Perpendicularity of cross and longitudinal movement of table.	0.04/300	
13	Parallelism between spindle rotation axis and the guideway of ram.	vertical plane 0.05/300 (only down)	
		horizontal plane 0.05/300	
14	Coaxialism between the hole center of hanger and spindle rotation axis.	vertical plane 0.05 (only down)	
		horizontal plane 0.05	

	PACKING LIST	Total page 1 page 1

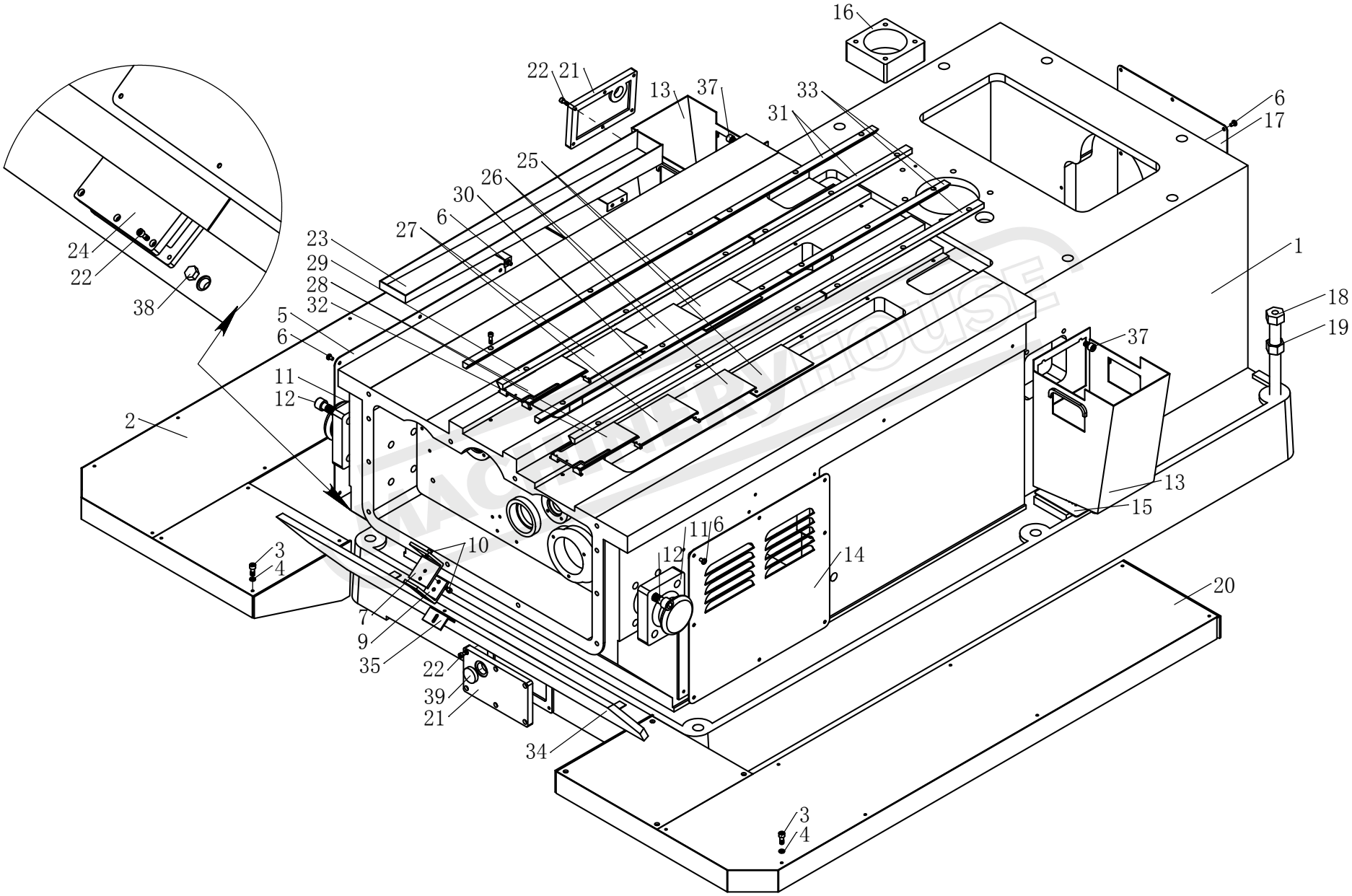
No.	Name	Model	Qty
1	Machine		1
2	Vertical milling head		1 set
3	Milling chuck		1 set
4	7:24 Taper sleeve		1
5	Wrench	S21-24 S27-30	each 1
6	Inner hexagon spanner	5, 10	each 1
7	Vice	160	1
8	Horizontal milling arbor	ϕ27, ϕ32	each 1 set
9	Horizontal draw bar	M24	1
10	Vertical draw bar	M16	1
11	Nut	M24, M16	each 1
12	Flat Washer	24, 16	each 2
13	Operation manual		1
14	Accuracy testing list		1
15	Packing list		1

X715 Bed-Type Universal MILLING MACHINE

EXPLOSION DIAGRAM

CONTENTS

01 Base Part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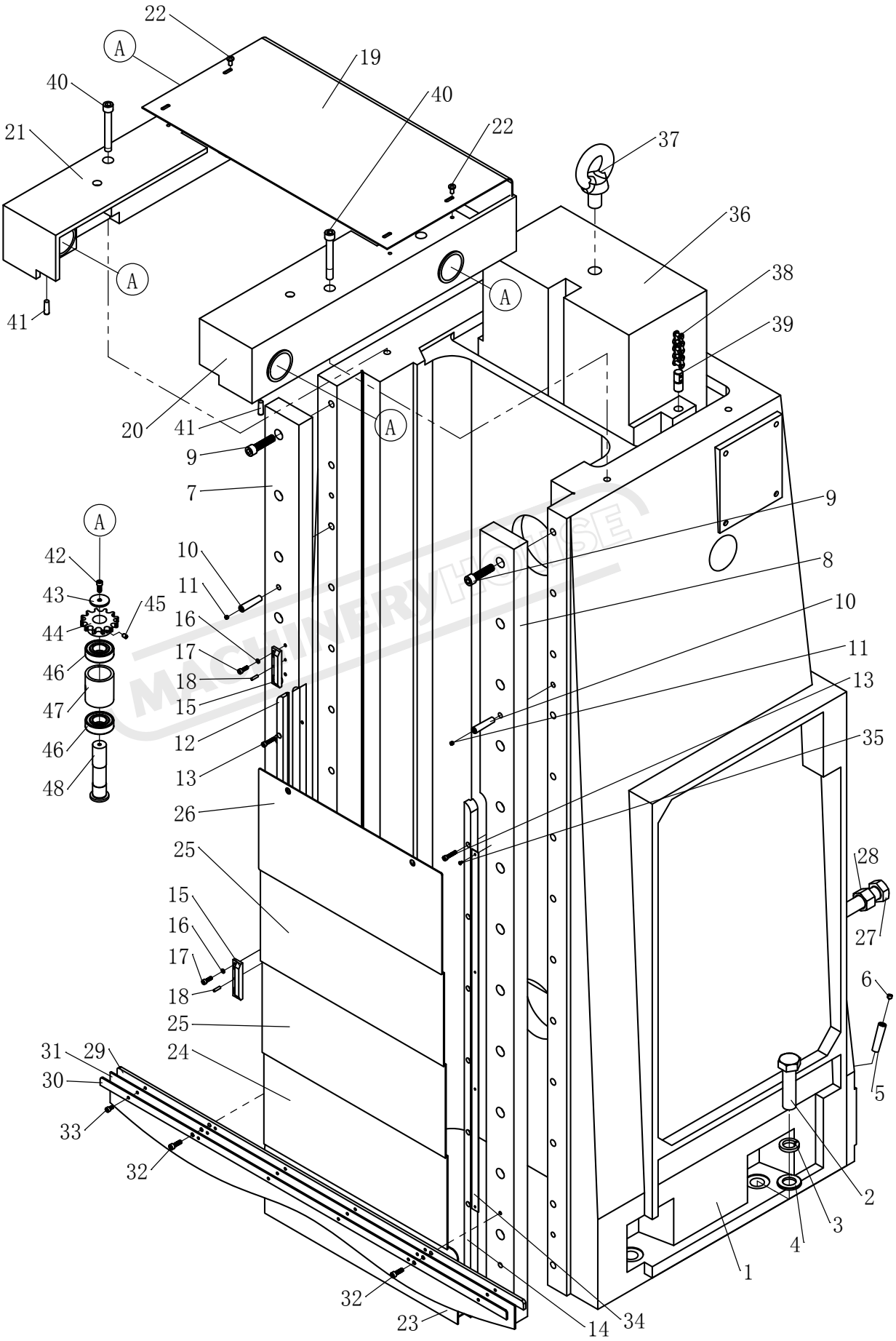
01 Base Part

No.	Name	Qty
1	Base	1
2	Plate	1
3	M8×20 Hexagon socket head cap screw	2
4	8 Elastic washer	2
5	Cover	1
6	6×10 Cross recessed pan head screw	4
7	Plate	1
8	M6×12 Hexagon socket head cap screw	1
9	Plate	1
10	M6×20 Hexagon socket head cap screw	9
11	Lifting bracket	2
12	M16×35 Hexagon socket head cap screw	2
13	Filter box	2
14	Cover	1
15	Filter	2
16	Bracket	1
17	Cover	1
18	Adjusting screw	1
19	M24 Nut	1
20	Plate	1
21	Cover	2
22	M6×16 Hexagon socket head cap screw	3
23	Coolant drain	1
24	Cover	1
25	Wiper	2
26	Wiper	2
27	Wiper	2
28	Wiper	2
29	Scale	1

01 Base Part

No.	Name	Qty
30	Scale	2
31	Scale	2
32	Scale	1
33	Scale	2
34	Plate	1
35	Plate	1
36	Cover	1
37	M10×16 Hexagon socket head cap screw	2
38	M18×1.5 Oil plug	2
39	M27×1.5 Oil scale	2

02 Column part



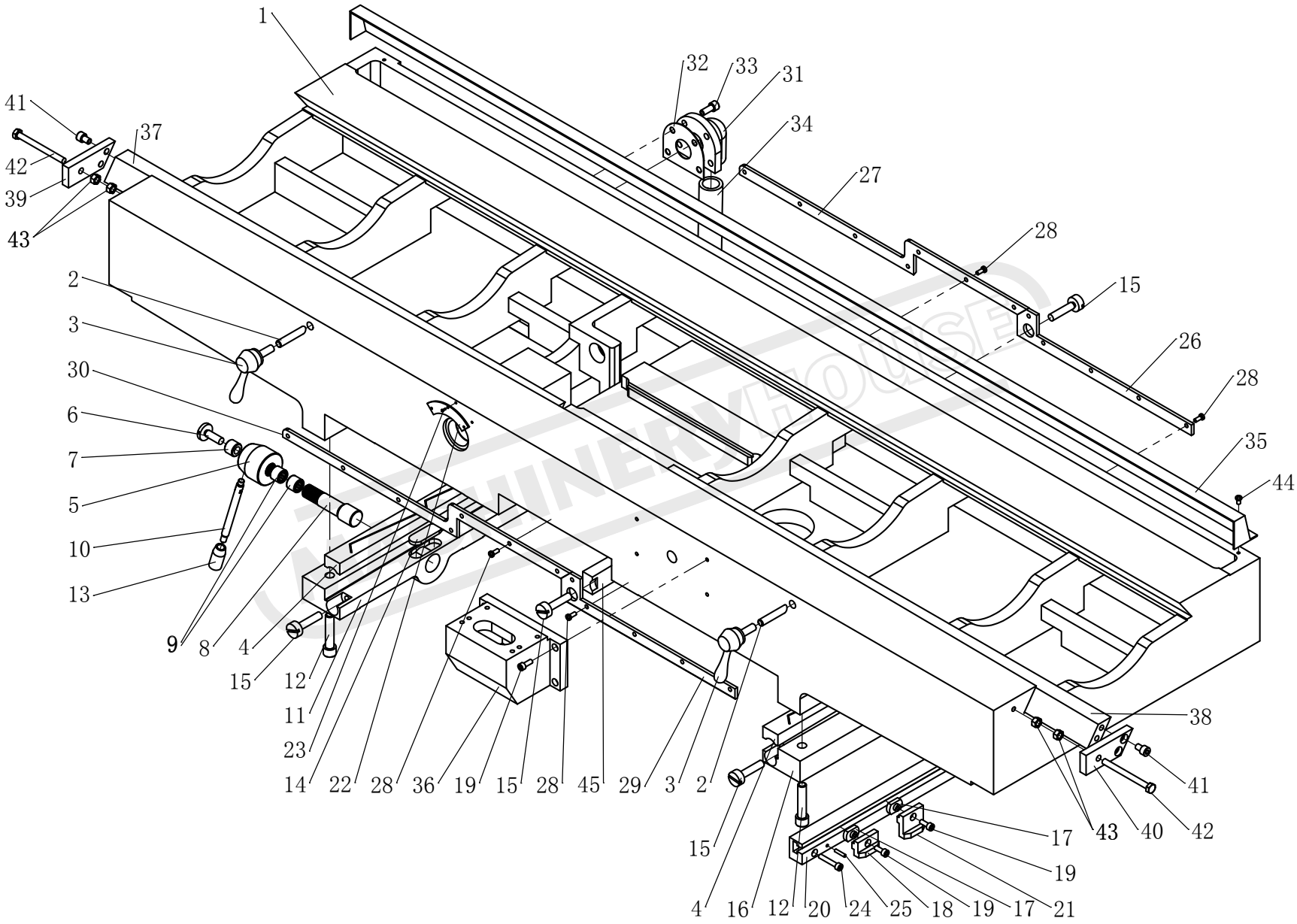
02 Column part

No.	Name	Qty
1	Column	1
2	M24×90 Hexagon bolt	6
3	24 Helical spring lockwasher	6
4	24 Plain washer	6
5	A12×55 Taper pin	2
6	M8×8 Set screw	2
7	Right pressure plate	1
8	Left pressure plate	1
9	M12×50 Hexagon socket head cap screw	26
10	A10×50 Taper pin	4
11	M6×6 Set screw	4
12	Right slipper path	1
13	M5×25 Hexagon socket head cap screw	14
14	Left slipper path	1
15	Fixed stop dog	2
16	5 Helical spring lockwasher	4
17	M5×16 Hexagon socket head cap screw	4
18	4×16 Taper pin	2
19	Cover	1
20	Bracket	1
21	Right bracket	1
22	M6×12 Cross recessed pan head screw	4
23	Wiper	1
24	Wiper	1
25	Wiper	2
26	Wiper	1
27	M24×240 Hexagon bolt	1
28	M24 Hexagon nut	1
29	Supporting bar	1

02 Column part

No.	Name	Qty
30	Pressure bar	1
31	Rubber guard	1
32	M6×20 Hexagon socket head cap screw	2
33	M5×10 Hexagon socket head cap screw	6
34	Scale	1
35	M3×6 screw	4
36	Balance block	1
37	M24 Lifting eye bolt	1
38	10A-1×90 Roller chain	2
39	Screw	2
40	M12×90 Hexagon socket head cap screw	4
41	A8×28 Taper pin	4
42	M6×16 Hexagon socket head cap screw	4
43	Washer	4
44	Chain wheel	4
45	M6×10 Set screw	4
46	6205-2Z 25×52×15 Bearing	8
47	Bush	4
48	Shaft	4

