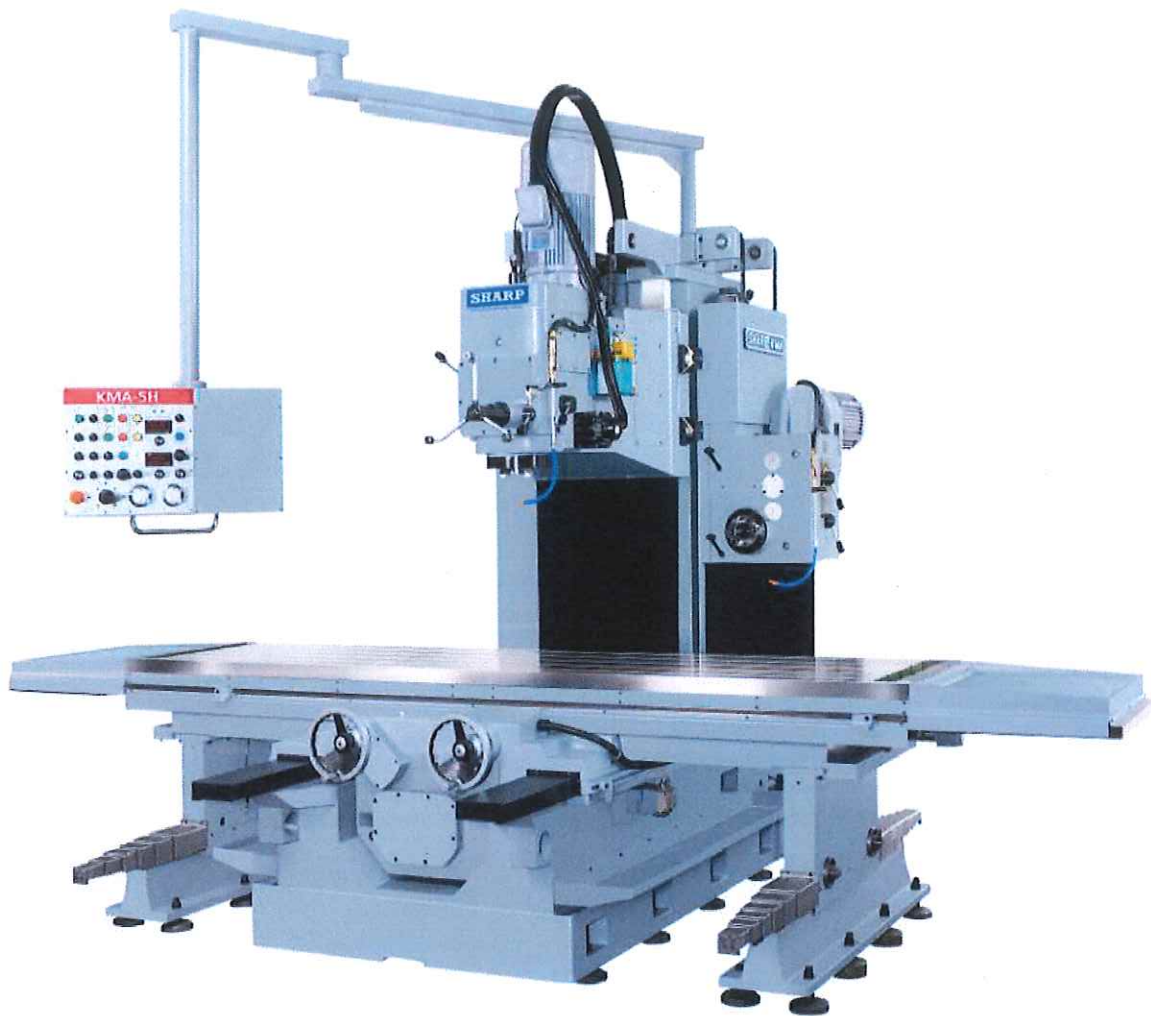


VERTICAL BED TYPE MILLING & BORING MACHINE

KMA-5, KMA-5H
Operation & Parts Manual



MODEL KMA-5H
(WITH OPTIONAL FEATURES)

SHARP
PRECISION MACHINE TOOLS

CONTENTS

1. Outline of Machine	
1-1 Specifications	1
1-2 Main Dimension	3
1-3 Name of Main Parts	4
2. Installation of the Machine	
2-1 Transportation	6
2-2 Loosening the clamping units of machine	6
2-3 Leveling and foundation	6
2-4 Cleaning the machine	9
2-5 Removal of pad-bond coating agent	9
3. Lubrication	10
4. Cutting Fluid Pump Device	14
5. Operation	16
5-1 Preparation for Operation	16
5-2 Operation of Vertical Spindle	16
5-3 Operation of Table and Saddle	17
6. Clamping Devices	
6-1 Vertical Spindle Head Clamping	19
6-2 Table Clamping	19
6-3 Saddle Clamping	19
7. Adjustment	
7-1 The Level Adjustment of the Machine	22
7-2 Adjustment of Vertical Spindle	22
7-3 Adjustment of Sliding Surfaces of Gib	22
8. Electric System	

1. Outline of machine

1-1 Specifications (Model: KMA-5)

CAPACITY	
Working surface of table(length x width)	2700 x 750mm
Travel longitudinal x cross	2000 x 800mm
Vertical spindle head travel(vertical)	700mm
Vertical spindle nose to table top	70–770mm
Vertical spindle center to column front	800mm
TABLE	
T–slot (Wide x No. x Pitch)	18mm x 5 x 150mm
Table top to floor	900mm
SPINDLE HEAD	
Spindle Nose	ISO R297No.50
Vertical spindle speeds	45-1500RPM (60Hz) Infinitely variable
Change of vertical spindle speed	Infinitely variable
Automatic Feeds (vertical spindle)	3~300mm/min
Feed	
Rapid traverse (longitudinal & cross)	3100mm/min
Feed rates (longitudinal & cross)	28–1000mm/min
Change of feed	Infinitely variable
MOTORS	
Vertical spindle	AC11kW (15HP)–4P
X & Y Axes feed (servo motor)	AC3.5kW
Z Axis feed (servo motor) (VERT. SPINDLE)	AC1.3kW
Lubrication	AC3.5W–2P
Cutting fluid	AC0.12kW(1/6HP)–2P
Machine size	
Floor space (longitudinal cross)	3710 x 3145mm
Machine height	2923mm
Net wight (Aprrox)	11800kgs
Standard color	Gray

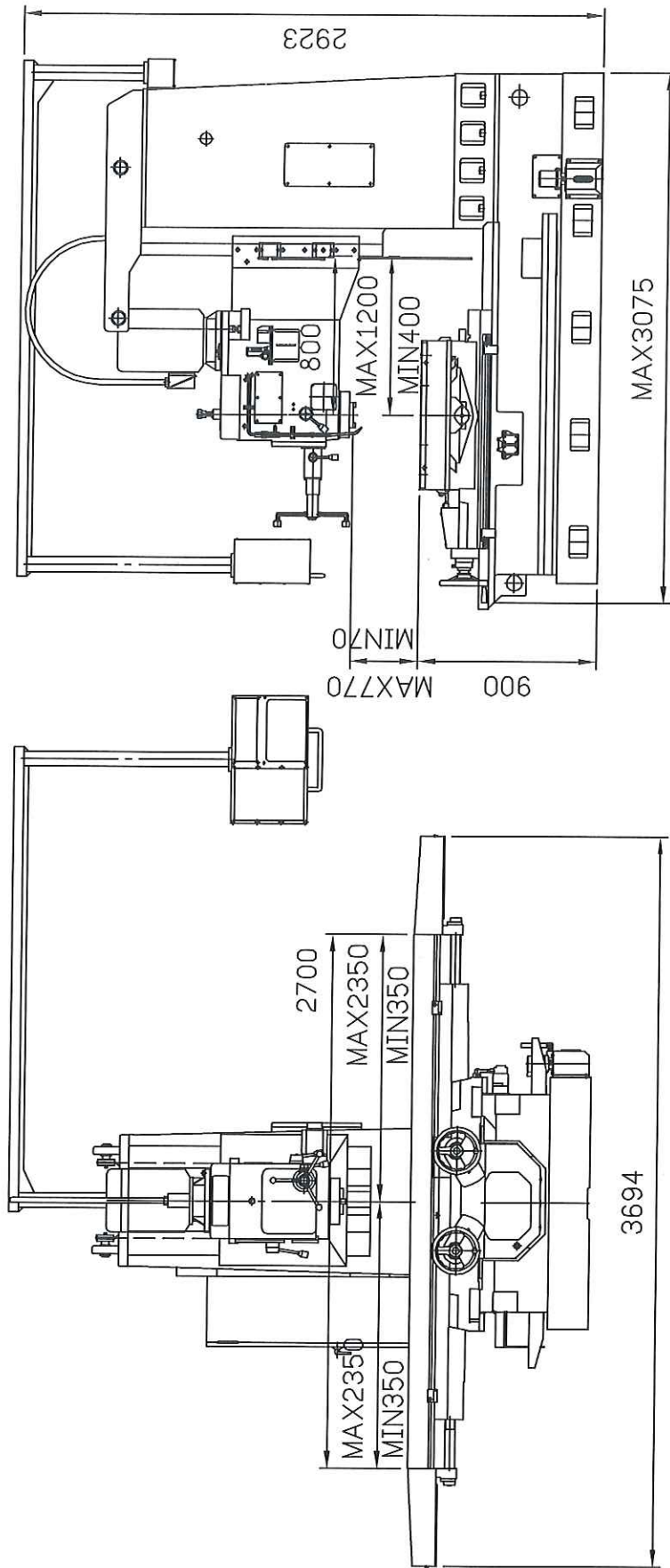
Standard Accessories:

- | | |
|-----------------------------------|--------|
| 1. Cutting fluid supply mechanism | 1 unit |
| 2. Tools and box | 1 set |
| 3. Leveling blocks | 10 pcs |
| 4. Leveling bolts and nuts | 10 pcs |
| 5. Draw bar | 1 pce |

Optional Accessories:

- Digital scale
- Power draw bar

Fig. 1 The Dimension of Vertical Boring & Milling Machine



1-2 Main dimension

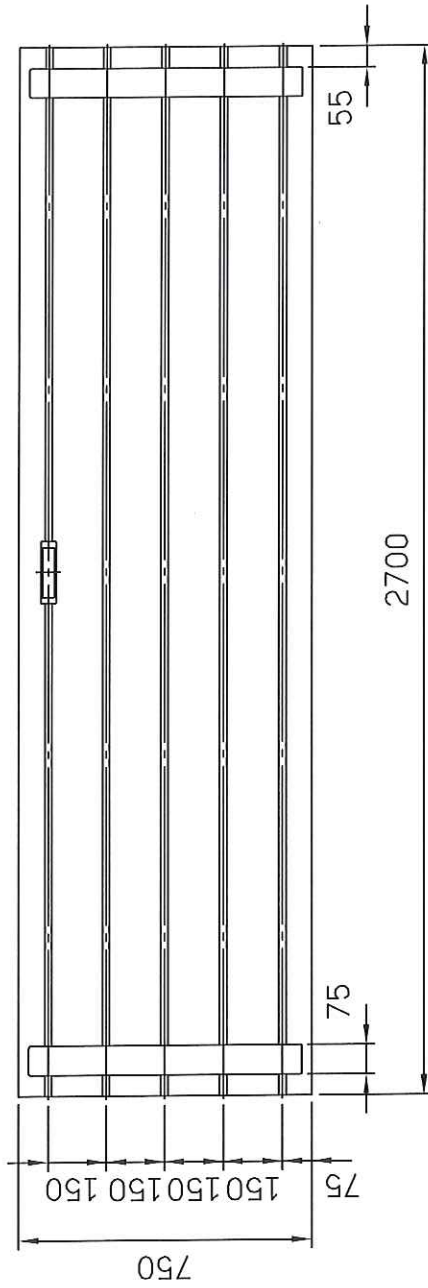


Fig. 2 Dimension of table

Fig. 3 Dimension of T- slot

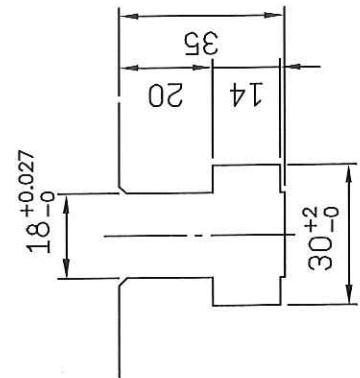
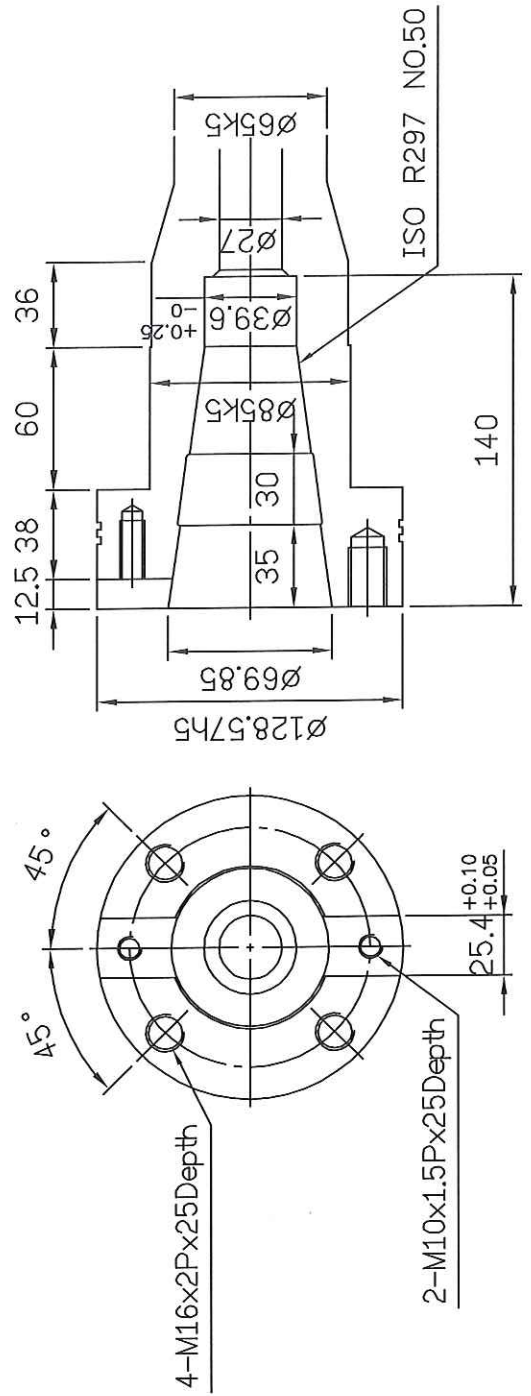


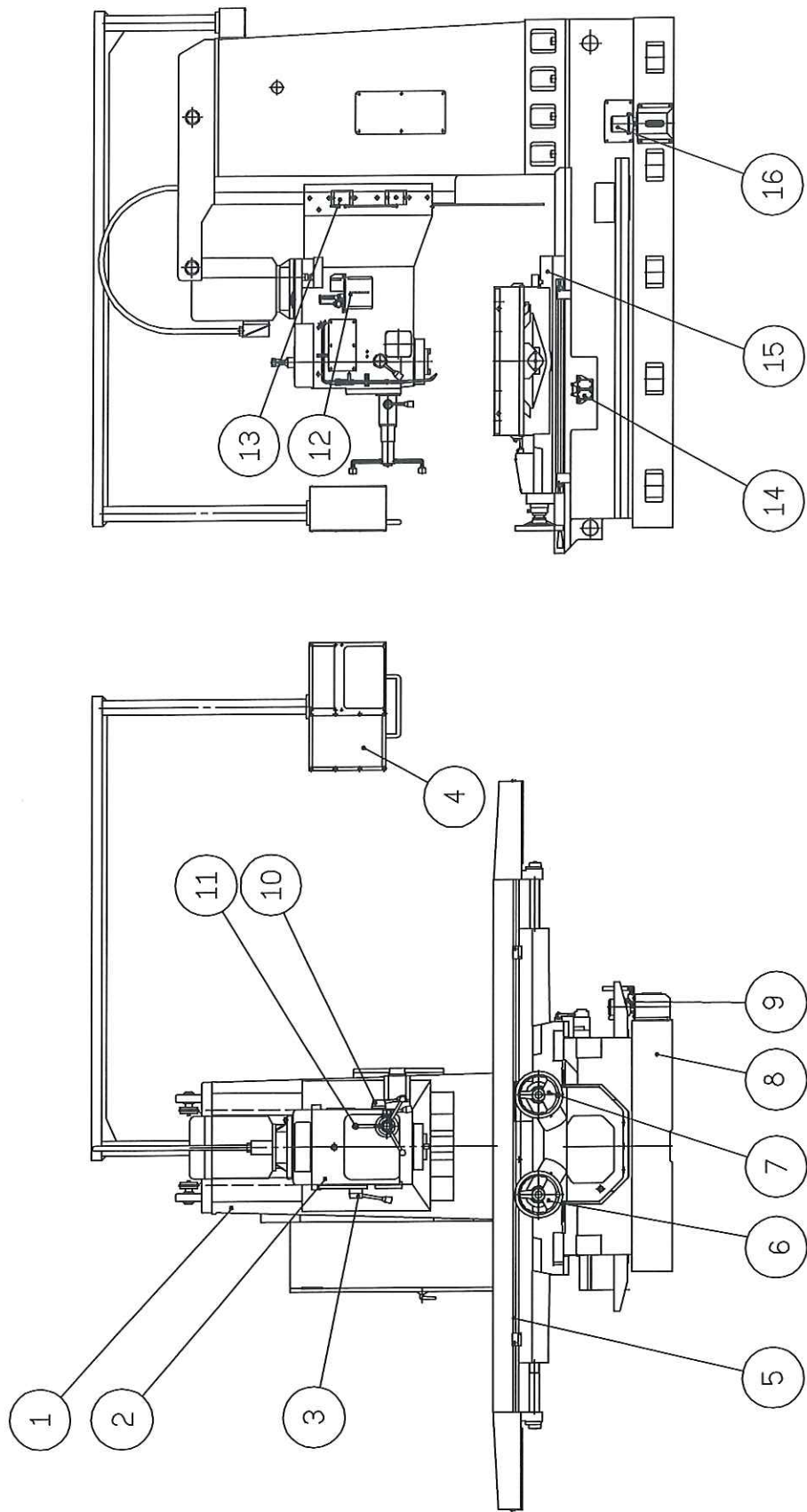
Fig. 4 Dimension of spindle nose



1-3 Name of Main Parts (Fig. 5)

1. Column
2. Vertical spindle head
3. High-low speed change lever for vertical spindle head
4. Operator's box
5. Table
6. Feeding hand wheel of saddle
7. Feeding hand wheel of table
8. Bed
9. Cutting fluid pump
10. Change lever for manual or auto feed of vertical spindle head
11. Rapid feed hand wheel for vertical spindle head
12. Lubrication pump for vertical spindle head sliding surface
13. Clamping device for vertical spindle head
14. Limit switch for saddle feed stop
15. Saddle
16. Lubrication pump for table and saddle sliding surface

Fig 5. The name of main parts



2. Installation of the machine

2-1 Transportation (Fig. 6)

Fix every part of the machine before hanging it. Especially pay attention to the fixation of spindle head and balancing weight (1). Put the balancing weight at the position of side of column by using the hand wheel for vertical spindle head rapid feed (2), Insert 2 shaft (8) for fixing balance weight.

Then use bolts (3) to fix balancing weight. Place the table to the middle position of machine , and move saddle close to the side of column. Move vertical spindle head upward, then insert the support bar (4) between table, hence the chain (6) is at loose condition. Both end of support bar should be cushioned with cloth or rubber to avoid damage of machine. Use steel rope to lift the machine shown on (Fig 6). Cloth or rubber should be cushioned between the rope and machine surface. Steel rope should not be touched the weak parts of the machine.

2-2 Loosening the clamping units of machine (Fig. 6)

After the transportation is completed. Loosen the clamping units of the machine and be careful to remove the support bar and to stretch the chain (6) slowly. At this time, check the chain whether contact the sprocket (7) tightly or not due to transportation. Before removal of support bar and the chain in good condition.