03 Table Part



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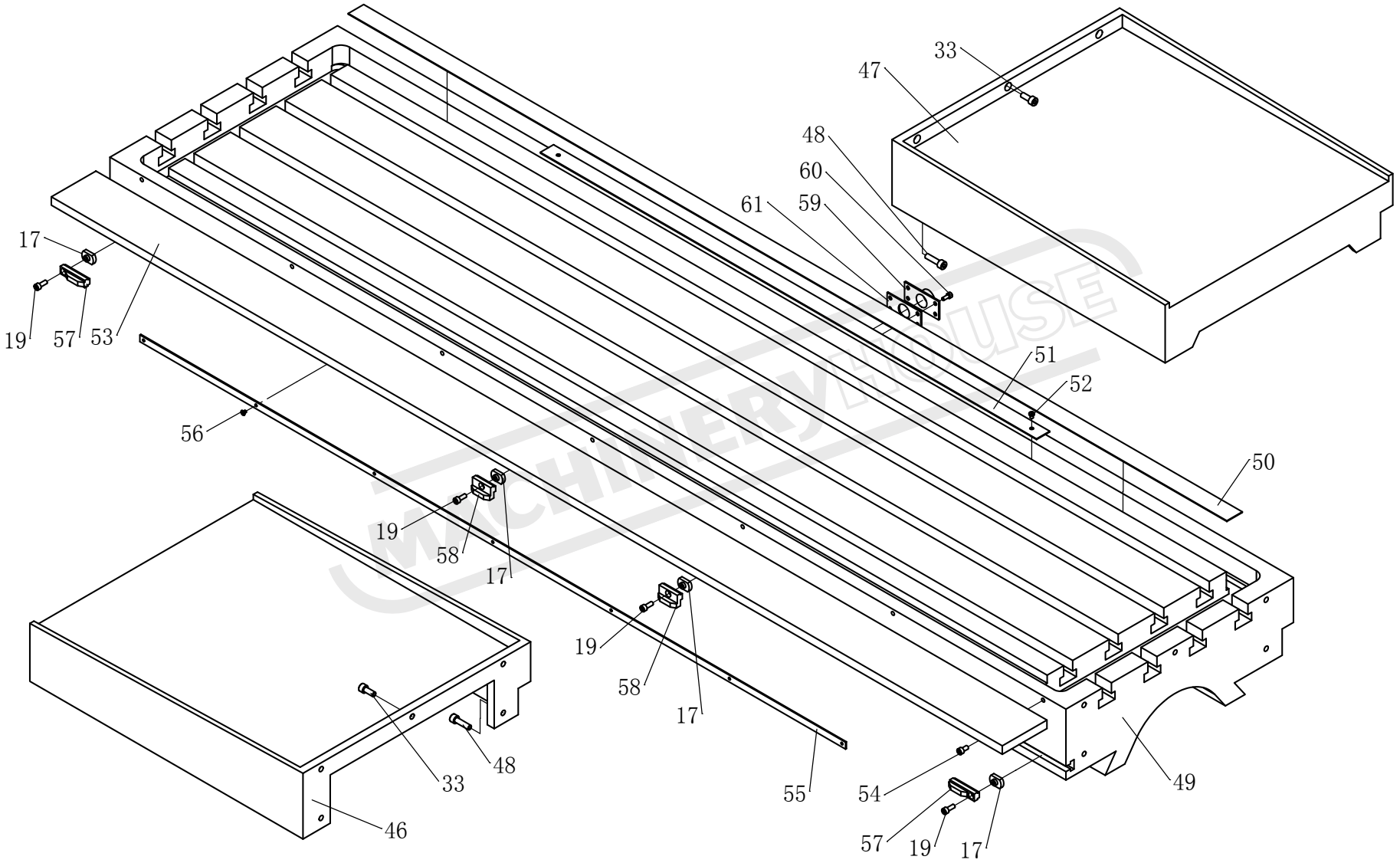

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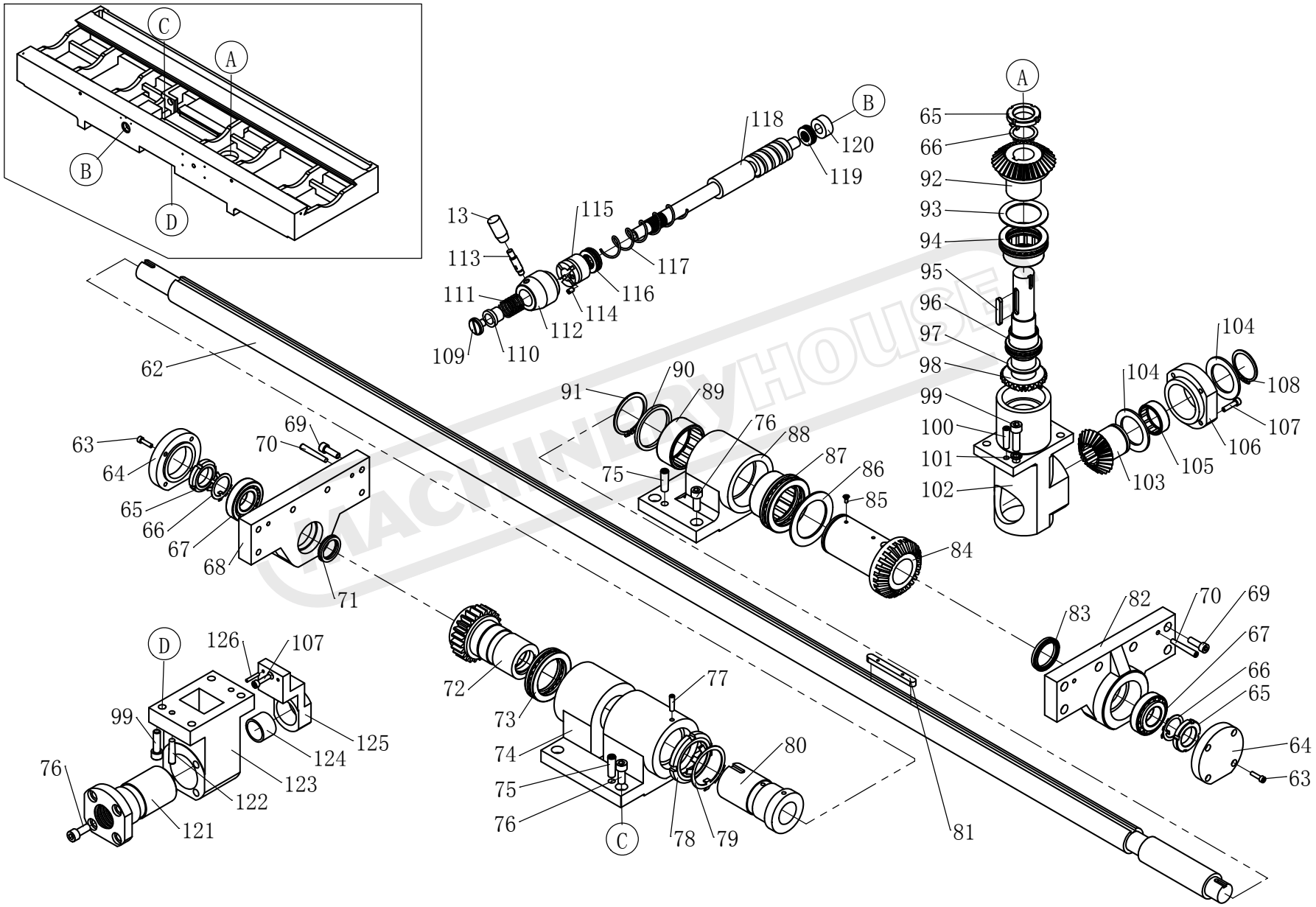


03 Table part

No.	Name	Qty
1	Saddle	1
2	Rod	2
3	B-M12×95×40 Handle	2
4	Gib	2
5	Handle boss	1
6	Screw	1
7	Collar	1
8	Shaft	1
9	NK20/20 20×28×20 Bearing	2
10	Handle lever	1
11	Pressure plate	1
12	M12×55 Hexagon socket head cap screw	10
13	B-M8×40 Grip	2
14	Key	1
15	Screw	6
16	Pressure plate	1
17	Nut	8
18	Dog	2
19	M6×16 Hexagon socket head cap screw	12
20	Bracket	1
21	Dog	2
22	Name plate	1
23	2×6 Rivet	3
24	M6×35 Hexagon socket head cap screw	4
25	4×20 Taper pin	2
26	Wiper	1
27	Wiper	1
28	M5×12 Cross recessed pan head screw	26
29	Wiper	1

03 Table part

No.	Name	Qty
30	Wiper	1
31	Elbow	1
32	Washer	1
33	M8×20 Hexagon socket head cap screw	1
34	Pipe	10
35	Wiper	1
36	Bracket	1
37	Gib	1
38	Gib	1
39	Plate	1
40	Plate	1
41	M8×12 Hexagon socket head cap screw	4
42	M8×90 Hexagon bolt	2
43	M8 Hexagon nut	4
44	M5×8 Cross recessed pan head screw	5
45	Gib	1
46	Cover	1
47	Cover	1
48	M8×30 Hexagon socket head cap screw	4
49	Table	1
50	Cover	1
51	Filter	1
52	M5×6 Cross recessed pan head screw	2
53	Guard	1
54	M6×12 Hexagon socket head cap screw	7
55	Scale	1
56	M4×6 Cross recessed pan head screw	7
57	Dog	2
58	Dog	2

03 Table part

No.	Name	Qty
59	Pipe joint	1
60	M5×12 Hexagon socket head cap screw	4
61	Washer	1
62	Lead screw	1
63	M5×20 Hexagon socket head cap screw	8
64	Cover	2
65	M30×1.5 Nut	3
66	30 Check washer	3
67	30206 Tapered roller bearing	2
68	Bracket	1
69	M8×25 Hexagon socket head cap screw	12
70	6×50 Taper pin	4
71	FB030050 Oil seal	1
72	m=3.15 z=24 Worm gear	1
73	51111 Thrust ball bearing	1
74	Bracket	1
75	10×35 Taper pin	4
76	M10×25 Hexagon socket head cap screw	12
77	6×26 Taper pin	1
78	M55×2 Lock nut	1
79	55 Check washer	1
80	Bush	1
81	Key	1
82	Bracket	1
83	FB040060 Oil seal	1
84	m=2.75 z=32 Bevel gear	1
85	M4×10 Screw	2
86	Washer	1
87	NKX60 Combination gear	1

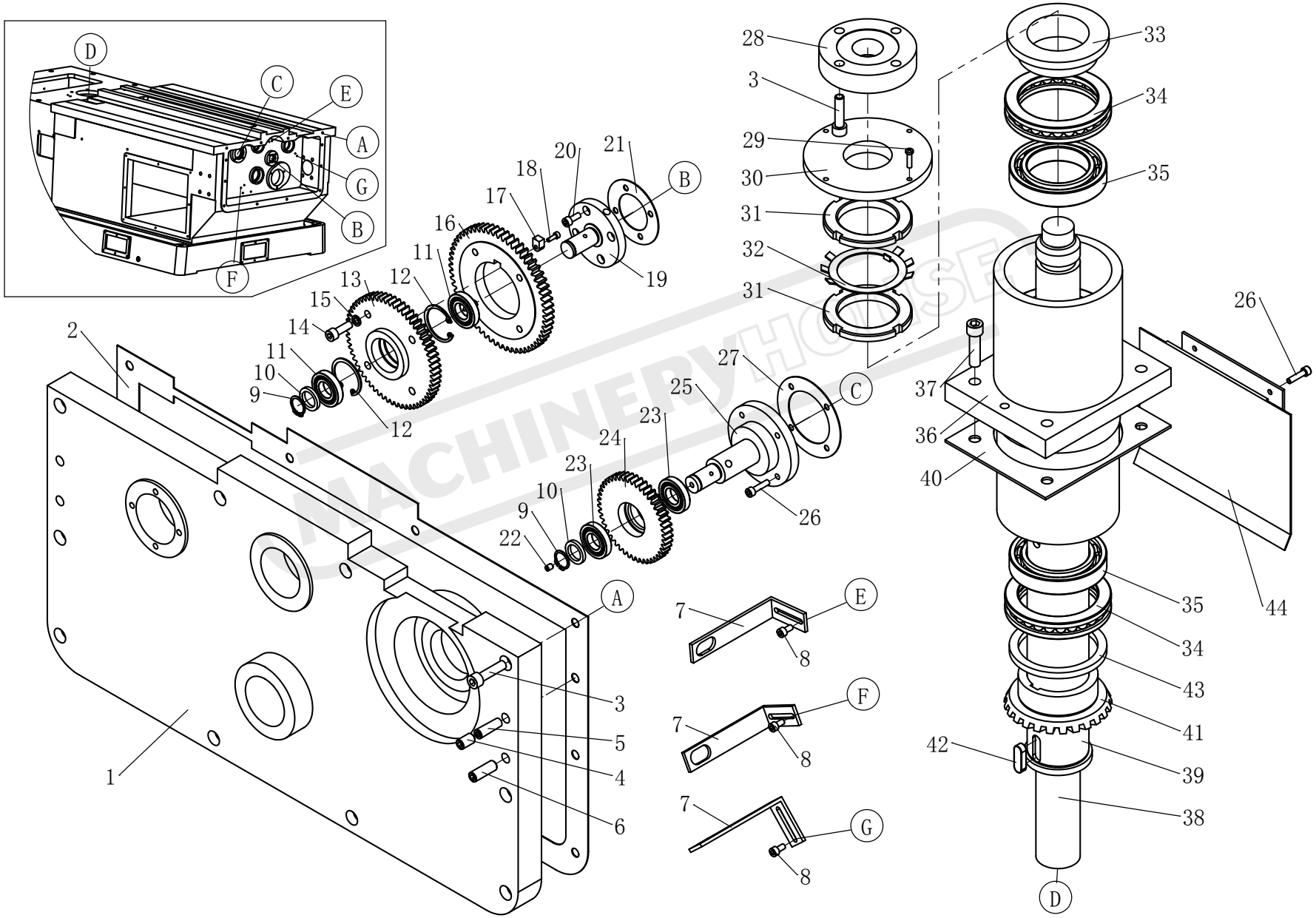
03 Table part

No.	Name	Qty
88	Bracket	1
89	NK60/25 60×72×25 Bearing	2
90	Washer	1
91	60 Circlip for shaft	1
92	m=2.75 z=32 Bevel gear	1
93	Washer	1
94	NKX50 Combination gear	1
95	8×45 Flat key	1
96	NKX35 Combination gear	1
97	Washer	1
98	m=2.75 z=24 Bevel gear	1
99	M10×35 Hexagon socket head cap screw	8
100	8×35 Taper pin	2
101	10 Spring washer	4
102	Bracket	1
103	m=2.75 z=24 Bevel gear	1
104	Washer	2
105	NK45/30 45×55×30 Bearing	1
106	Cover	1
107	M6×25 Hexagon socket head cap screw	4
108	45 Circlip for shaft	1
109	Screw	1
110	Bush	1
111	2×23×30 Spring	1
112	Lever seat	1
113	Handle lever	1
114	M6×10 Slotted flat end set screw	1
115	Bush	1
116	51104 Thrust ball bearing	1

03 Table part

No.	Name	Qty
117	2.5×25.5×140 Spring	1
118	m=3.15 z=1 Worm	1
119	51102 Thrust ball bearing	1
120	Bush	1
121	Nut	1
122	8×40 Taper pin	2
123	Bracket	1
124	Bush	1
125	Bracket	1
126	4×25 Taper pin	2