Move the spindle head upward for removing the support bar. Then move the spindle head downward slowly and smoothly until the chain is properly stretched.

NOTE: The chain can not stand impact load or it would be broken. Examine the chain in good condition once more, then loosen and remove the bolts (side window of column) for fixed balancing weight. But remember during spindle head downward before chain is stretched, the bolts of fixed balancing weight is absolutely not allowed to take out.

2-3 Leveling and Foundation (Fig. 7)

The machine can be located at 200mm thick concrete floor or set on 600mm thick concrete foundation , to ensure the accuracy of the machine and prevent cutting vibration. Shown on (Fig. 7) move the table to the middle position and clamp spindle head at the middle position of the column, then put the precision level (accuracy 0.02-0.05mm/1000mm) on the table to adjust the leveling of machine.

After finishing the leveling. Pour the concrete into the anchor bolt holes, tighten the bolt after the concrete is completed rigid, check the machine leveling once more, clean the machine base (sands & scraps etc.) then pour concrete between machine base and floor.

Fig 6. Method Of Lifting The Machine

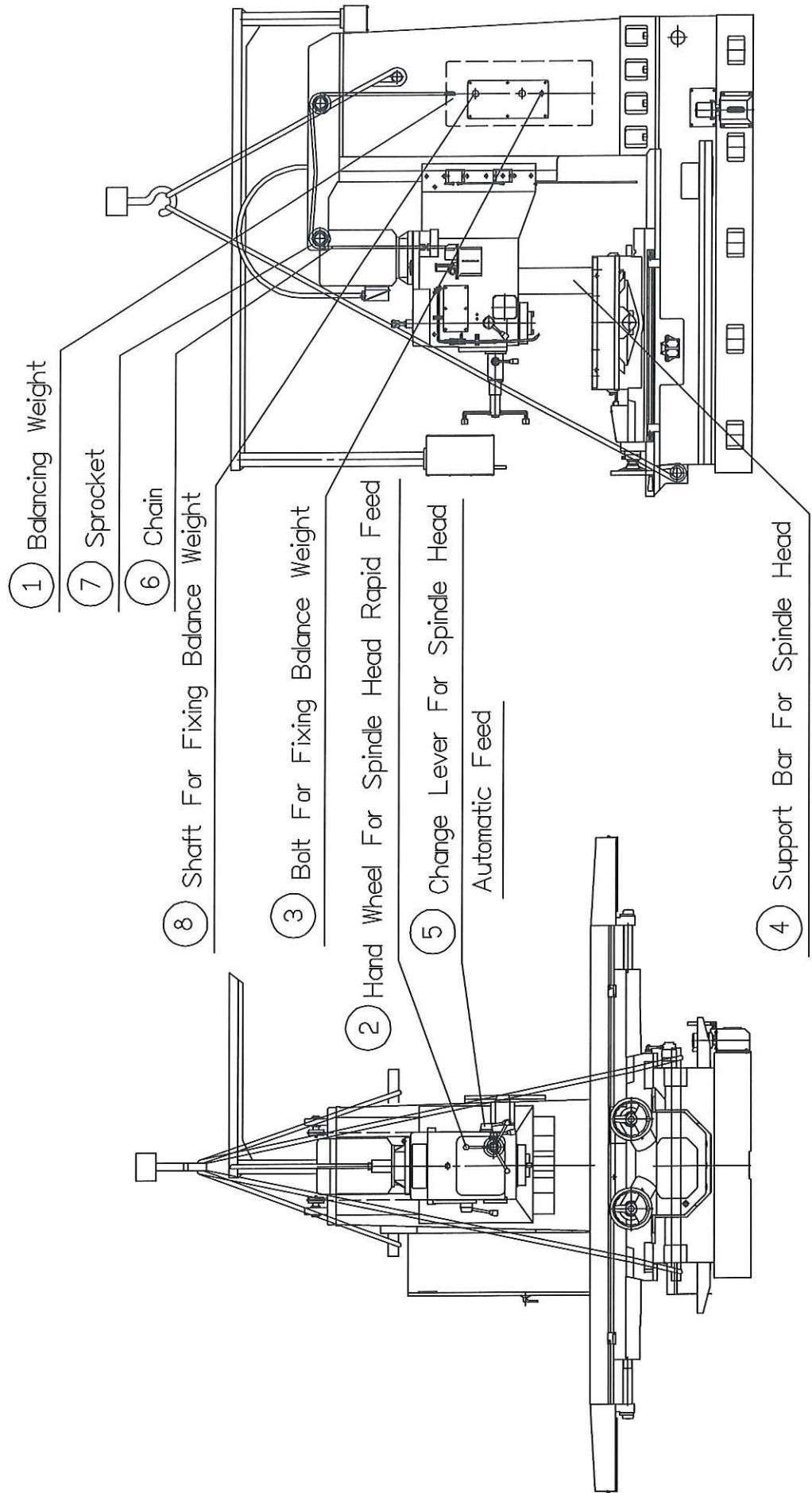


Fig. 7 Foundation drawing

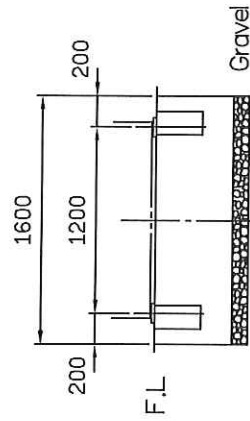
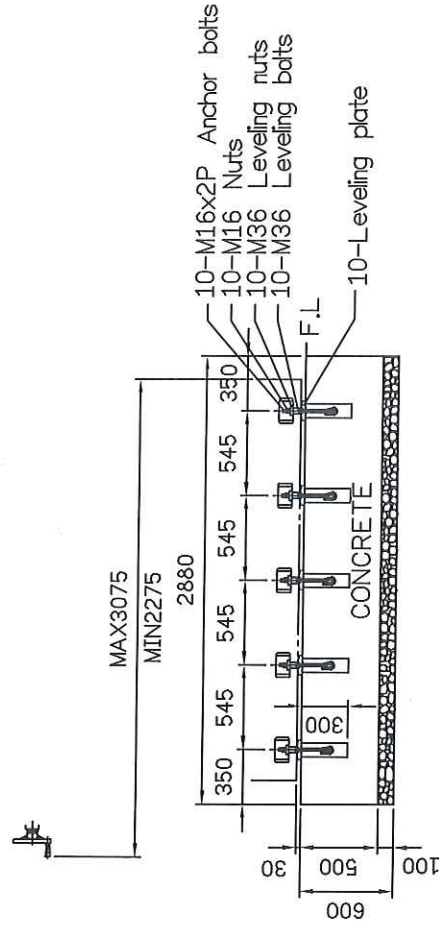
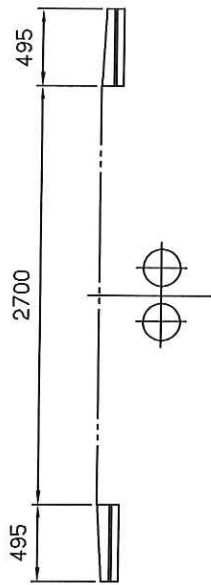
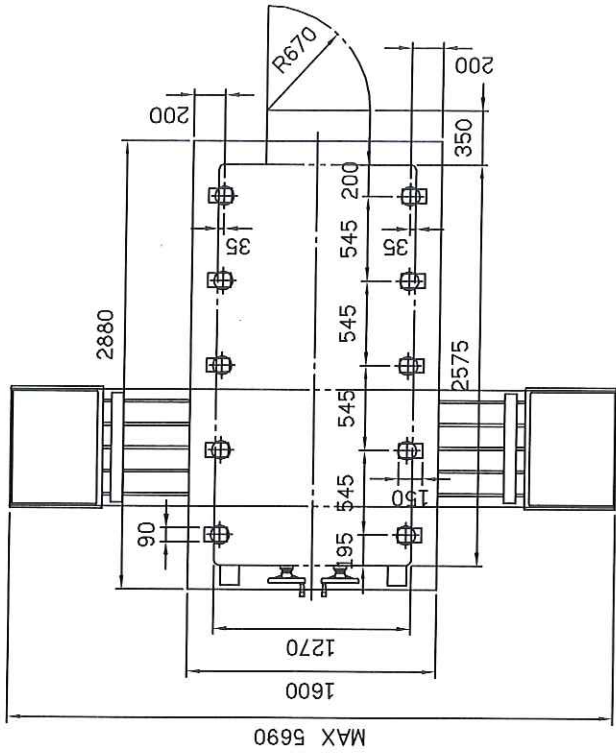
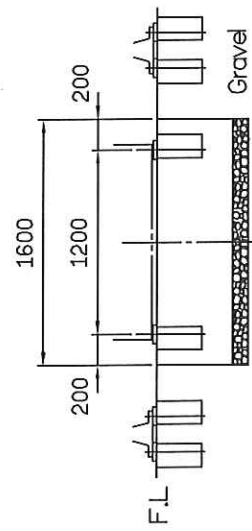
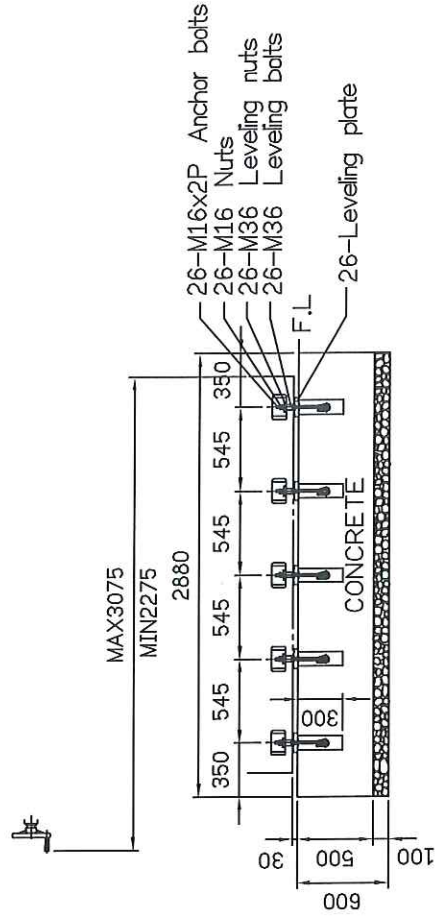
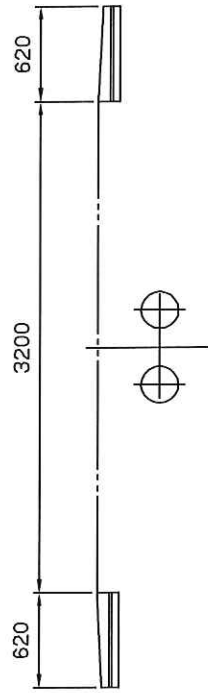
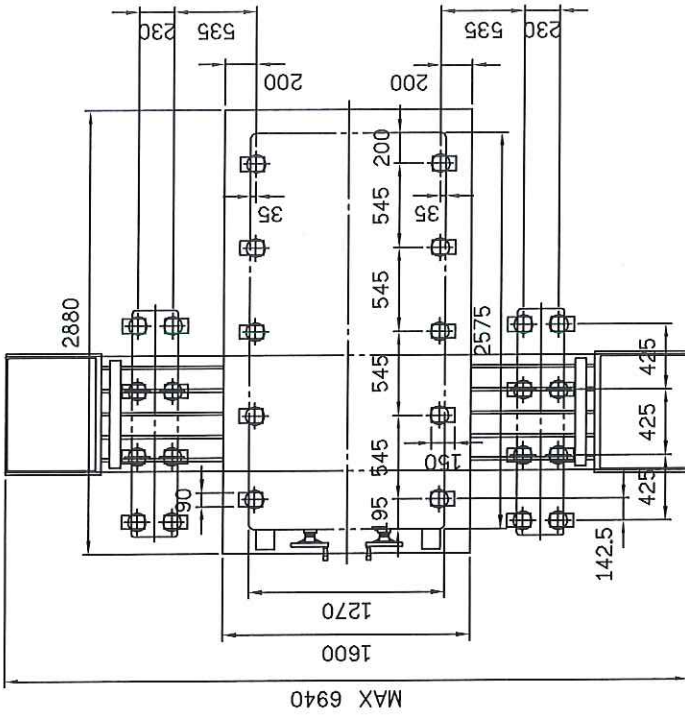


Fig. 7 Foundation drawing (8VLL)



2-4 Cleaning the machine

The machine is protected by grease or antirust oil before shipment. But the machine should be cleaned with gasoline before putting the protecting oil.

2-5 Removal of pad-bond coating agent.





The covers should be applied with pad-bond coating agent if need be. During taking them apart and putting them together again, you should remove all of the used pad-bond coating agent and replace with new ones.

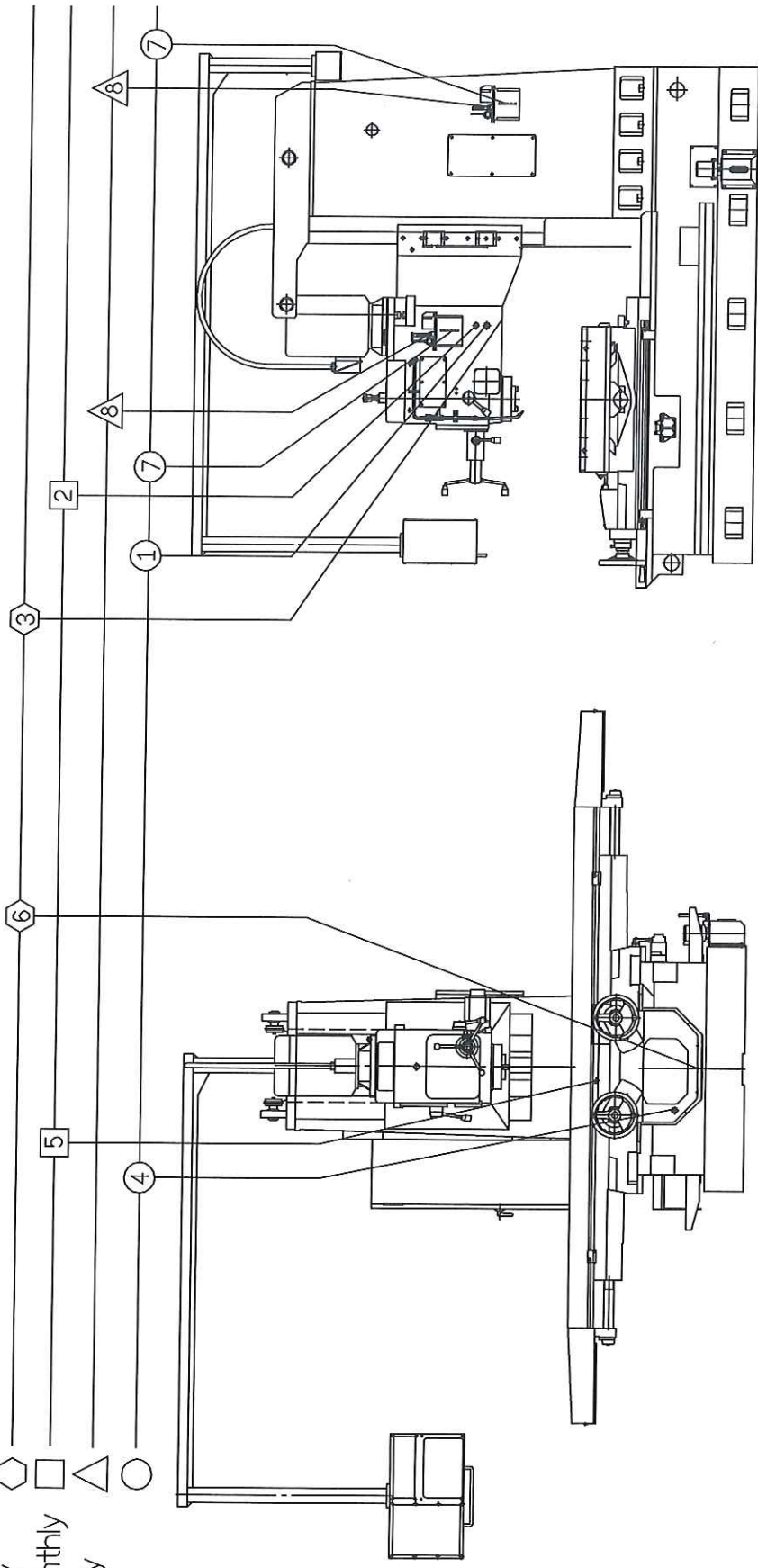
3 . Lubrication

3-1 Refer to (Fig.8) and table 3 & 4, check all of the lubricating portions of the machine which should be applied with suitable amount of oil in compliance with the regulation.

When the machine is in operation, inspect again all of the moving parts in good lubricating condition in order to ensure the superior function.

Fig. 8 Table of mechanical lubrication

- Yearly 
- 3-Monthly 
- Weekly 
- Daily 











Action points	Vertical Spindle head gear		Gear box		Ball screw & Slide way			
	1	2	3	4	5	6	7	8
Item								
Check	Daily			Daily			Daily	
Fill		3-Monthly			3-Monthly			Weekly
Clean & Replace			Yearly			Yearly		
Lubricant		CB32			CB68			G68
Quantity		6L	12L		1.2L	5L		0.5L
Remarks								

TABLE 3 Instruction for correct lubricant

	Application Fields	Properties	Symbol and Viscosity Grade	Kinematic Viscosity(40°C)			REMARKS
				Mem.	min.	max.	
GEARS	Enclosed moderately loaded gear (spur gear, bevel gear) Enclosed heavily loaded gears (worm and wheel)	Refined mineral oils with good oxidation stability	CB 32	28.8	35.2	Pinion speeds (motor output) 2000-5000 rpm (within 3.7kw) 1000-2000 rpm (within 7.5kw) -1000 rpm (within 15kw)	
			CB 68	61.2	74.8		
			CB 150	135	165		
BEARINGS	Spindles bearings and associated clutches	Refined mineral oils with good oxidation stability and with improved load-carrying ability	CC 150	135	165	Warm speeds 2000- rpm 1000- rpm -1000 rpm	
			CC 320	288	352		
			CC 460	414	506		
SLIDEWAYS	Slide ways	Refined mineral oils with superior anticorrosion and anti-oxidation performances.	FC 2	1.98	2.42	Shaft speeds (shaft dia.) 10,000- rpm (-30mm) 2000-10,000 rpm (30-150mm) -2000 rpm (150- mm)	
			FC 10	9.00	11.0		
			FC 22	19.8	24.2		
HYDRAULIC SYSTEMS	Hydraulic systems	Refined mineral oils with improved lubricity and tackiness preventing stick-slip	G68	61.2	74.8	Slide way (surface pressure) Horizontal (under 4kgf/cm ²) Vertical (under 4kgf/cm ²)	
			G220	198	242		
			HL32	28.8	35.2		
HYDRAULIC SYSTEMS	Hydraulic systems	Refined mineral oils with superior anti-corrosion and anti-oxidation performance	HL68	61.2	74.8	Oil perature (Rated pressure) 0-50°C (under 35kgf/cm ²) 15-65°C (under 140kgf/cm ²)	
			HM32	28.8	32.2		
			HM68	61.2	74.8		
GREASE	Hydraulic and Slide ways	Refined mineral oils of HM type with anti-stick-slip properties.	HG 32	28.8	32.2	Oil temperature (Rated pressure) 0-50°C (under 70kgf/cm ²) 15-65°C (under 140kgf/cm ²)	
			HG 68	61.2	74.8		
			XM 1	Viscosity (25°C) SSU			Centralized systems Cup or hand gun
XM 2	310 - 340 265 - 295						