04 Feed Part



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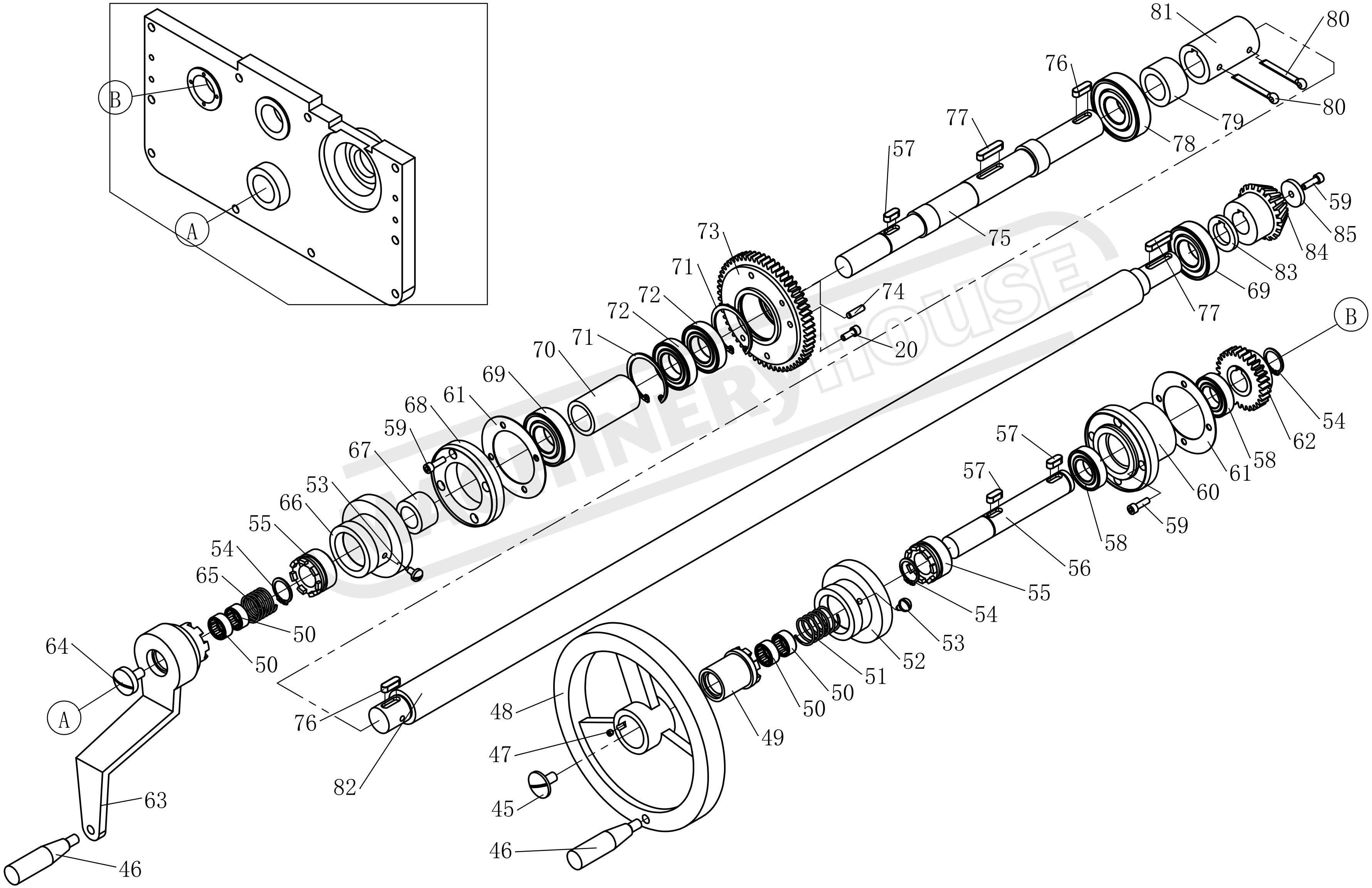
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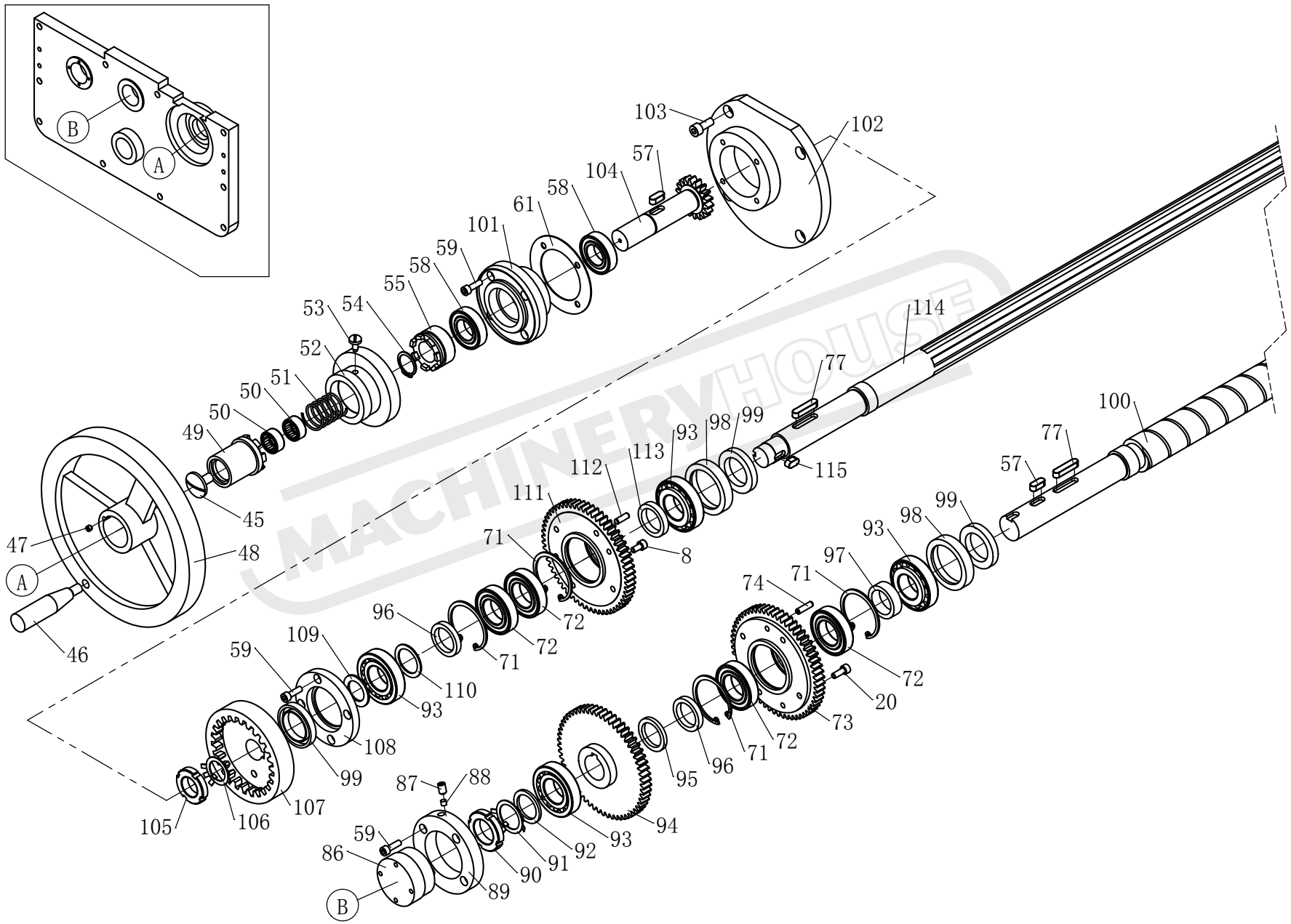

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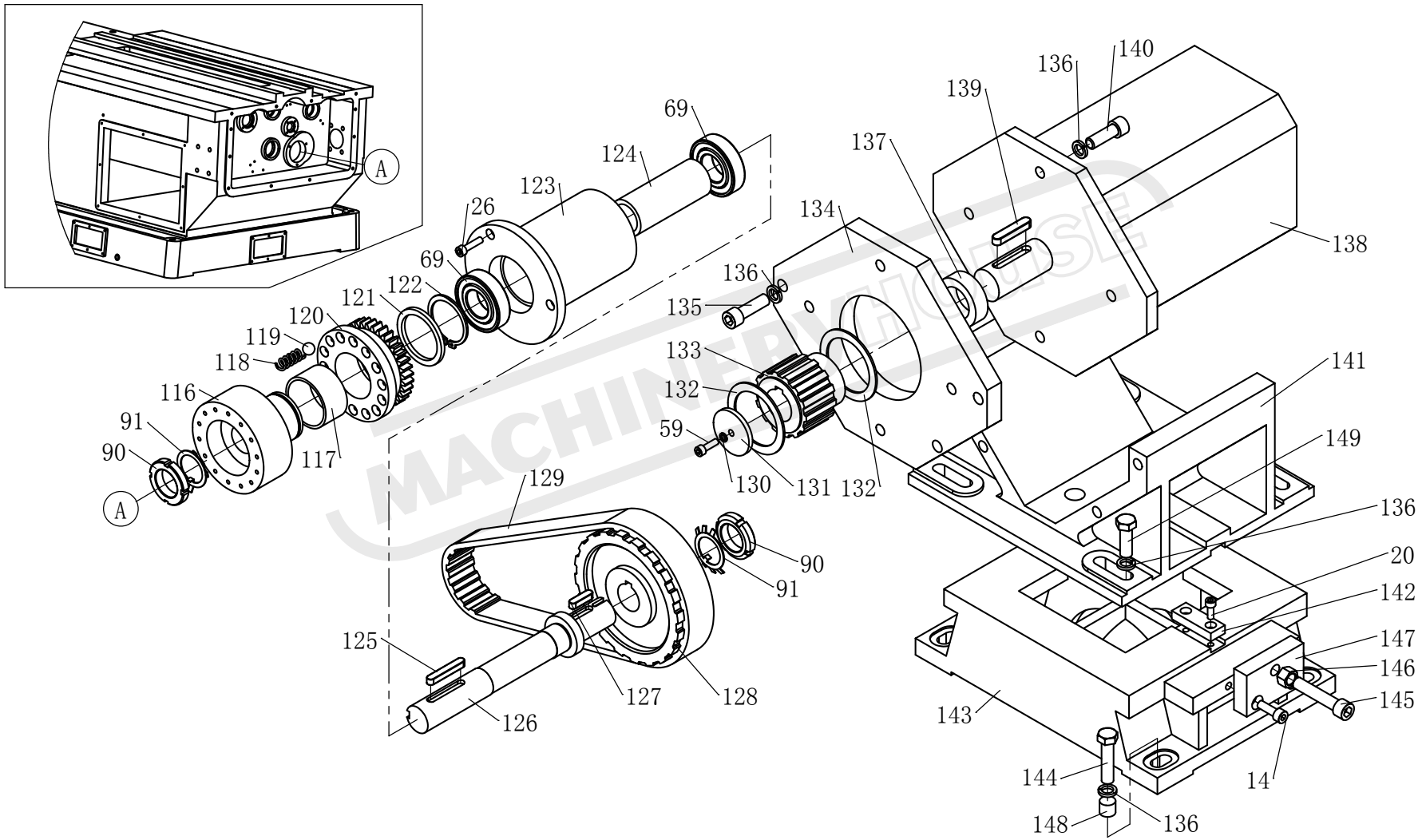


04 Feed part

No.	Name	Qty
1	Lid support	1
2	Washer	1
3	M10×40 Hexagon socket head cap screw	14
4	M12×20 Set screw	2
5	10×35 Taper pin	2
6	M12×35 Set screw	2
7	Bent plate	3
8	M6×12 Hexagon socket head cap screw	10
9	20 Circlip for shaft	4
10	Washer	2
11	6004 20×42×12 Bearing	4
12	42 Circlip for hole	2
13	m=2.25 z=60 Gear	1
14	M8×25 Hexagon socket head cap screw	6
15	8 Helical spring lockwasher	4
16	m=2.5 z=60 Gear	1
17	Key	1
18	M4×12 Hexagon socket head cap screw	1
19	Shaft	1
20	M6×16 Hexagon socket head cap screw	16
21	Washer	1
22	M6×8 Set screw	1
23	6004-Z 20×42×12 Bearing	2
24	m=2.25 z=46 Gear	1
25	Shaft	1
26	M6×25 Hexagon socket head cap screw	9
27	Washer	1
28	Connector	1
29	M5×20 Cross recessed pan head screw	4

04 Feed part

No.	Name	Qty
30	Pressure cover	1
31	M68×2 Lock nut	2
32	68 Check washer	1
33	Collar	1
34	51118 90×120×22 Bearing	2
35	6014 70×110×20 Bearing	2
36	Bush	1
37	M12×45 Hexagon socket head cap screw	4
38	Lead screw	1
39	Nut	1
40	Adjustable washer	1
41	m=3 z=40 Gear	1
42	12×36 Flat key	1
43	Washer	1
44	Baffle plate	1
45	Screw	2
46	M10×80 Handle	3
47	M6×6 Slotted taper end set screw	2
48	Handwheel	2
49	Clutch	2
50	2516 25×32×16 Bearing	6
51	2×28×40 Spring	2
52	Dial	2
53	Screw	3
54	25 Circlip for shaft	4
55	Clutch	3
56	Shaft	1
57	8×20 Flat key	5
58	6005-2Z 25×47×12 Bearing	4

04 Feed part

No.	Name	Qty
59	M6×20 Hexagon socket head cap screw	26
60	Bearing seat	1
61	Waher	3
62	m=2.25 z=39 Gear	1
63	Handle	1
64	Screw	1
65	2×28×28 Spring	1
66	Dial	1
67	Bush	1
68	Pressure cover	1
69	6206-2Z 30×62×16 Bearing	4
70	Spacer	1
71	55 Circlip for hole	6
72	6006-2Z 30×55×13 Bearing	6
73	m=2.25 z=58 Gear	2
74	6×22 Cylindrical pin with internal thread	4
75	Shaft	1
76	8×25 Flat key	2
77	8×36 Flat key	4
78	6306-2Z 30×72×19 Bearing	1
79	Collar	1
80	6.3×50 Split pin	2
81	Collar	1
82	Shaft	1
83	Washer	1
84	m=3 z=20 Gear	1
85	Waher	1
86	Blind nut	1
87	M8×12 Screw	1

04 Feed part

No.	Name	Qty
88	Copper washer	1
89	Cover	1
90	M30×1.5 Lock nut	3
91	30 Check washer	3
92	Washer	1
93	30206 30×62×16 Bearing	4
94	m=2.25 z=58 Gear	1
95	Collar	1
96	Collar	3
97	Collar	1
98	Oil seal seat	2
99	355208 Seal	3
100	Lead screw	1
101	Bearing seat	1
102	Eccentric cover	1
103	M8×20 Hexagon socket head cap screw	4
104	m=2.5 z=18 Gear	1
105	Lock nut	1
106	24 Check washer	1
107	m=2.5 z=36 Gear	1
108	Pressure cover	1
109	Washer	1
110	Washer	1
111	m=2.25 z=58 Gear	1
112	6×18 Cylindrical pin with internal thread	2
113	Washer	1
114	Spline shaft	1
115	8×16 Flat key	1
116	Clutch seat	1

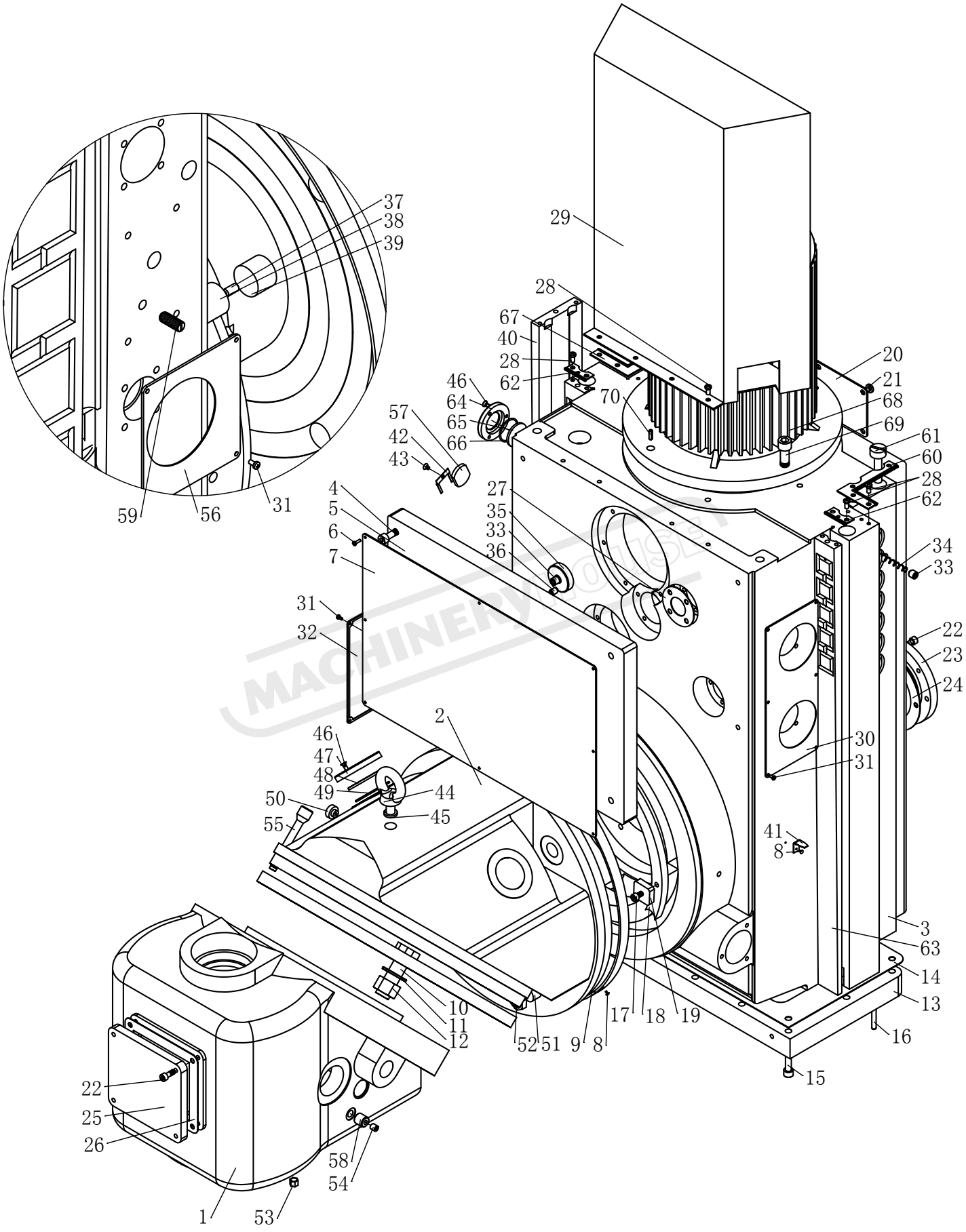
04 Feed part

No.	Name	Qty
117	Collar	1
118	2×10×30 Spring	14
119	12 Steel ball	14
120	m=2.5 z=35 Gear	1
121	Washer	1
122	50 Circlip for shaft	1
123	Supporting bush	1
124	Bush	1
125	8×50 Flat key	1
126	Shaft	1
127	8×30 Flat key	2
128	Synchronous pulley	1
129	310H-40 Synchronous belt	1
130	6 Spring washer	4
131	Back cover	1
132	Collet	2
133	Synchronous pulley	1
134	Connecting plate	1
135	M12×40 Hexagon socket head cap screw	4
136	12 Spring washer	12
137	Collet	1
138	APM-SF20M Servo motor	1
139	10×50 Flat key	1
140	M12×35 Hexagon socket head cap screw	4
141	Supporting seat	1
142	Key	2
143	Connecting seat	1
144	M12×50 Hexagon bolt	4
145	M12×60 Hexagon socket head cap screw	1

04 Feed part

No.	Name	Qty
146	M12 Nut	1
147	Supporting plate	1
148	Plug	4
149	M12×35 Hexagon bolt	4

06 Headstock part



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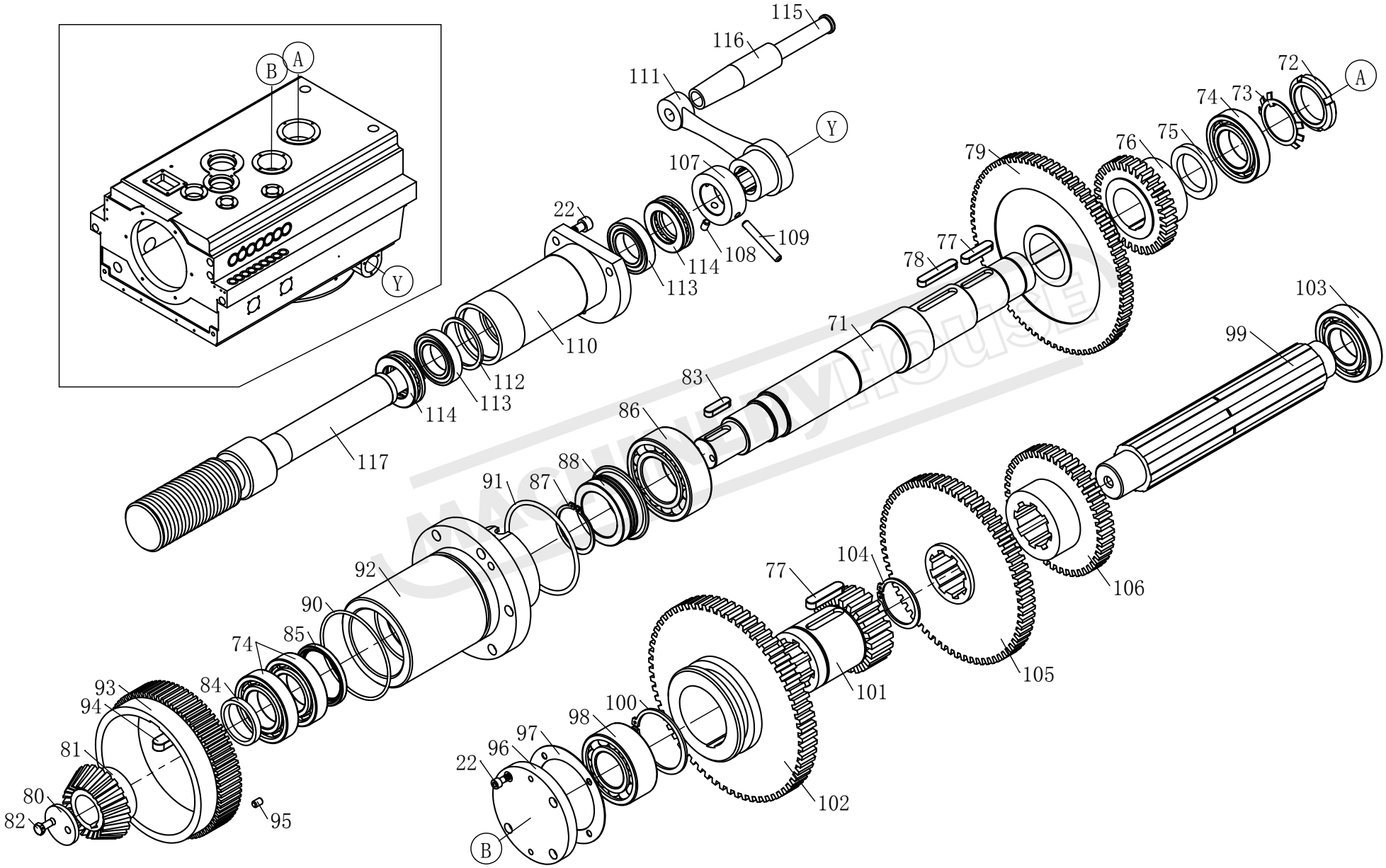

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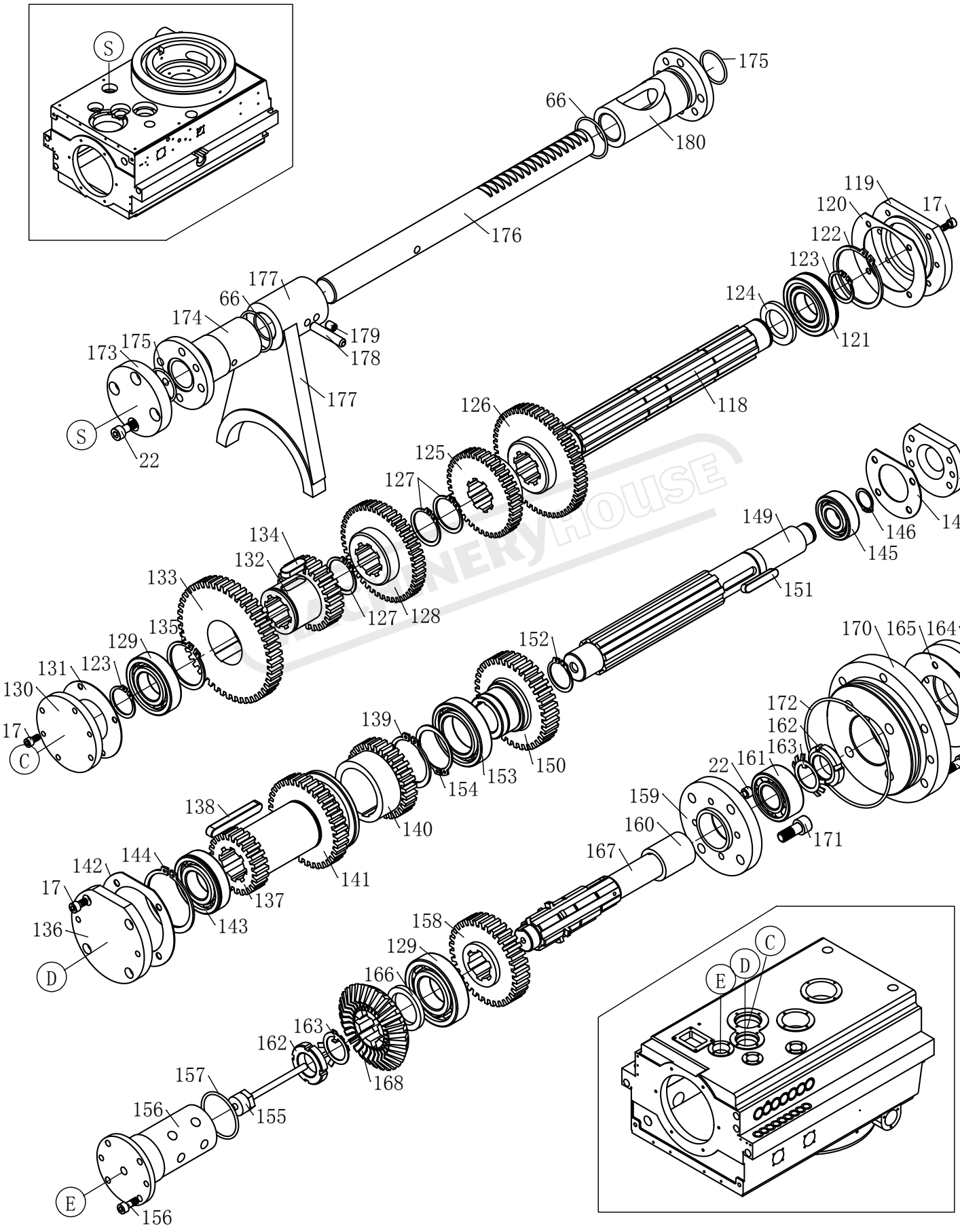

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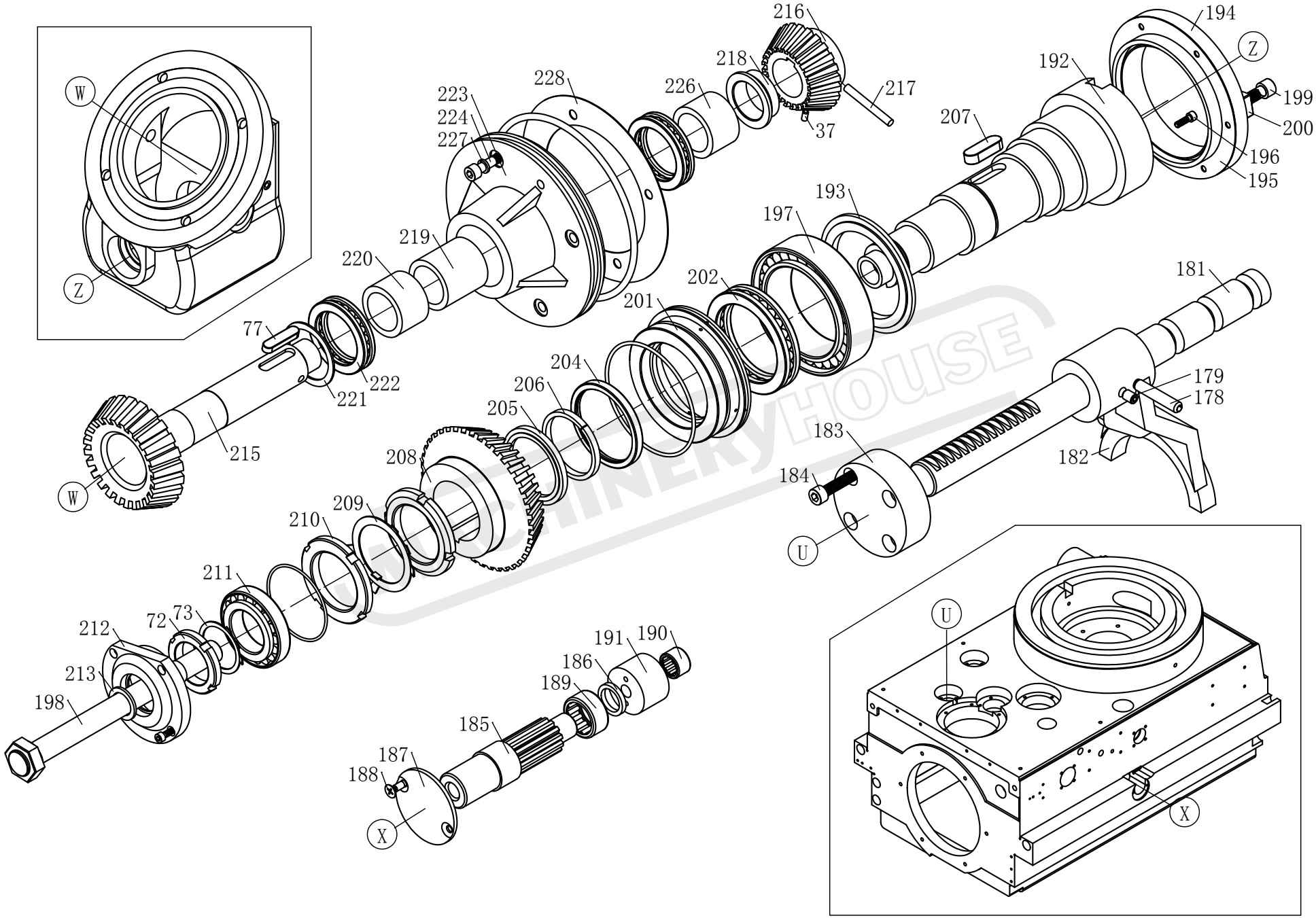