Table 4 The General Lubricants For Machine Tool

Symbol		CPC	Esso/Esson	Shll	Moil	Daphne
Gear	C332	R32	Teresso 32	Te11us Oil C32	Dte Oil Light	Mechanic Oil 32
	C368	R63	Teresso 68	Te11us Oil C68	Dte Oil Heavy Medium	Mechanic Oil 63
	C3150	R150	Teresso 150	Te11us Oil C150	Dte Oil Extra Heavy	Mechanic Oil 150
	CC 150	R150	Spartan EP 150	Omala Oil 150	Gear 629	CE Compound 150S
	CC 320	R320	Spartan EP 320	Omala Oil 320	Gear 632	CE Compound 320S
	CC 460	R460	Spartan EP 460	Omala Oil 460	Gear 634	CE Compound 460S
Bearing	FC2			High Spin Oil C2	Velocite Oil No. 3	Mechanic Oil 2
	FC10	R12	Spinesso 10	Tellus Oil C10	Velocite Oil No. 6	Mechanic Oil 10
	FC22	R22	Spinesso 22	Tellus Oil C22	Velocite Oil No. 10	Mechanic Oil 22
Side Ways	G63	G68	Febis K63	Tonna T63	Vactra Oil No. 2	Multiway 63C
	G220	G220	Febis K220	Tonna T220	Vactra Oil No. 4	Multiway 220C
Hydraulic System	HL 32	R32	Teresso 32	Tellus Oil C32	Dte Oil Light	Hydraulic Fluid 32
	HL 68	R68	Teresso 68	Tellus Oil C68	Dte Oil Heavy Medium	Hydraulic Fluid 68
	HM 32	32AW	Auto HP32	Tellus Oil 32	Ste 24	Super Hydraulic Fluid 32
	HM 68	68AW	Auto HP68	Tellus Oil 68	Dte 26	Super Hydraulic Fluid 68
	HG 32		Powerex DP 32	Tonna Oil T32	Vacuoline Oil 1405	Multiway 32
	HG 68		Poweex DP 68	Tonna Oil T68	Vacuoling Oil 1408	Multiway 68
Grease	XM1	Culfc-Rown Grease E.P. NO.1	Listan 1	Alvania Grease 1	Mobilux EP 1	Cornex Grease No.1
	XM2	Culfc-rown Grease E.P.	Listan 2	Alvania Grease 2	Mobilux 2	Cornex Grease No.2

4. Cutting Fluid Pump Device (Fig. 9)

Cutting fluid pump (P1) located on the right side of the machine is operated by switch buttons (P3) on the operation panel. It will rotate in left position together with spindle, or rotate in right position by itself.

Volume of cutting fluid is about 12 Gal, injected from pan (P4) until the gauge (P5) reaches the upper limit.

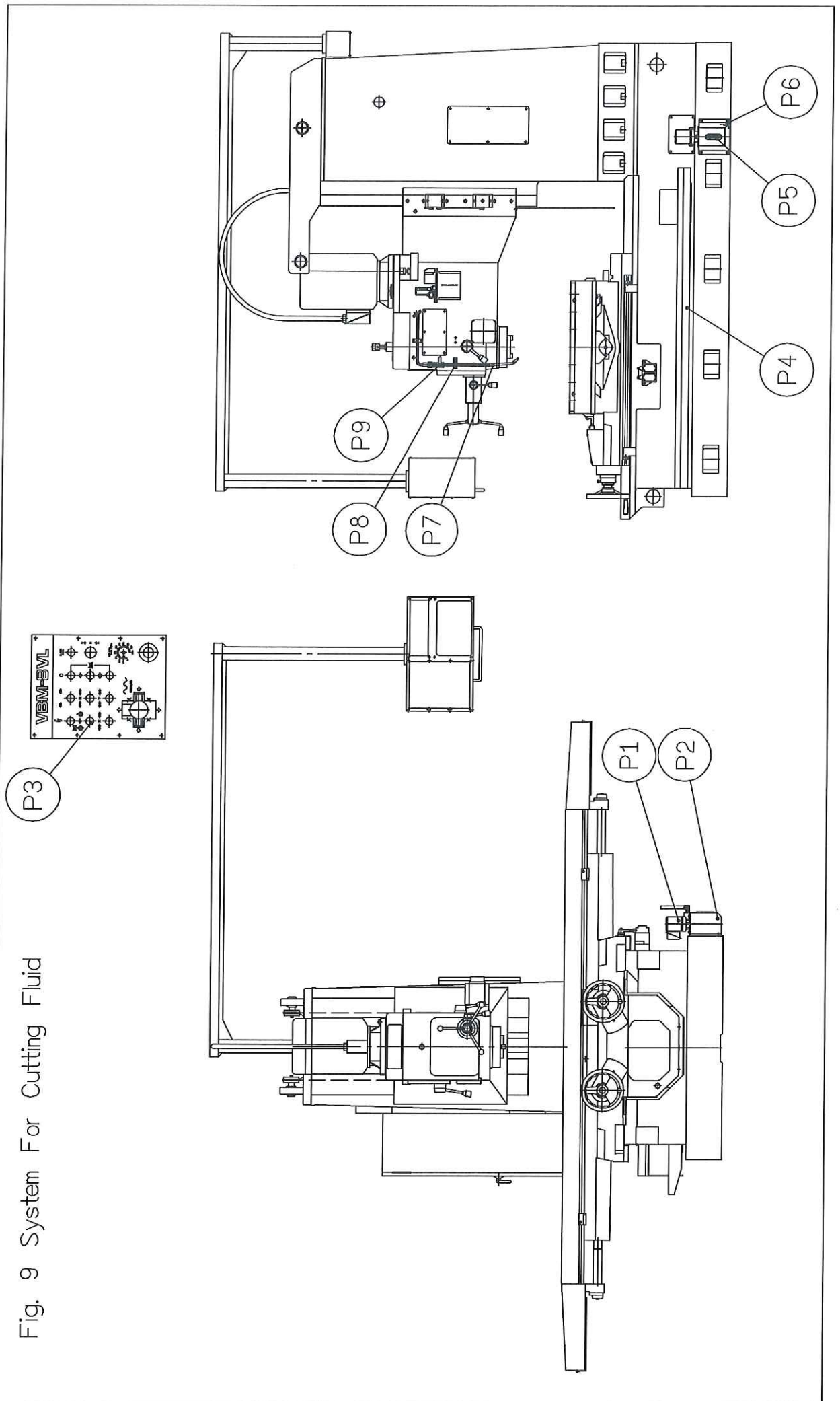
Release the rotary plug to change the cutting fluid.

Cutting fluid nozzle (P7) is located on the right side of spindle head, held by nozzle clamper (P8).

The nozzle direction is adjustable and easy to take apart.

The injection quantity is controlled by a valve (P9), increased in counter-clockwise, and decreased in clockwise.

Fig. 9 System For Cutting Fluid



5. Operation

5-1. Preparation For Operation

Before operating the machine, check and prepare the following items. Items (1) and (2) are belonged to regular maintenance items.

- (1) Clean the dust or cutting scraps on each sliding surface and circumference and bore of spindle.
- (2) Inject oil to each sliding part according to the oil recommendation (Fig. 8 , Table 3 & 4), especially when the machine turned off for a long period.
- (3) Connect the power source (380V , 50HZ) to R.S.T terminals board of electrical cabinet according to the wiring diagram.
- (4) Turn on the no-fuse breaker. The pilot lamps of operation panel will be lit up when the current is conducted.

5-2. Operation Of Vertical Spindle (Fig. 10)

Before operating the spindle, check the clamp of the spindle head switch (S11), and rotate to unclamp position (Fig. 10). (A) Rapid Feed Of Spindle Head (by hand) Engage the vertical spindle head manual or automatic feed change lever (H6) in "A" position for manual feed, then turn the hand wheel (H7) of spindle head rapid feed to clockwise to move spindle head downward and to counter- clockwise to move it upward.

The spindle head will move 30mm in each revolution.

(B) The Start And Stop Of Spindle

The spindle will be started or stopped by switches (S4),(S5) and (S6). (S4) is starting switch, (S6) is inching switch, and (S5) is stopping switch. Starting switch (S4) can only be operated when everything go right. Operate (S5) to stop the spindle.

In emergency case, it is also possible to operate the emergency switch (S9) on operation panel to stop the machine.

(C) Rotating Speed Change of Vertical Spindle

Spindle rotation speed can be changed by operating high-low change lever (H3). Then turn the knob (S16) increase or decrease spindle speed.

There are infinitely variable change speed as shown in specification. Do not operate the lever when the spindle is in rotation. It can be operated only when the spindle is stopped.

If the spindle is rotated manually, the high-low change lever should be placed in the middle position.

(D) Automatic Feed Of Vertical Spindle Head

The spindle head automatic feed can be operate spindle head manual or automatic feed change lever (H6). Lever(H6) will set "A" direction for manual feed and push lever to "B" direction for automatic feed. Push the switch (S14) up the spindle head will move upward, push the switch (S14) down the spindle head will move downward and push the button (S13) will move rapid feed.

Turn the knob (S15) increase or decrease spindle head (Z axis) feed.

5-3. Operation Of Table And Saddle (Fig. 11)

Before operation, rotate the table clamping switch (Fig.11) (S12), saddle clamping switch (Fig. 11) (S10) on the operation panel to unclamp position.

(A) Hand Feed Of Table And Saddle

Push the table feed hand wheel (E1) to mesh clutch for rotation. It will move the table to right in clockwise, and left in counterclockwise.

Push the saddle feed hand wheel (E2) to match clutch for rotation. It will move the saddle to backward in clockwise, and forward in counterclockwise. Hand wheel will move forward or backward 6mm in each revolution. Each hand wheel has 0.025mm scale knob (E7), (E8) When scale knob is calibrated to the positive zero and the set screw is fixed, the reading represents the displacement.

(B) Starting And Stopping Operation Of Table Automatic Feed

Check the proper operation of the table feed stop block (D3), (D4) and table feed limit switches (Li1), (Li2) and saddle feed stop block (D5), (D6) and saddle feed limit switches (Li3), (Li4).

Adjust and fix the feed stop block (D3), (D4) or (D5), (D6) on the desired position. When starting switch (S8) on the operation panel moving to right, left, forward or backward, the table will move to right, left, forward or backward. If the starting switch (S8) is in neutral position, the table will stop feeding.

Besides, the table will be stopped also by table feed stop block (D3), (D4) contact limit switch (Li1) (Li2), and saddle feed stop block (D5), (D6) contact the limit switches (Li3),(Li4).

In case of emergency , press the emergency stop switch (S9), all of the power are shut down.

(C) Automatic Feed Speed Change Of Table

Automatic feed speed of table can be adjusted by control knob (S7), increase feeding in clockwise, and decrease feeding in counterclockwise. Operator can adjust the knob to a satisfied feed speed based on the actual situation. The knob is scaled in mm/min.