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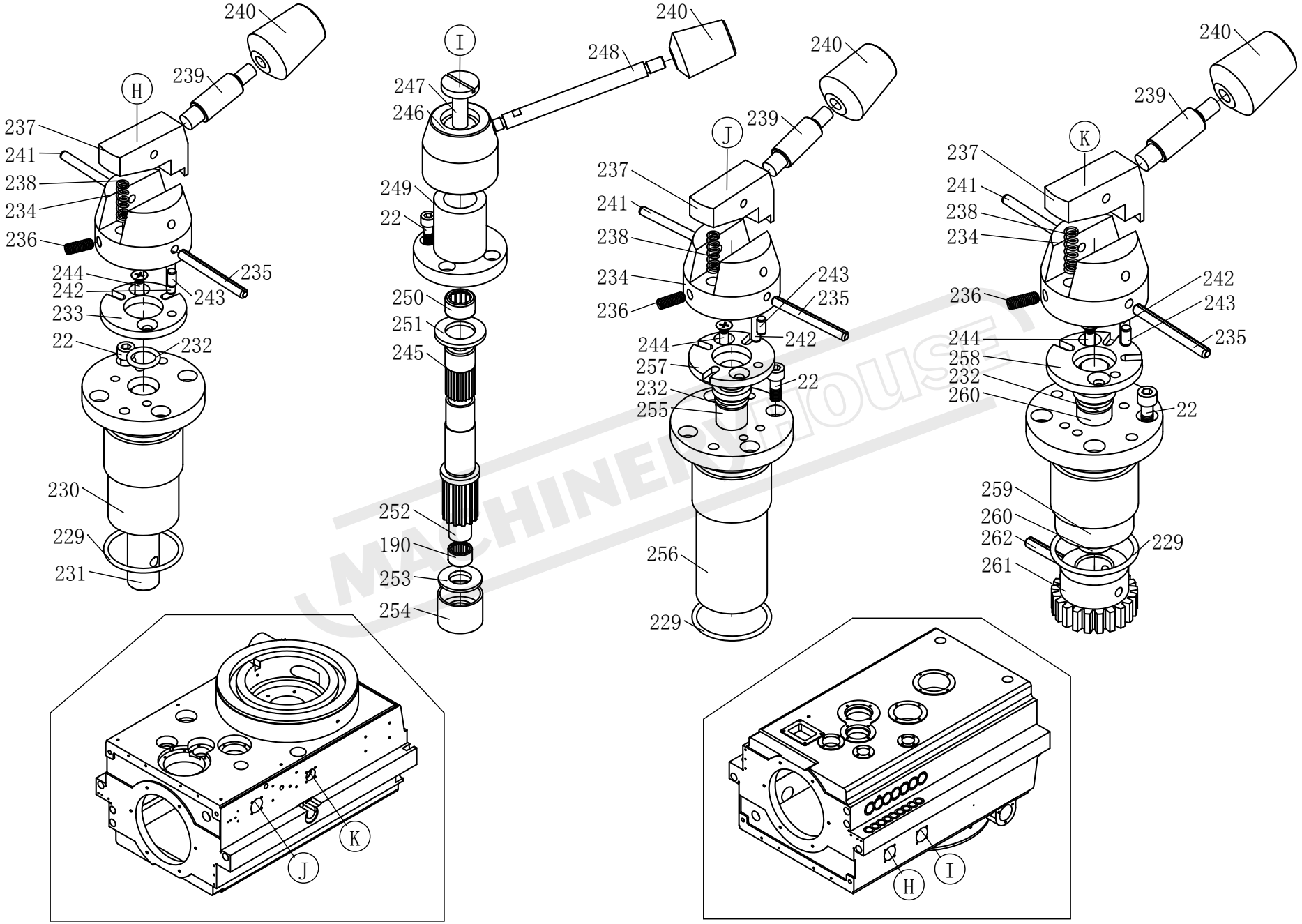

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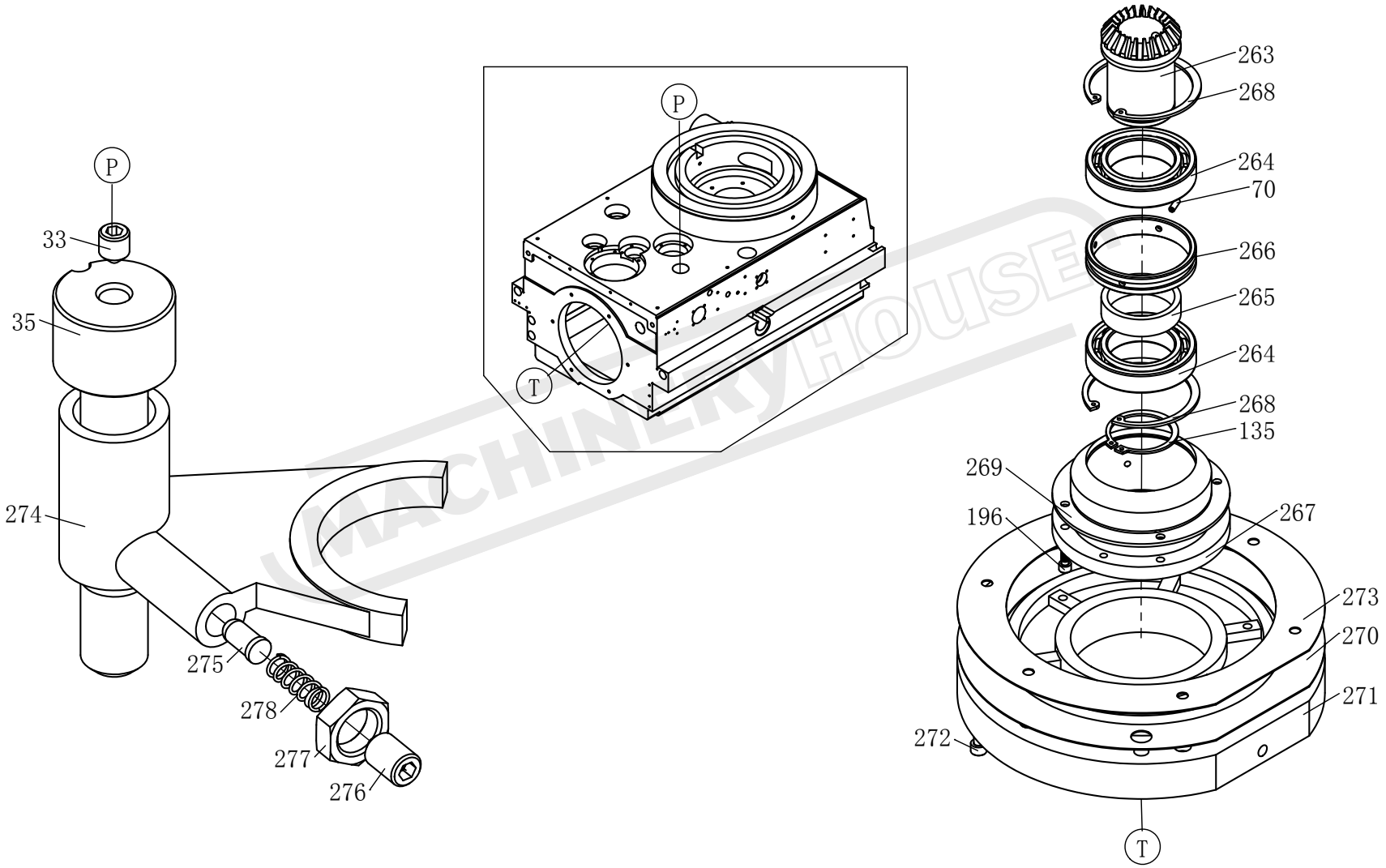


06 Headstock Part

No.	Name	Qty
1	Headstock	1
2	Rotary head	1
3	Gearbox	1
4	8×25 Hexagon socket head cap screw	4
5	Scutcheon	1
6	M3×10 Screw	14
7	Scutcheon	1
8	M2×6 Rivet	5
9	Scale	2
10	Screw	1
11	20 Flat washer	8
12	M20 Nut	8
13	Cover	1
14	Washer	1
15	8×35 Hexagon socket head cap screw	12
16	6×50 Cylindrical pin	3
17	M6×12 Hexagon socket head cap screw	32
18	Plate	1
19	Plate	1
20	Cover	1
21	M6×8 Screw	4
22	M6×16 Hexagon socket head cap screw	54
23	Cover	1
24	Washer	1
25	Cover	1
26	Washer	1
27	Washer	1
28	M5×10 Screw	14
29	Cover	1

06 Headstock Part

No.	Name	Qty
30	Indicator drop	1
31	M3×6 Screw	14
32	Speed plate	1
33	M10×12 Screw	2
34	1.2×6.3×85 Spring	1
35	Sliding bar	1
36	M8×10 Screw	2
37	M6×12 Screw	2
38	Rack shaft	1
39	Plug	1
40	Gib	1
41	Index	1
42	Spring washer	1
43	M4×6 Screw	1
44	M12 Ringbolt	1
45	12 Spring washer	1
46	M4×16 Screw	2
47	Oil scale	1
48	Glass	1
49	50×1.8 O-ring	1
50	A10 Oil scale	1
51	Taper pin	1
52	M16 Nut	1
53	M10 Oil plug	1
54	8 Oil cup	1
55	Taper pin	1
56	Indicator drop	1
57	Clamping plate	1
58	Plug	1

06 Headstock Part

No.	Name	Qty
59	M8×20 Screw	1
60	Wiper	1
61	Screw	1
62	Wiper	2
63	Gib	2
64	Oil scale	1
65	Glass	1
66	31.5×1.8 O-ring	3
67	Wiper	1
68	7.5Kw-B5 Motor	1
69	12×40 Hexagon socket head cap screw	1
70	4×15 Elastic pin	2
71	Shaft	1
72	M50×1.5 Nut	2
73	50 Lock washer	2
74	6210 Bearing	3
75	Collar	1
76	m=3.5 z=32 Gear	1
77	12×50 Key	3
78	12×63 Key	1
79	m=3.5 z=74 Gear	1
80	Cover	1
81	m=4 z=23 Helical gear	1
82	8×16 Bolt	1
83	12×40 Key	1
84	Washer	1
85	80×55×8 Seal ring	1
86	3212 Bearing	9
87	60 Circlip for shaft	1

06 Headstock Part

No.	Name	Qty
88	Bush	1
89	M8×30 Hexagon socket head cap screw	1
90	112×3.55 O-ring	1
91	115×5.3 O-ring	1
92	Bearing housing	1
93	m=2.5 z=75 Worm wheel	1
94	16×40 Key	1
95	M8×12 Screw	2
96	Cover	1
97	Washer	1
98	3208 Bearing	1
99	Spline shaft	1
100	68 Circlip for shaft	1
101	m=3.5 z=63 Gear	1
102	m=3.5 z=21 Gear	1
103	6208 Bearing	1
104	52 Circlip for shaft	1
105	m=3 z=67 Gear	1
106	m=3 z=45 Gear	1
107	Bush	1
108	M5×8 Screw	2
109	5×40 Elastic pin	1
110	Bearing housing	1
111	Handle	1
112	Washer	1
113	61905-2Z Bearing	2
114	HK51105 Bearing	2
115	Handle	1
116	Grip	1

06 Headstock Part

No.	Name	Qty
117	Worm	1
118	Spline shaft	1
119	Cover	1
120	Washer	1
121	6207-ZN Bearing	1
122	72 Circlip for shaft	1
123	35 Circlip for shaft	2
124	Washer	1
125	m=2.5 z=40 Gear	1
126	m=2.5 z=52 Gear	1
127	42 Circlip for shaft	3
128	m=2.5 z=46 Gear	1
129	6207 Bearing	2
130	Cover	1
131	Washer	1
132	m=3 z=26 Gear	1
133	m=3 z=48 Gear	1
134	12×35 Key	1
135	55 Circlip for shaft	2
136	Cover	1
137	m=2.5 z=24 Gear	1
138	10×70 Key	1
139	50 Circlip for shaft	1
140	m=2.5 z=30 Gear	1
141	m=2.5 z=36 Gear	1
142	Washer	1
143	6206-ZN Bearing	1
144	62 Circlip for shaft	1
145	6204 Bearing	1

06 Headstock Part

No.	Name	Qty
146	20 Circlip for shaft	1
147	Cover	1
148	Washer	1
149	Spline shaft	1
150	m=2.5 z=36 Gear	1
151	8×45 Key	1
152	30 Circlip for shaft	1
153	6009 Bearing	1
154	45 Circlip for shaft	1
155	Nozzle	1
156	Oil distributor	1
157	45×2.65 O-ring	1
158	m=2.5 z=34 Gear	1
159	Flange	1
160	Bush	1
161	3205 Bearing	1
162	M25×1.5 Nut	2
163	25 Lock washer	2
164	Cover	1
165	Washer	1
166	Washer	1
167	Spline shaft	1
168	m=3 z=30 Helical gear	1
169	8×20 Hexagon socket head cap screw	1
170	Cover	1
171	10×25 Hexagon socket head cap screw	1
172	112×2.65 O-ring	1
173	Cover	1
174	Cover	1

06 Headstock Part

No.	Name	Qty
175	25×1.8 O-ring	2
176	Shifter rod	1
177	Shifting fork	1
178	6×36 Elastic pin	2
179	M6×8 Screw	3
180	Housing	1
181	Shifter rod	1
182	Shifting fork	1
183	Cover	1
184	M6×30 Hexagon socket head cap screw	4
185	Worm wheel	1
186	Washer	1
187	Cover	1
188	M4×10 Screw	1
189	HK2520 Bearing	5
190	HK1512 Bearing	2
191	Bearing housing	1
192	Spindle	1
193	Collar	1
194	Cover	1
195	Washer	1
196	M6×20 Hexagon socket head cap screw	12
197	3020K/P5 Bearing	1
198	Drawbar	1
199	M12×25 Hexagon socket head cap screw	1
200	Key	1
201	Pressure plate	1
202	HK51118 Bearing	1
203	128×3.55 O-ring	1

06 Headstock Part

No.	Name	Qty
204	FB80×100×10 seal ring	1
205	Colllar	1
206	Colllar	1
207	18×50 Key	1
208	m=4 z=41 Helical gear	1
209	68 Lock washwer	1
210	M68×2 Nut	2
211	30210/P5 Bearing	1
212	Cover	1
213	Washer	1
214	85×2.65 O-ring	1
215	m=4 z=31 Helical gear	1
216	m=4 z=24 Helical gear	1
217	8×70 Taper pin	1
218	Bush	1
219	Bush	1
220	Bush	1
221	Washer	1
222	60×72×40 Combined bearing	1
223	Cover	1
224	10×40 Hexagon socket head cap screw	4
225	206×7 O-ring	1
226	Collar	1
227	10 Spring washer	1
228	Washer	1
229	40×2.65 O-ring	3
230	Cover	1
231	Shaft	1
232	14×2.65 O-ring	3