(D) Automatic Feed Direction Of Table

Automatic feed of table in this machine is controlled by switch (S8). Its feed direction is the same as switch direction, right, left, forward, backward.

(E) Table Rapid Feeding

Table rapid feeding is also controlled by switch (S8) press the button and push to operate in the direction based on actual requirements. Rapid feed speed is 3100mm/min.

(F) Automatic Feed Stop

Left-right direction elbow (D3), (D4) and back-forth direction elbow block (D5), (D6) must fixed exact position.

F-1. Stop The Feed Of Table Moving Toward To Left Side

When the elbow block (D3) devices on the right side in front of table touch the limited switch (Li1), the electrical circuit of feed motor will be interrupted and the movement of table will stop at once. At this time, if the switch (S8) is operated to "B" direction the motor will be started in reverse direction.

F-2. Stop The Feed Of Table Moving Toward To Right Side

When the elbow block (D4) devices on the left side in front of table touch the limited switch (Li2), the electrical circuit of feed motor will be interrupted, and the movement of table will stop at once. At this time, if the switch (S8) is operated to "A" direction the motor will be started in reverse direction.

F-3. Stop The Feed Of Saddle Moving Toward to Forward

When the elbow block (D6) devices on the rear side in right side of saddle touch the limited switch (Li4) the electrical circuit of feed motor will be interrupted, and the movement of saddle will stop at once. At this time, if the switch (S8) is operated to "C" direction, the motor will be started in reverse direction.

F-4. Stop The Feed Of Saddle Moving Toward To Backward

When the elbow block (D5) devices on the front side in right side of saddle touch the limited switch (Li3) the electrical circuit of feed motor will be interrupted, and the movement of saddle will stop at once. At this time, if the switch (S8) is operated to "D" direction, the motor will be started in reverse direction.

(G) Identification On Automatic Feed Stop

After the feed is stopped in each direction, if it is necessary to restart the feed at the same direction, please process in manual operation. Automatic feed stop in each direction will be effective either on cutting feeding or rapid feeding.

If the elbow block and limit switch are under the following status, the switch (S8) has no action at all. So the motor in speed change box will be not started.

- (1) (D3), (Li1) and (D5), (Li3) operating same time.
- (2) (D4), (Li2) and (D6), (Li4) operating same time.

In above function , the elbow block and limit switch will be released by hand feed. When automatic feed is stopped, the switch (S8) must be place in neutral position. When it is turned on again or power turned on and signal processed, the motor must be started according to the switch (S8) direction .

6. Clamping Devices

In order to maintain better finishing and accurate surface, the following portions should be clamped tightly before cutting operation.

6-1. Vertical Spindle Head Clamping (Fig. 10)

The clamping of spindle head should turn the clamping switch (S11) to right for clamping and turn to left side for unclamping.

6-2. Table clamping (Fig. 10)

The clamping of table should turn the clamping switch (S12) (In the case of boring or drilling operation) to right for clamping and turn to left side for unclamping.

6-3. Saddle Clamping (Fig. 10)

The clamping of saddle should turn the clamping switch (S10) to right side for clamping and turn to left side for unclamping.

Fig. 10 Operation Of Vertical Spindle Head

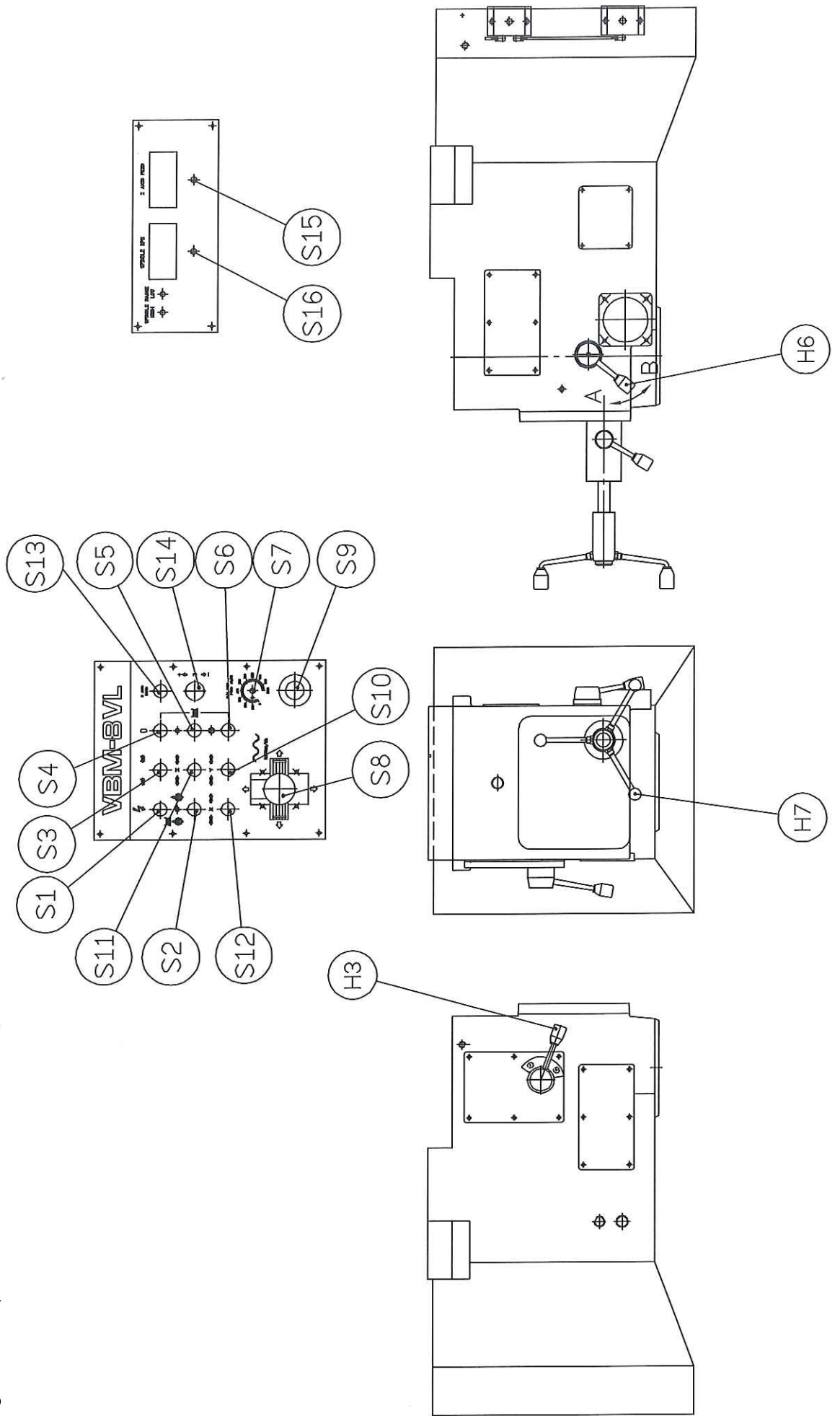
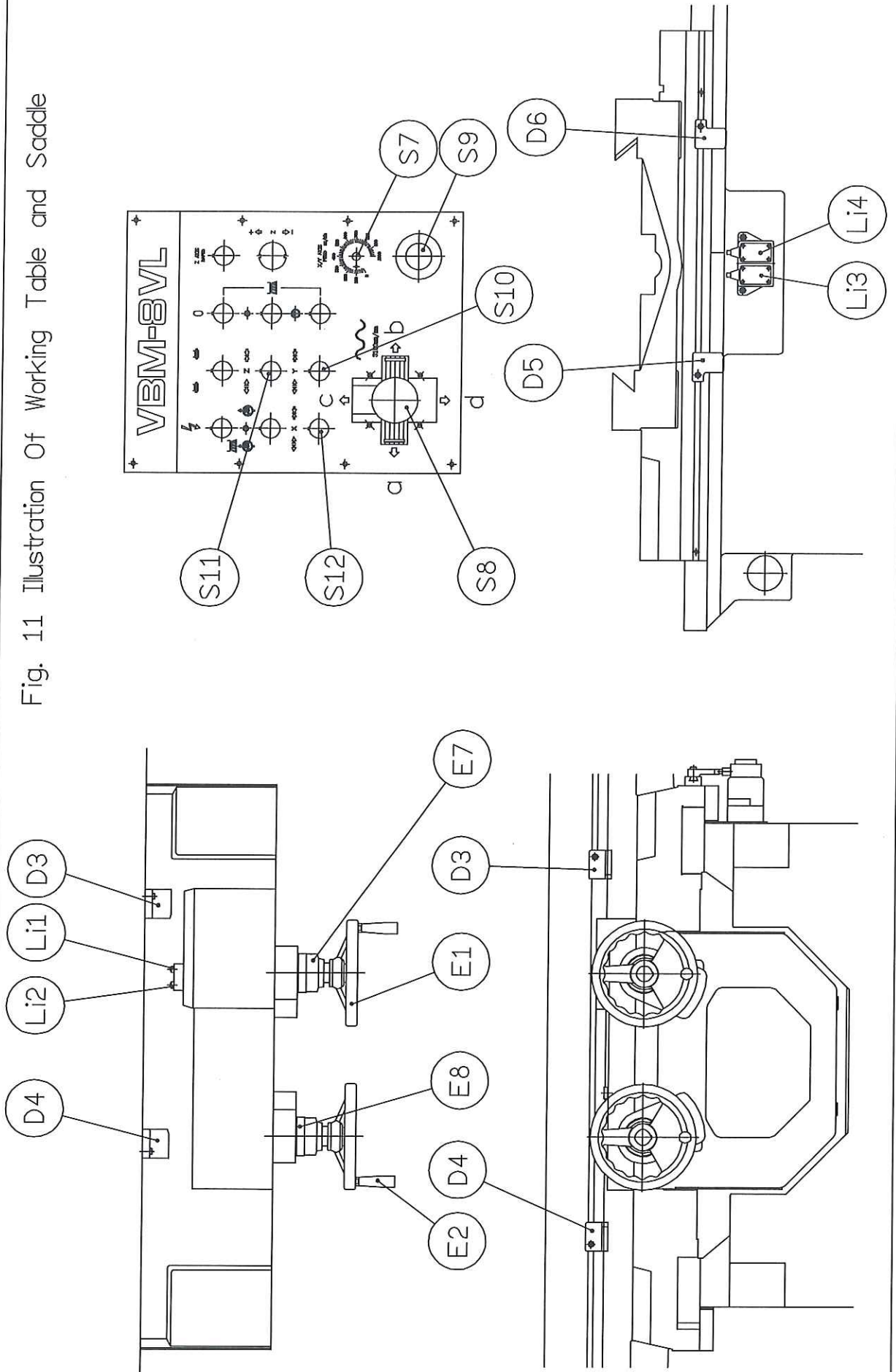


Fig. 11 Illustration Of Working Table and Saddle



7. Adjustment :

After installation of the machine or in operation, you find the condition of the machine is abnormal. The following steps should be taken. (Inspection or adjustment).