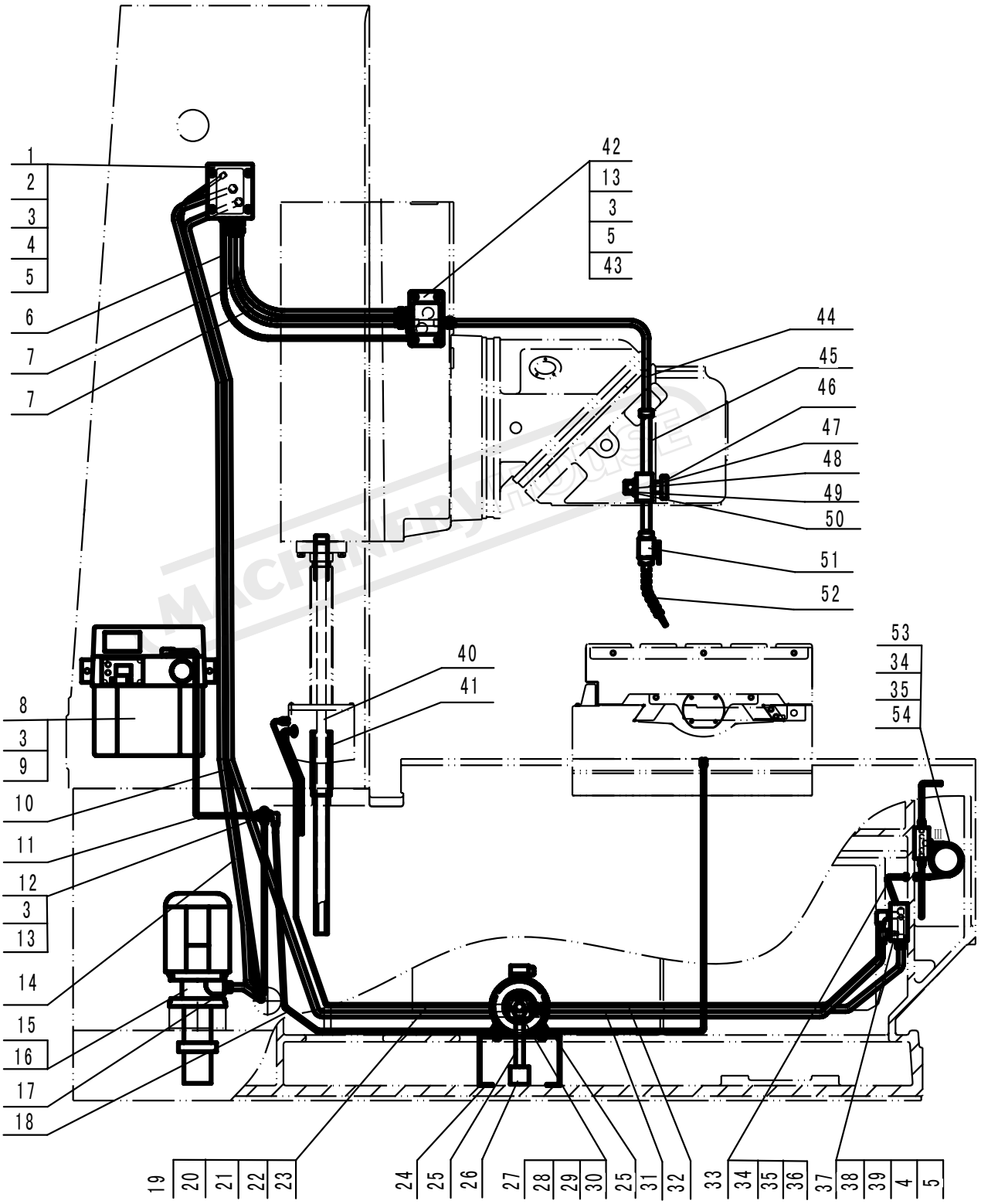
06 Headstock Part

No.	Name	Qty
233	Locating plate	1
234	Lever boss	3
235	5×55 Elastic pin	3
236	M6×16 Screw	3
237	Lever	3
238	1×6×25 Spring	3
239	Lever	3
240	B-M8×25 grip	4
241	5×50 Cylindrical pin	3
242	5×30 Cylindrical pin	3
243	5 ×10 Cylindrical pin	3
244	M5×16 Screw	6
245	Collar	1
246	Handle seat	1
247	Screw	1
248	Handle lever	1
249	Bearing housing	1
250	HK2020	1
251	Washer	1
252	m=1.5 z=13 Gear shaft	1
253	Washer	1
254	Bearing housing	1
255	Shaft	1
256	Cover	1
257	Locating plate	1
258	Locating plate	1
259	Cover	1
260	Shaft	1
261	m=2 z=21 Gear	1

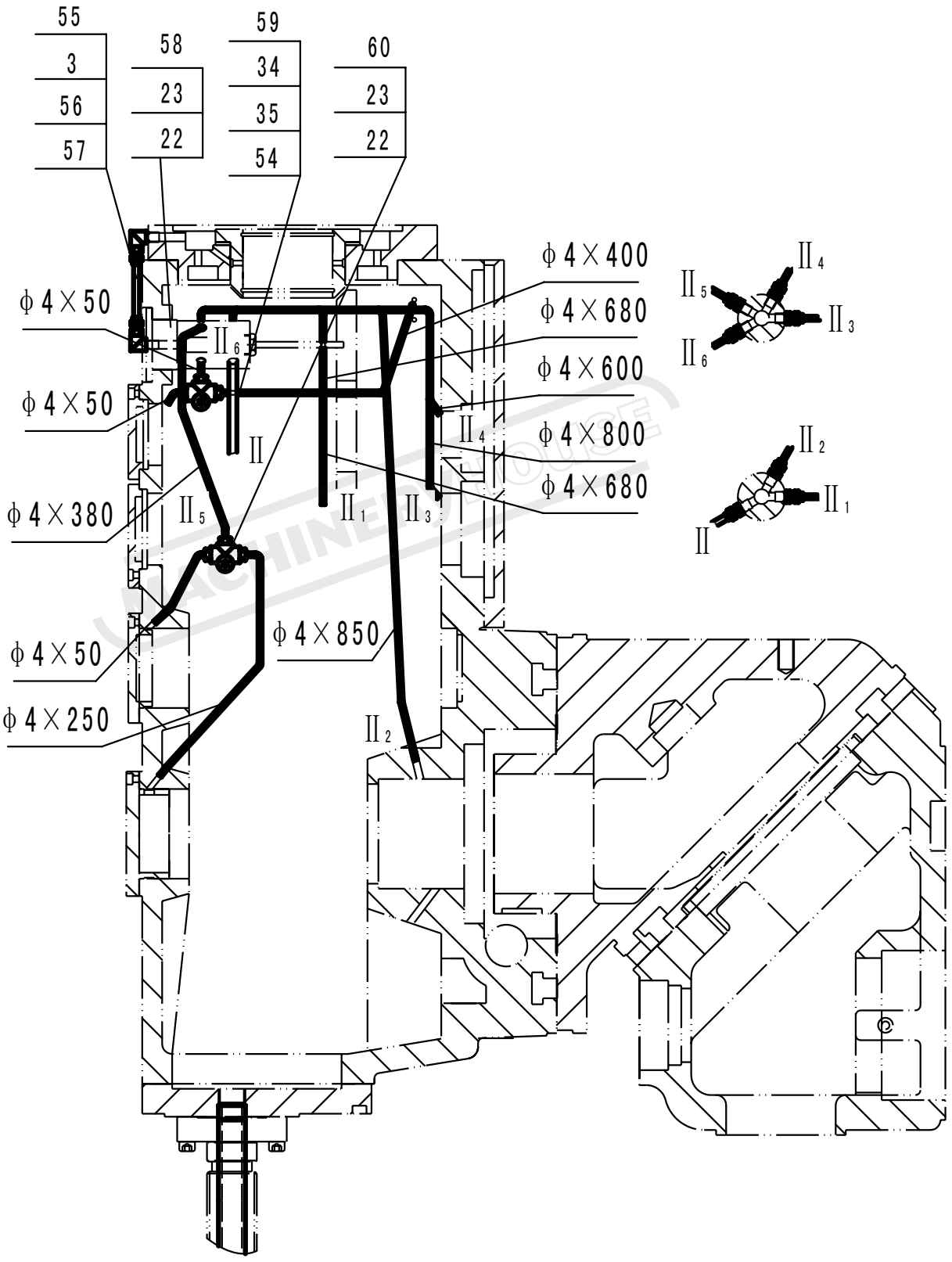
06 Headstock Part

No.	Name	Qty
262	5×36 Elastic pin	1
263	m=3 z=21 Helical gear	1
264	6011 Bearing	2
265	Collar	1
266	Collar	1
267	Bearing housing	1
268	90 Circlip for hole	2
269	Washer	1
270	Washer	1
271	Flange	1
272	M8×40 Hexagon socket head cap screw	6
273	Washer	1
274	Shifting fork	1
275	Pin	1
276	M12×20 Screw	1
277	M12 Nut	1
278	1×7.5×25 Spring	1

09 10 Cooling & lubricating parts



09 10 Cooling & lubricating parts



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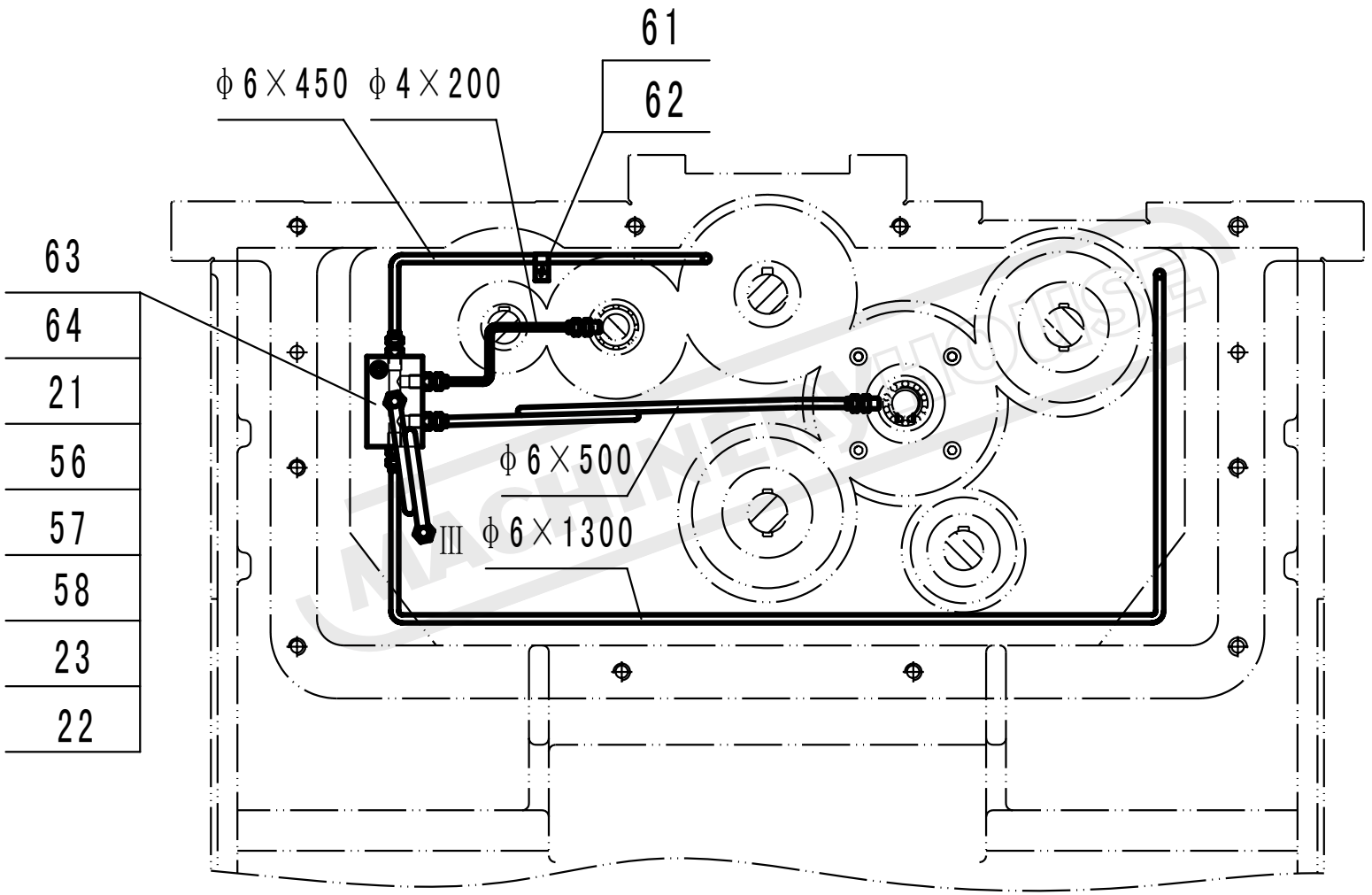
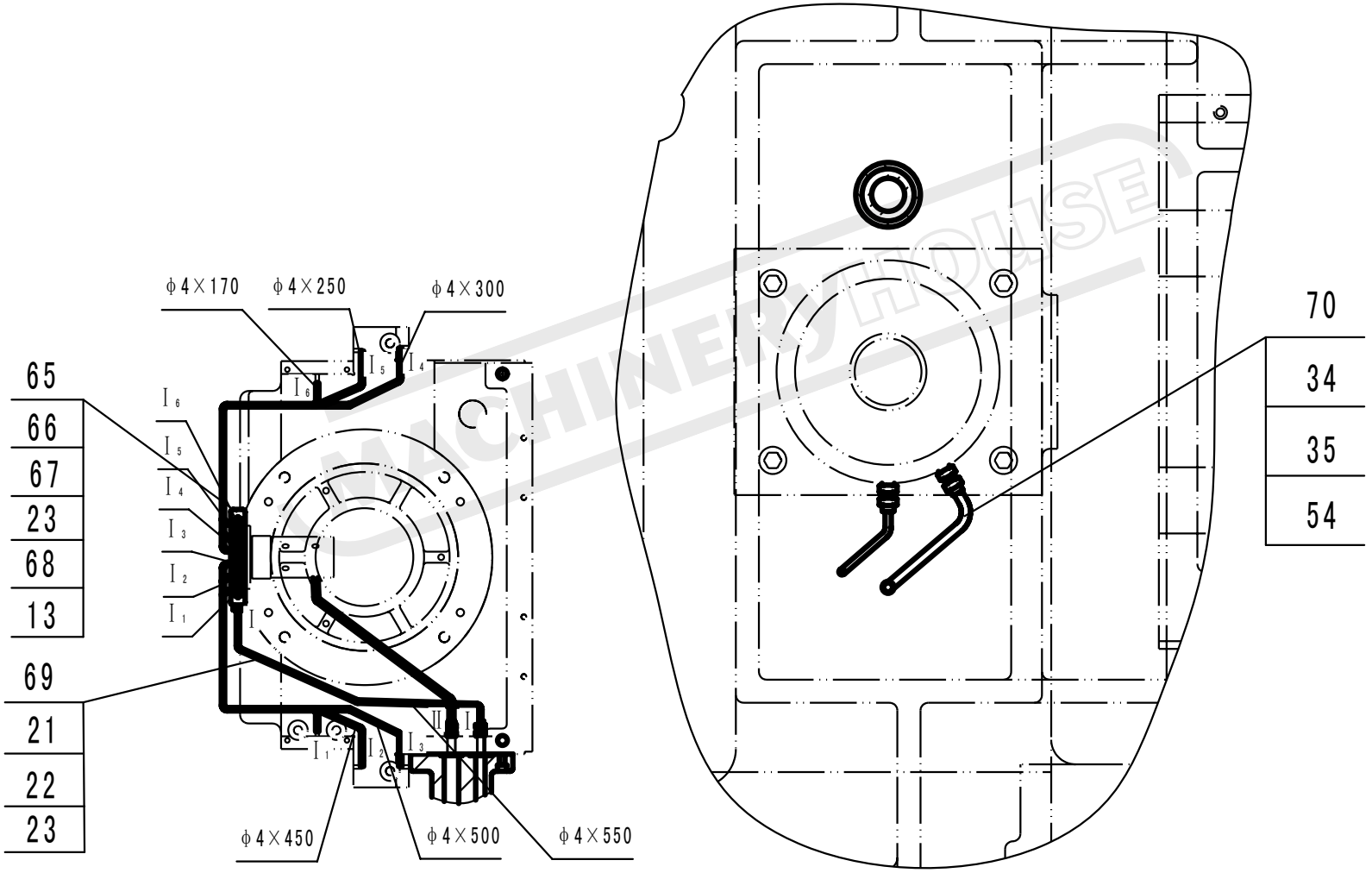
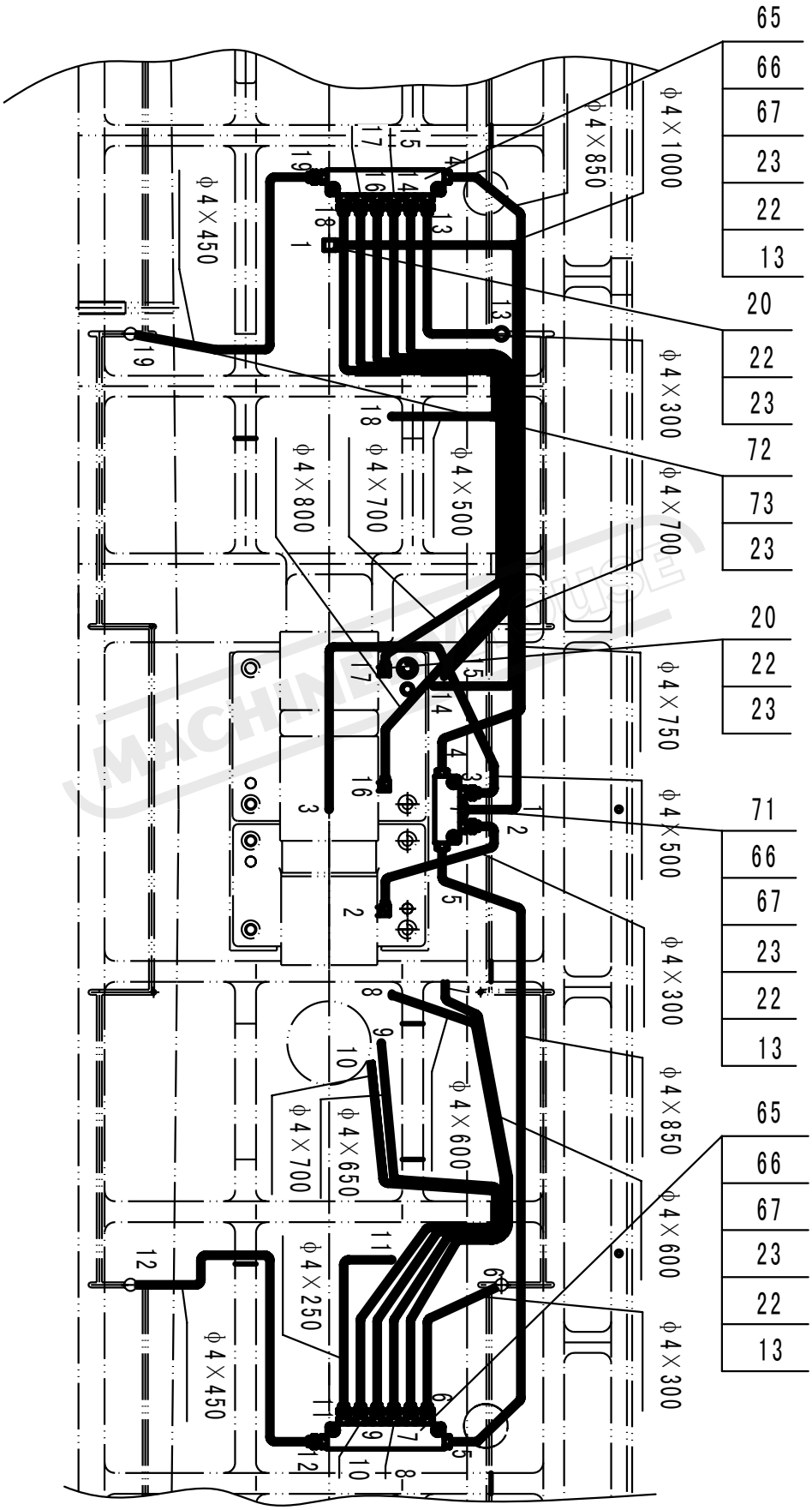