7-1. The level adjustment of the machine (Fig. 12)

1. Place the two levels of 0.02-0.05mm/1000mm accuracy on the table perpendicular to each other.
2. Loosen the nuts (A1) of anchor bolts (A2).
3. Loosen the leveling fixed nuts (L3).
4. Loosen the leveling bolts (L2) and adjust the level (10 leveling bolts to be adjusted) . Until the leveling is accurate.
5. Looking the leveling and fixed nuts (L3) (don't rotate the leveling bolts) .
6. Lock the anchor bolts with nuts (A1) .
7. Recheck the air bubbles displacement on the level

7-2. Adjustment Of vertical Spindle (Fig. 13)

If you find loose spindle or temperature rise of spindle bearing. The readjustment should be taken carefully.

1. Take apart the cover of spindle head (HC1).
2. Loosen the fixed bolts (B1).
3. Screwing the adjustable nuts (N1) not so loose, not so tight (because of temperature rise of bearing).
4. Screwing the fixed bolts (B1), (Preventing the adjusted nuts (N1) loose).
5. Reassembling the spindle head cover.

7-3. Adjustment Of Sliding Surfaces Of Gib. (Fig. 14, Fig. 15)

When sliding surfaces are loose, make a suitable adjustment.

A. Adjustment of side gib of vertical spindle head (Fig. 14)

1. Screw the bolts (K2) to adjust the inside gibs (K1).
2. Try to ascend and descend the spindle head and observe the tightness.

B. Adjustment of gib inside of vertical spindle head (Fig. 14)

1. Tighten the locking bolts (K6).
2. Screw the bolts (K4) to adjust the inside gibs (K3).
3. Try to ascend and descend the spindle head and observe the tightness.

C. Adjustment of gibs for table (Fig. 15)

1. Loosen the locking nuts (KT3).
2. Screw the lock bolts (KT2) to adjust the gibs (KT1)
3. Tighten the lock nuts (KT3).
4. Try to swing the table and observe the tightness.

D. Adjustment of gib for saddle (Fig. 15)

1. Loosen the locking nuts (KT7).
2. Screw the locking bolts (KT6) to adjust the gibs (KT5)
3. Tighten all of the locking nuts (KT7).
4. Try to swing the saddle and observe the tightness.