09 10 Cooling & lubricating parts



09 10 Cooling & lubricating parts



09 10 Cooling & Lubricating parts

No.	Name	Qty
1	Distribution	1
2	M8×60 Hexagon socket head cap screw	4
3	M10×1/M10×1 Elbow	6
4	G14- M18×1.5 Pipe joint	3
5	G14- M18×1.5 Pipe joint	6
6	A-φ6×1200 Tube	1
7	Hose assembly	2
8	M10×1 Lubrication pump	1
9	M6×16 Cross recessed pan head screw	2
10	A-φ6×2600 Flexible pipe	1
11	A-φ6×450 Flexible pipe	1
12	M10×1 Distribution	1
13	M6×25 Hexagon socket head cap screw	13
14	Hose assembly	1
15	M8×65 Hexagon socket head cap screw	4
16	550W Coolant pump	1
17	Adapter	1
18	A-φ6×2500 Flexible pipe	1
19	φ14/φ3×2500 Copper pipe	1
20	M8×1/M10×1 Elbow	6
21	M10×1/M10×1 Elbow	6
22	Φ4.2-M8×1 Oil pipe connecting	27
23	φ6/φ4.1 Sleeve	49
24	Bracket	1
25	Pipe	1
26	Filter	1
27	120W Cycloid pump	1
28	M6×20 Hexagonal bolt	4
29	M6 Hexagon nut	4

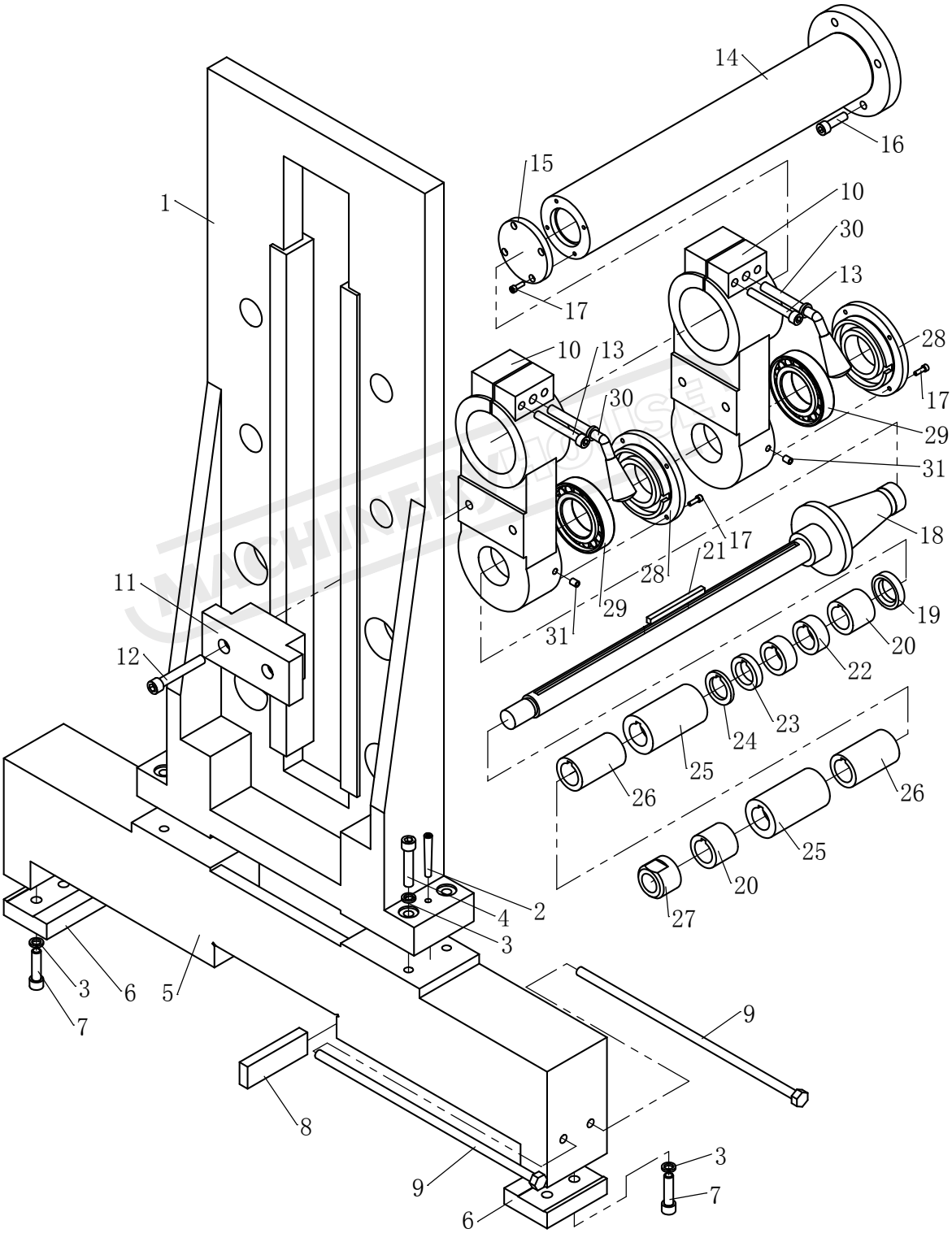
09 10 Cooling & Lubricating parts

No.	Name	Qty
30	6 Spring washer	4
31	M12×1/G 1/8 Hose assembly	7
32	M12×1/G 1/8 Hose assembly	1
33	φ8/φ6×350 Copper pipe	1
34	M12×1/ G 1/8 Straight joint	7
35	φ10/φ8.1 Sleeve	7
36	φ8.2-M12×1 Oil pipe joint	7
37	Distribution	1
38	M6×45 Hexagon socket head cap screw	2
39	M8×1/M10×1 Elbow	6
40	Oil pipe	1
41	Pipe	1
42	Distribution	1
43	2.65× φ20 O-ring seal	2
44	Hose assembly	1
45	Connecting tube	1
46	Knurled screw	1
47	Supporting block	1
48	Supporting pipe	1
49	Clamping bush	1
50	Bush	1
51	G 3/8 Globe valve	1
52	G3/8” Copper tube	1
53	φ8/φ6×400 Copper tube	1
54	φ8.2-M12×1 Oil pipe joint	6
55	φ6/φ4×180 Copper tube	1
56	φ8/φ6.1 Sleeve	6
57	φ6.1-M10×1 Oil pipe joint	6
58	M8×1/G 1/8 Straight joint	8

09 10 Cooling & Lubricating parts

No.	Name	Qty
59	Φ8/Φ6×180 Copper tube	1
60	M8×1 Distribution	2
61	Φ4 Pipe clamp	5
62	M5×8 Cross recessed pan head screw	5
63	Distribution	1
64	M6×35 Hexagon socket head cap screw	2
65	M8×1 Distribution	3
66	Gauge	22
67	Φ4.2-M8×1 Collar nut	22
68	M8×1 Oil plug	1
69	Φ4/Φ3×850 Copper tube	1
70	Φ8/Φ6×400 Copper tube	1
71	Distribution	1
72	M8×1 Elbow	4

01 Column & Base part



F Accessories part

No.	Name	Qty
1	Bracket	1
2	8×65 Taper pin	2
3	12 Spring washer	8
4	M12×60 Hexagon socket head cap screw	4
5	Boss	1
6	Pressure plate	2
7	M12×45 Hexagon socket head cap screw	4
8	Gib	1
9	Screw	2
10	Hanger	2
11	Clamping plate	1
12	M12×80 Hexagon socket head cap screw	4
13	M10×80 Hexagon socket head cap screw	4
14	Support	1
15	Cover	1
16	M10×35 Hexagon socket head cap screw	4
17	M5×16 Hexagon socket head cap screw	8
18	Cutter arbor	1
19	Collar	1
20	Collar	2
21	Key	1
22	Collar	2
23	Collar	1
24	Collar	1
25	Collar	2
26	Collar	2
27	Nut	1
28	Cover	2
29	N211E 55×100×21 Bearing	2

F Accessories part

No.	Name	Qty
30	Handlebar	2
31	8 Oil cup	2

DC lubricator

DC lubricator includes a motor-driven gear pump of reasonable structure, excellent performance, complete functions, wide applicability, good self absorption and high volume efficiency. Reservoir capacity is in 2L and 3L, This kind of pump is equipped with level switch and pressure switch can be provided according to different applications. These are connected with BMTC or HLTC programmed controller on the pump, or programmed control system on main user equipment to control and monitor oil level in reservoir, supply system pressure and setting of lubrication cycle.

DC lubricator is widely used in centralized lubrication systems for machine tools, plastics, textiles, light industry, printing, auto escalators and conveyers among other mechanical equipment.

Technology Date

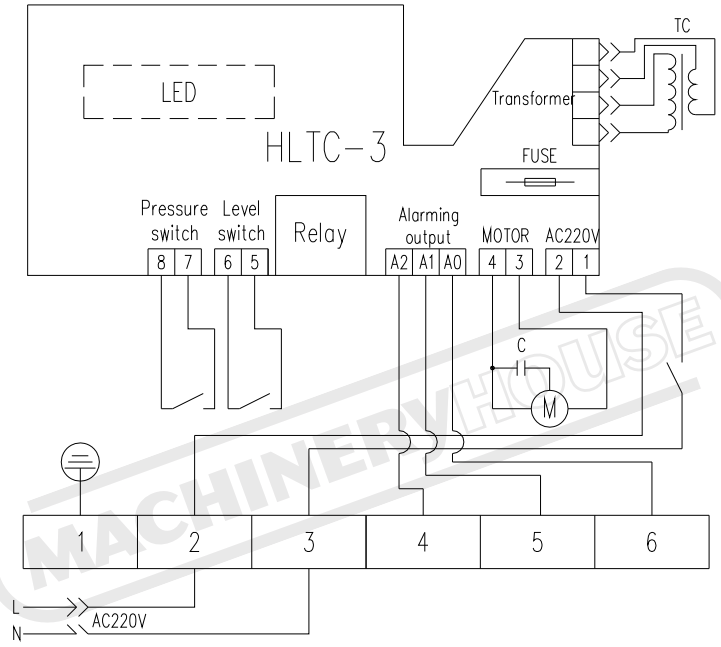
Model	P.N.	Discharge	Controller	Pressure	Viscosity	Voltage	Power	Control unit
DC-110×3	20131	108 (ml/min)	None	2.5 (MPa)	20~320 (mm^2/s)	220 VAC	20 W	Meter unit
	20131D		None					PDI system
DC-110×3K	20132D		HLTC-3					Meter unit
	20134D		HLTC-2					PDI system

HLTC-3 Series Controller

Operation

The HLTC-3 Controller is a multi-purpose programmable controller used with industrial lubrication systems. Controller settings are saved whenever power is interrupted. Up to three operating modes can be selected which allows the controller to be used with various lubrication system designs.

Electrical Terminal Connections



Connection #	*Description*
1	Positive(+) 220V AC, 2Amp
2	Negative(-)
3	Motor
4	Common
5	Level switch, closed at low level; Capacity 220V,0.1Amp;
6	
7	Pressure switch, lower 0.2MPa normal open; over 1.4MPa stop Capacity:220V ACm,1Amp
8	
Relay	Capacity:22V AC,60W
Fuse	Φ5×20,1A

Operation

Voltage Selection

Before connecting with the power supply, set the voltage switch on the top-left of main circuit board to the correct position for desired input voltage.

Keys Description

 Select  Enter and reset  Step selection  Adjustment

With the controller energized

1. Press the keys  and  simultaneously and release to enter control mode.

2. The display panel will now show a fixed letter for the selected mode and a flashing number (0-2).

3. To select the required mode press the  key.

4. Press the  key to advance to the next parameter of the selected mode.

5. Repeat steps 3 and 4 above using the  key to move across the digits and the  key to change the value of the selected flashing digit.

6. On completion, press the  key to save the data and initiate a lubrication cycle.

Manual Override

With the controller energized press the  key to initiate a lubrication cycle.

Program Review

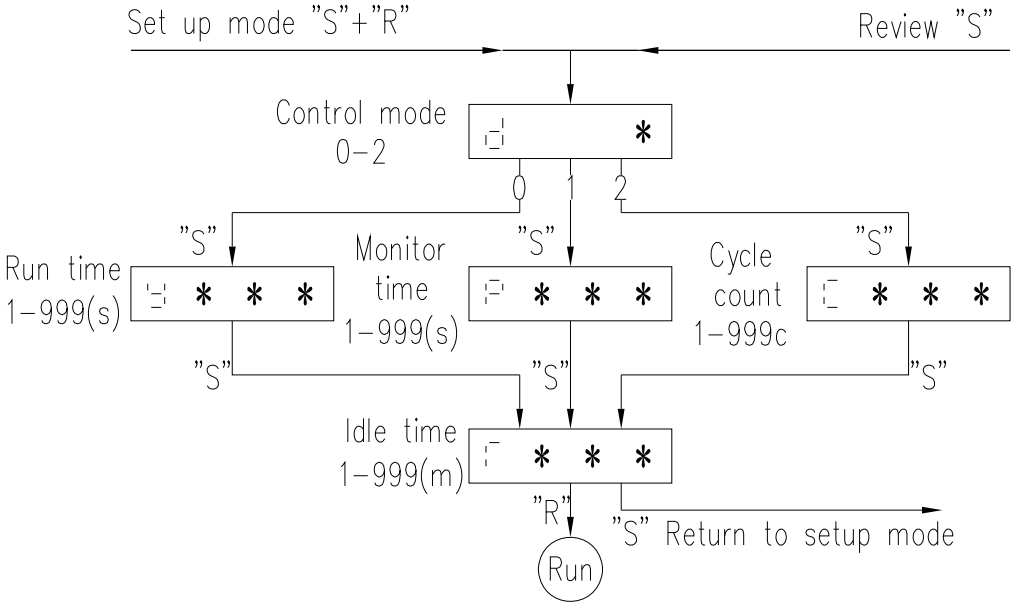
To review the preset data, press the  key repeatedly with the controller energized.

To return to operating condition display, release  key or depress  key for 5 seconds.

Fault Alarm

In any alarm condition, e.g. low level, low pressure etc., the pump will not be able to operate and the alarm lamp will illuminate. The fault condition must be rectified to cancel the alarm and reactivate the system.

Operation Mode



* For lubricators fitted with low level switch

• Time control mode (d=0)

Recommended for Systems without a Pressure Switch

Low level alarm function enabled*

In this mode, the lubricating system runs according to the preset run time and idle time.

• Pressure control mode (d=1)

Recommended for Injector Systems

Pressure switch function enabled/ Low level alarm function enabled*

A pressure switch installed downstream from the pump functions as the key monitoring device for the entire system. Normally the system will build up sufficient pressure required to activate the pressure switch (normally open) in a predetermined period of time (called monitor time) once the pump starts. The user can adjust the monitor time to a setting greater than the time required to satisfy the pressure switch (normally 1.5 times greater). If the system fails to reach sufficient pressure during that time period an alarm signal will be displayed (yellow LED on and EEPP appears on the digital readout). Possible causes for this type of alarm could be pump malfunction, broken supply line or crushed supply line prior to pressure switch. Lubrication intervals are adjustable from 1 to 9999 minutes. A four second run delay following a pressure switch closure assures adequate pressure downstream from the pump.

• Cycle control mode (d=2)

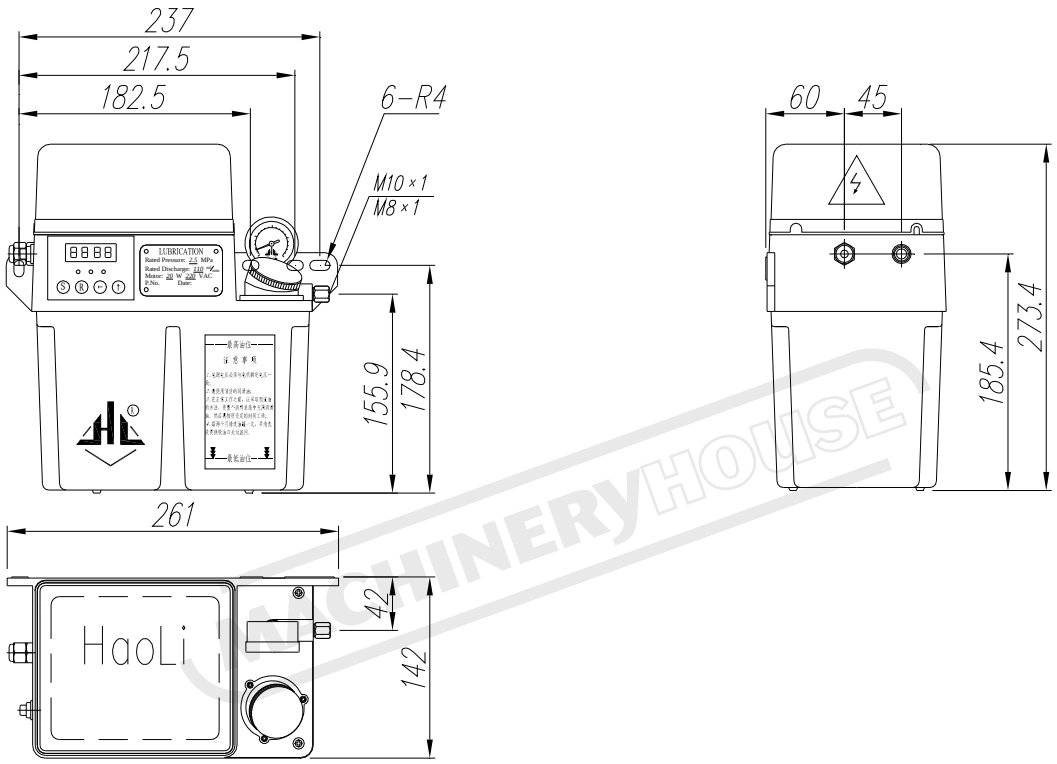
Recommended for Progressive systems

Cycle switch function enabled/ Low level alarm function enabled*

The cycle switch mounted on a progressive divider valve is the key monitoring device for the entire system. Normally when grease is being discharged from the outlets of the divider valve, a cycle pin engages with the switch, confirming a successful lubrication cycle. The controller can be programmed to allow for a predetermined number of cycle

counts (1-999). Once the preset number of counts is obtained the controller will stop the pump and revert back to the idle time setting (1-9999 minutes). If the desired number of cycle counts is not obtained within five minutes of run time (non-adjustable), an alarm signal will be displayed (yellow LED on and EEPP appears on the digital readout). Possible causes for this type of alarm could be pump malfunction, divider valve malfunction, broken supply line or blocked supply line or feed line.

Dimensional Schematics



⚠WARNING

General Machinery Safety Instructions

Machinery House
requires you to read this entire Manual before using this machine.

1. **Read the entire Manual before starting machinery.** Machinery may cause serious injury if not correctly used.
2. **Always use correct hearing protection when operating machinery.** Machinery noise may cause permanent hearing damage.
3. **Machinery must never be used when tired, or under the influence of drugs or alcohol.** When running machinery you must be alert at all times.
4. **Wear correct Clothing.** At all times remove all loose clothing, necklaces, rings, jewelry, etc. Long hair must be contained in a hair net. Non-slip protective footwear must be worn.
5. **Always wear correct respirators around fumes or dust when operating machinery.** Machinery fumes & dust can cause serious respiratory illness. Dust extractors must be used where applicable.
6. **Always wear correct safety glasses.** When machining you must use the correct eye protection to prevent injuring your eyes.
7. **Keep work clean and make sure you have good lighting.** Cluttered and dark shadows may cause accidents.
8. **Personnel must be properly trained or well supervised when operating machinery.** Make sure you have clear and safe understanding of the machine you are operating.
9. **Keep children and visitors away.** Make sure children and visitors are at a safe distance for you work area.
10. **Keep your workshop childproof.** Use padlocks, Turn off master power switches and remove start switch keys.
11. **Never leave machine unattended.** Turn power off and wait till machine has come to a complete stop before leaving the machine unattended.
12. **Make a safe working environment.** Do not use machine in a damp, wet area, or where flammable or noxious fumes may exist.
13. **Disconnect main power before service machine.** Make sure power switch is in the off position before re-connecting.
14. **Use correct amperage extension cords.** Undersized extension cords overheat and lose power. Replace extension cords if they become damaged.
15. **Keep machine well maintained.** Keep blades sharp and clean for best and safest performance. Follow instructions when lubricating and changing accessories.
16. **Keep machine well guarded.** Make sure guards on machine are in place and are all working correctly.
17. **Do not overreach.** Keep proper footing and balance at all times.
18. **Secure workpiece.** Use clamps or a vice to hold the workpiece where practical. Keeping the workpiece secure will free up your hand to operate the machine and will protect hand from injury.
19. **Check machine over before operating.** Check machine for damaged parts, loose bolts, Keys and wrenches left on machine and any other conditions that may effect the machines operation. Repair and replace damaged parts.
20. **Use recommended accessories.** Refer to instruction manual or ask correct service officer when using accessories. The use of improper accessories may cause the risk of injury.
21. **Do not force machinery.** Work at the speed and capacity at which the machine or accessory was designed.
22. **Use correct lifting practice.** Always use the correct lifting methods when using machinery. Incorrect lifting methods can cause serious injury.
23. **Lock mobile bases.** Make sure any mobile bases are locked before using machine.
24. **Allergic reactions.** Certain metal shavings and cutting fluids may cause an ellergic reaction in people and animals, especially when cutting as the fumes can be inhaled. Make sure you know what type of metal and cutting fluid you will be exposed to and how to avoid contamination.
25. **Call for help.** If at any time you experience difficulties, stop the machine and call you nearest branch service department for help.

⚠WARNING

Milling Machine Safety Instructions

Machinery House
requires you to read this entire Manual before using this machine.

1. **Maintenance.** Make sure the mill is turned off and disconnect from the main power supply and make sure all moving parts have come to a complete stop before any inspection, adjustment or maintenance is carried out.
2. **Mill Condition.** Mill must be maintained for a proper working condition. Never operate a mill that has damaged or worn parts. Scheduled routine maintenance should performed on a scheduled basis.
3. **Leaving a Mill Unattended.** Always turn the mill off and make sure all moving parts have come to a complete stop before leaving the mill. Do not leave mill running unattended for any reason.
4. **Avoiding Entanglement.** Remove loose clothing, belts, or jewelry items. Never wear gloves while machine is in operation. Tie up long hair and use the correct hair nets to avoid any entanglement with the mill spindle or moving parts.
5. **Chuck key safety.** Always remove your chuck key, draw bar wrench, and any service tools immediately after use. Chuck keys left in the chuck can cause serious injury.
6. **Understand the machines controls.** Make sure you understand the use and operation of all controls.
7. **Tooling selection & holding.** Always use the correct cutting tool for the job you are milling. Make sure it is sharp and held firmly in place.
8. **Cutting Tool inspection.** Inspect Drill and end mills for sharpness, chips, or cracks before use. Replace any cutting tools immediately if dull, chipped or cracked. Handle new cutting tools with care. Cutting edges are very sharp and can cause lacerations.
9. **Reversing the spindle.** Make sure the spindle has come to a complete stop before changing the direction of the spindle. Do not slow or stop the spindle by using you hand.
10. **Stopping the spindle.** Do not slow or stop the spindle by using you hand.
11. **Speed selection.** Select the appropriate speed for the type of work, material, and tool bit. Allow the mill to reach full speed before beginning a cut.
12. **Clearing chips.** Always use a brush to clear chips. Never clear chips when the mill is running.
13. **Power outage.** In the event of a power failure during use of the mill, turn off all switches to avoid possible sudden start up once power is restored.
14. **Clean work area.** Keep the area around the mill clean from oil, tools and chips.
15. **Tilting head.** Use an assistant to help support the head correctly. Make sure bolts that secure the head for tilting are not loosened to much as head can slip and cause serious injury. Please refer to Mill head Tilting Instructions for correct procedure.
16. **Call for help.** If at any time you experience difficulties, stop the machine and call you nearest branch service department for help.

PLANT SAFETY PROGRAM

NEW MACHINERY HAZARD IDENTIFICATION, ASSESSMENT & CONTROL

Milling Machine

Developed in Co-operation Between A.W.I.S.A and Australia Chamber of Manufactures
This program is based upon the Australian Worksafe Standard for Plant(NOHSC:1010-1994)

Item No.	Hazard Identification	Hazard Assessment	Risk Control Strategies (Recommended for Purchase / Buyer / User)
A	ENTANGLEMENT	HIGH	Eliminate, avoid loose clothing / Long hair etc.
B	CRUSHING	LOW	Secure & support workpiece on mill table.
B	CRUSHING	HIGH	Mill head tilting adjustment - please refer to mill head tilting instruction sheet for correct procedure. Incorrect adjustment may result in the head becoming detatched and a crushing hazard
C	CUTTING, STABBING, PUNCTURING	MEDIUM	Isolate power to machine prior to any checks or maintenance being carried out. Do not adjust or clean machine until the machine has fully stopped.
D	SHEARING	MEDIUM	Make sure all guards are secured shut when machine is on. Isolate power to machine prior to any checks or maintenance.
F	STRIKING	MEDIUM	Ensure tooling is secure in chuck. Wear safety glasses. Stand clear of moving parts on machine. Remove all loose objects around moving parts. Ensure correct spindle direction when milling.
H	ELECTRICAL	MEDIUM	All electrical enclosures should only be opened with a tool that is not to be kept with the machine. Machine should be installed & checked by a Licensed Electrician.
M	HIGH TEMPERATURE	LOW	Wear appropriate protective clothing to prevent hot swarf.
O	OTHER HAZARDS, NOISE.	LOW	Wear hearing protection as required.
Plant Safety Program to be read in conjunction with manufactures instructions			

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Authorised and signed by:
Safety officer: .....
Manager: .....

Revised Date: Aug-08