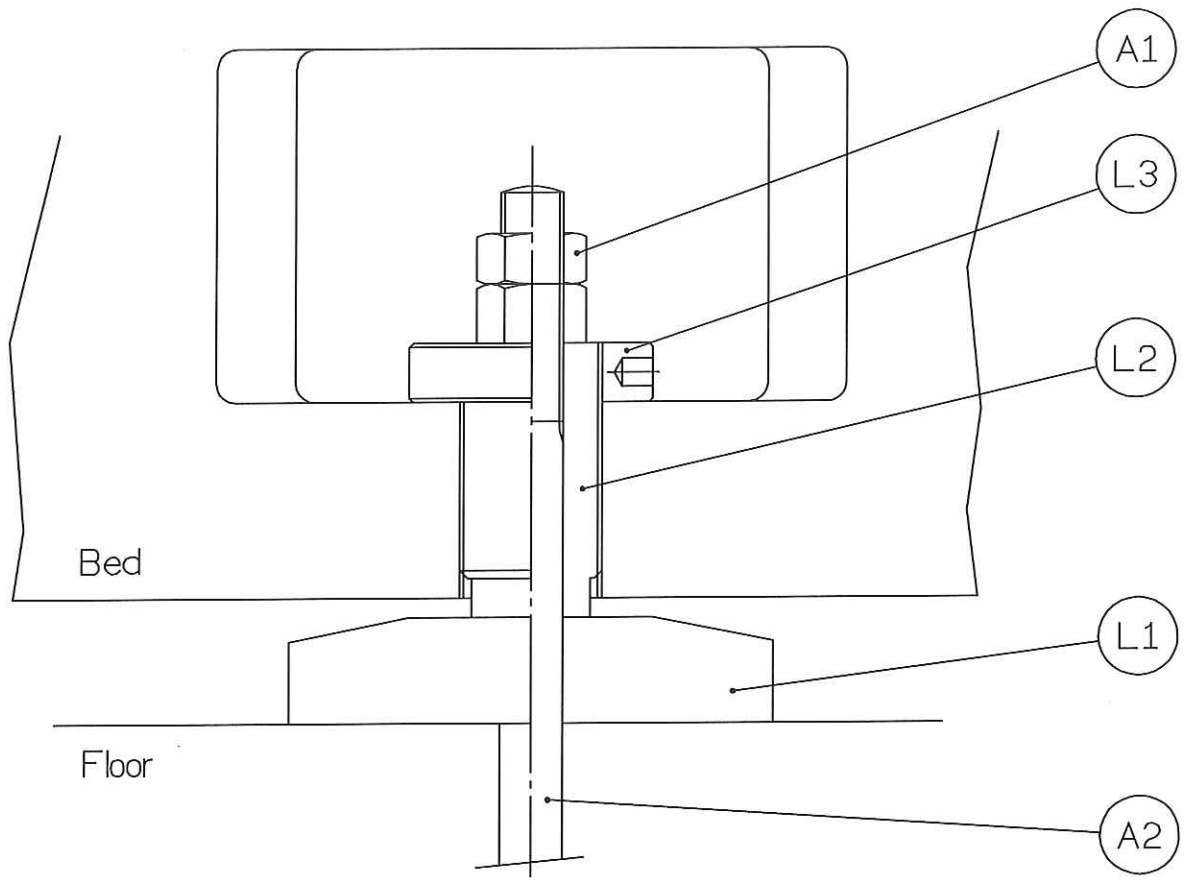


Fig. 12 Adjusting Machines Level

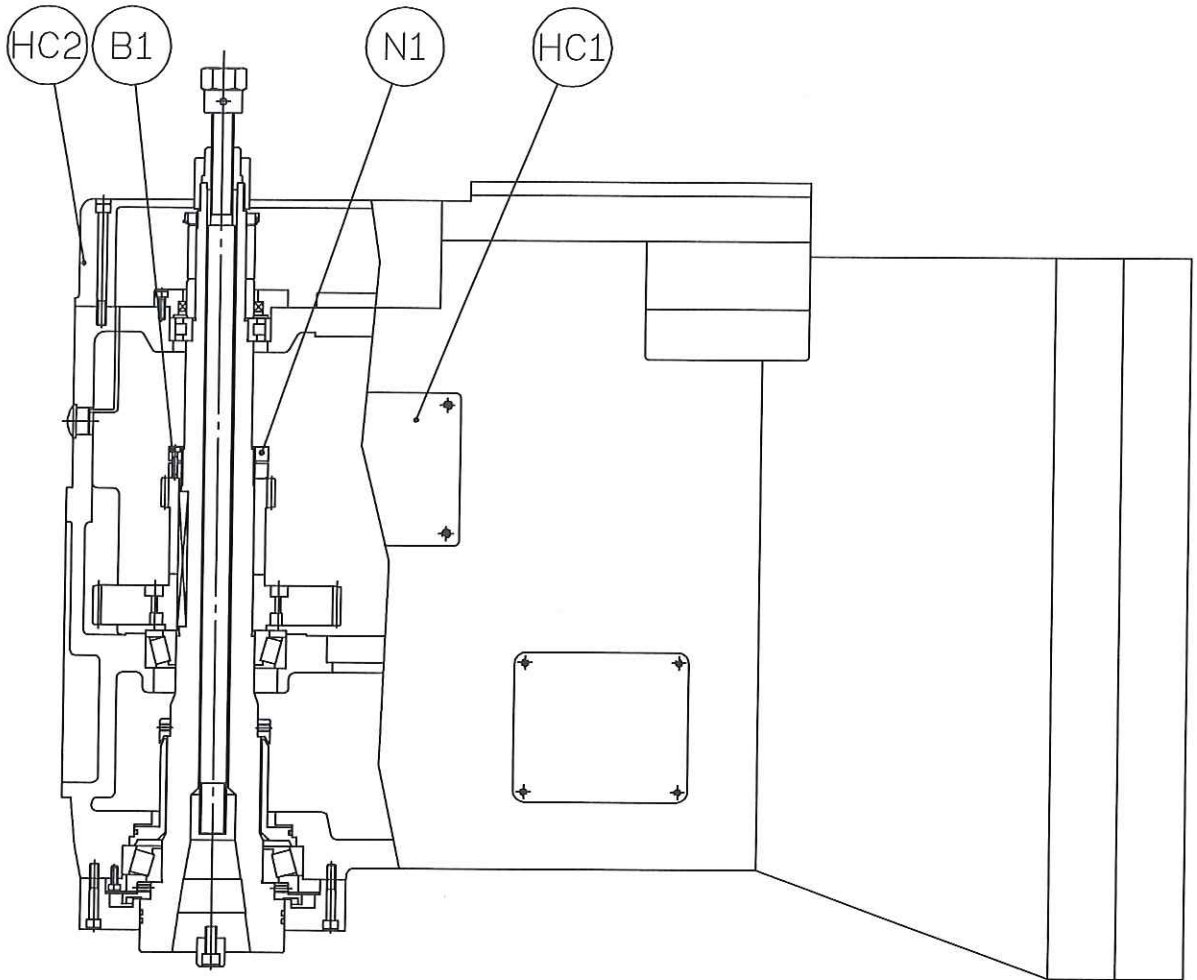


Fig. 13 Adjustment Of Vertical Spindle

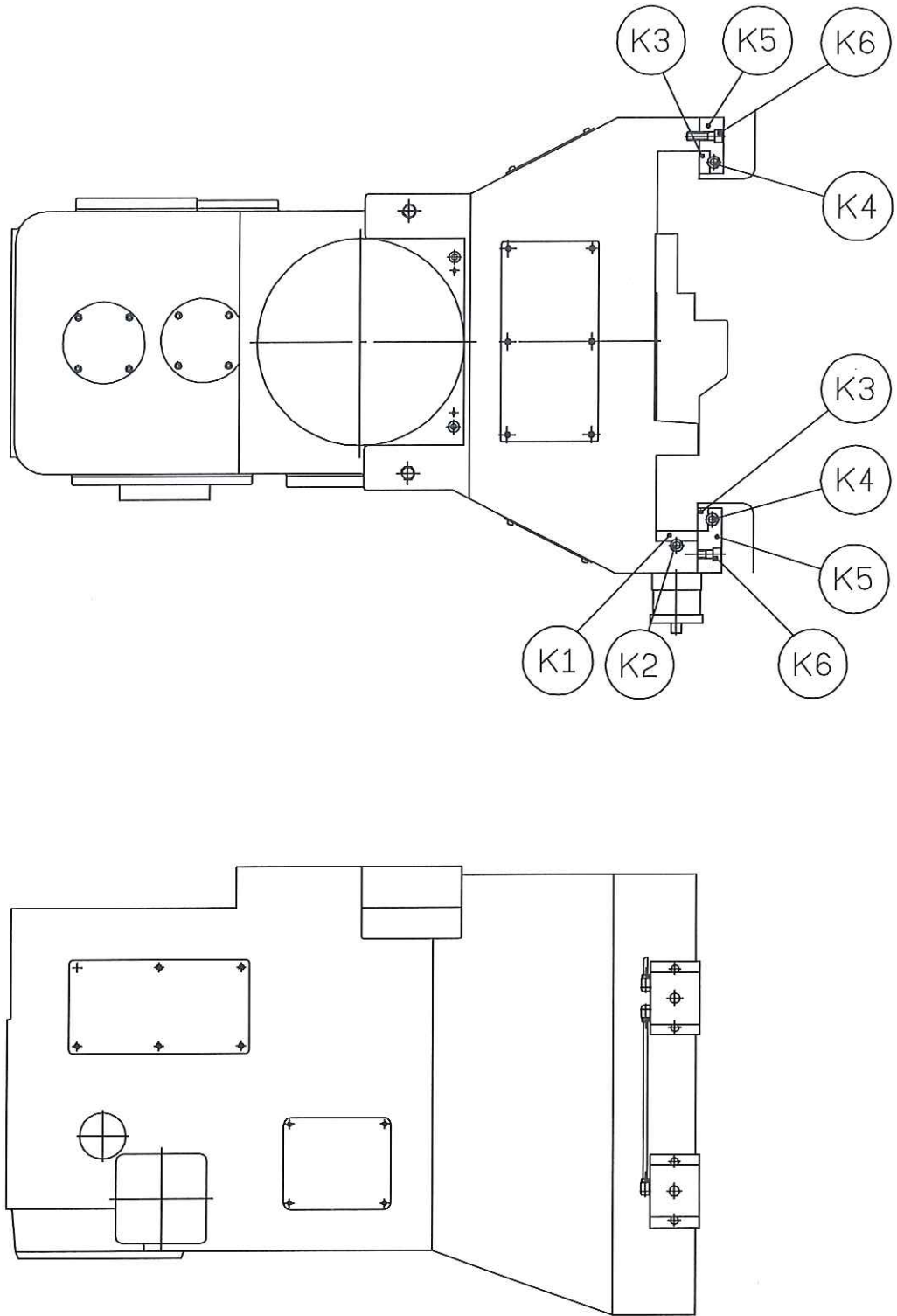


Fig. 14 Adjustment Of Slide Gibs Of Vertical Spindle

Fig. 15 Adjustment Of Working Table And Saddle Gibs

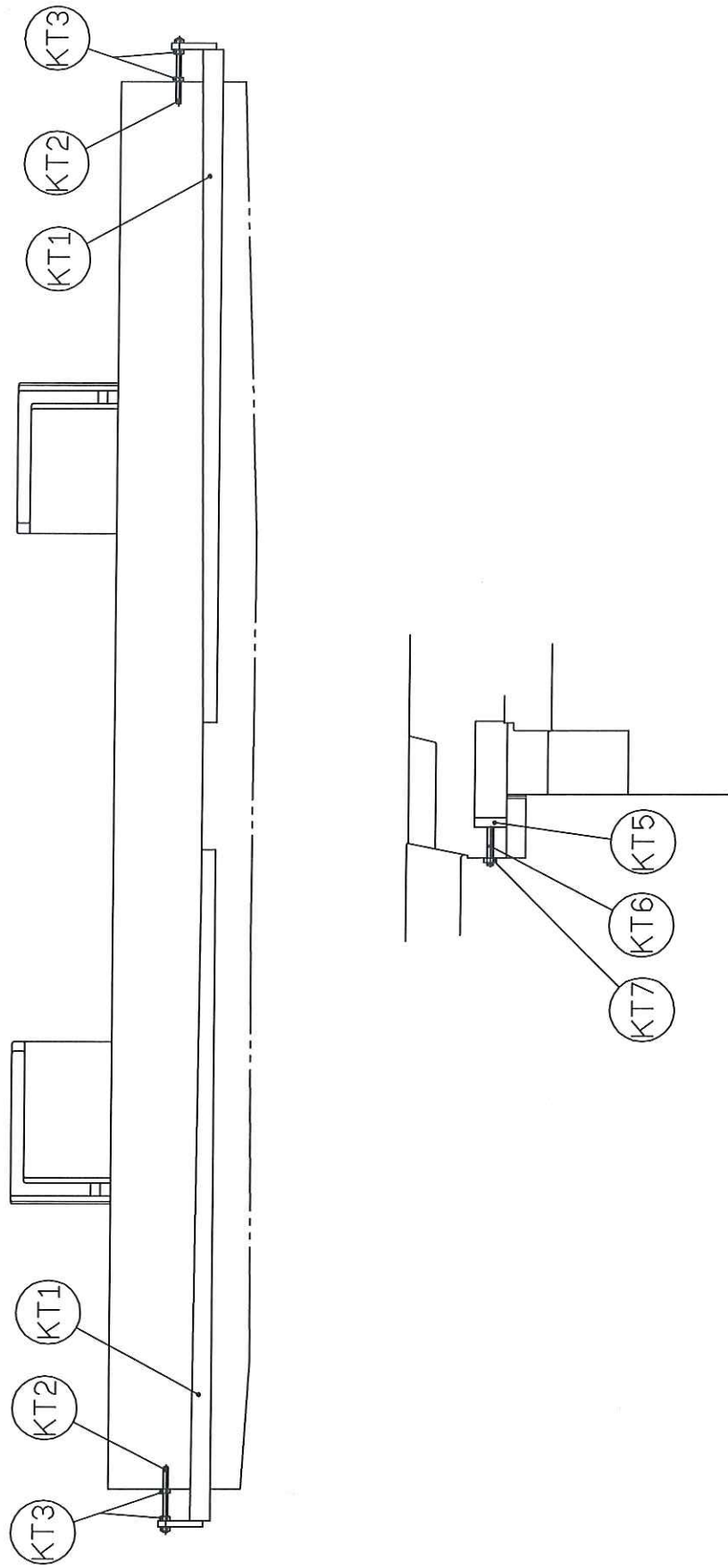


TABLE 6

Milling Cutter	Work Piece			Feed Amount Per Tooth MM.					
	Materials		Brinell hardness HB	Face milling Cutter	Plane mill cutter helical teeth	Slotting saw and slide milling cutter	End mill	Formed cutter	Saw blade milling cutter
High-Speed Steel Milling Cutters	Special steel	Hard tough annealed	300-400	0.1	0.075	0.075	0.05	0.05	0.025
			220-300	0.13	0.125	0.1	0.075	0.05	0.05
			180-22	0.2	0.175	0.125	0.1	0.025	0.05
	Low-carbon steel	Malleable cuts well	152-197	0.25	0.2	0.13	0.125	0.075	0.075
			150-180	0.3	0.25	0.175	0.13	0.1	0.035
	Cast iron	Hard medium hard soft	220-300	0.27	0.2	0.13	0.13	0.1	0.075
			150-250	0.325	0.25	0.175	0.175	0.1	0.075
150-180			0.4	0.325	0.225	0.2	0.125	0.1	
Brass and bronze	Hard medium hard soft	150-250	0.225	0.225	0.13	0.125	0.075	0.05	
		100-150	0.35	0.35	0.2	0.175	0.1	0.075	
		80-100	0.55	0.55	0.325	0.27	0.175	0.125	
Magnesium and its alloys			0.55	0.45	0.325	0.27	0.175	0.125	
Aluminum and alloys			0.55	0.45	0.325	0.27	0.175	0.125	
Plastic			0.375	0.3	0.225	0.175	0.125	0.1	
Super-Hard Alloy Milling Cutter	Special steel	Hard tough annealed	300-400	0.25	0.2	0.13	0.125	0.075	0.075
			220-300	0.3	0.25	0.175	0.13	0.1	0.075
			180-220	0.35	0.27	0.2	0.175	0.1	0.1
	Low carbon steel	Malleable cuts well	152-197	0.35	0.27	0.2	0.175	0.1	0.1
			150-180	0.4	0.325	0.225	0.2	0.125	0.1
	Cast iron	Hard medium hard soft	220-300	0.3	0.25	0.175	0.13	0.1	0.075
			180-220	0.4	0.325	0.25	0.2	0.125	0.1
150-180			0.5	0.4	0.3	0.25	0.13	0.125	
Brass and bronze	Hard medium hard cuts well	150-250	0.25	0.2	0.13	0.125	0.075	0.075	
		100-150	0.3	0.25	0.175	0.13	0.1	0.075	
		80-100	0.5	0.4	0.3	0.25	0.13	0.125	
Magnesium and its alloys			0.5	0.4	0.3	0.25	0.13	0.125	
Aluminum and its alloys			0.5	0.3	0.3	0.25	0.13	0.125	
Plastic			0.57	0.3	0.225	0.175	0.125	0.1	

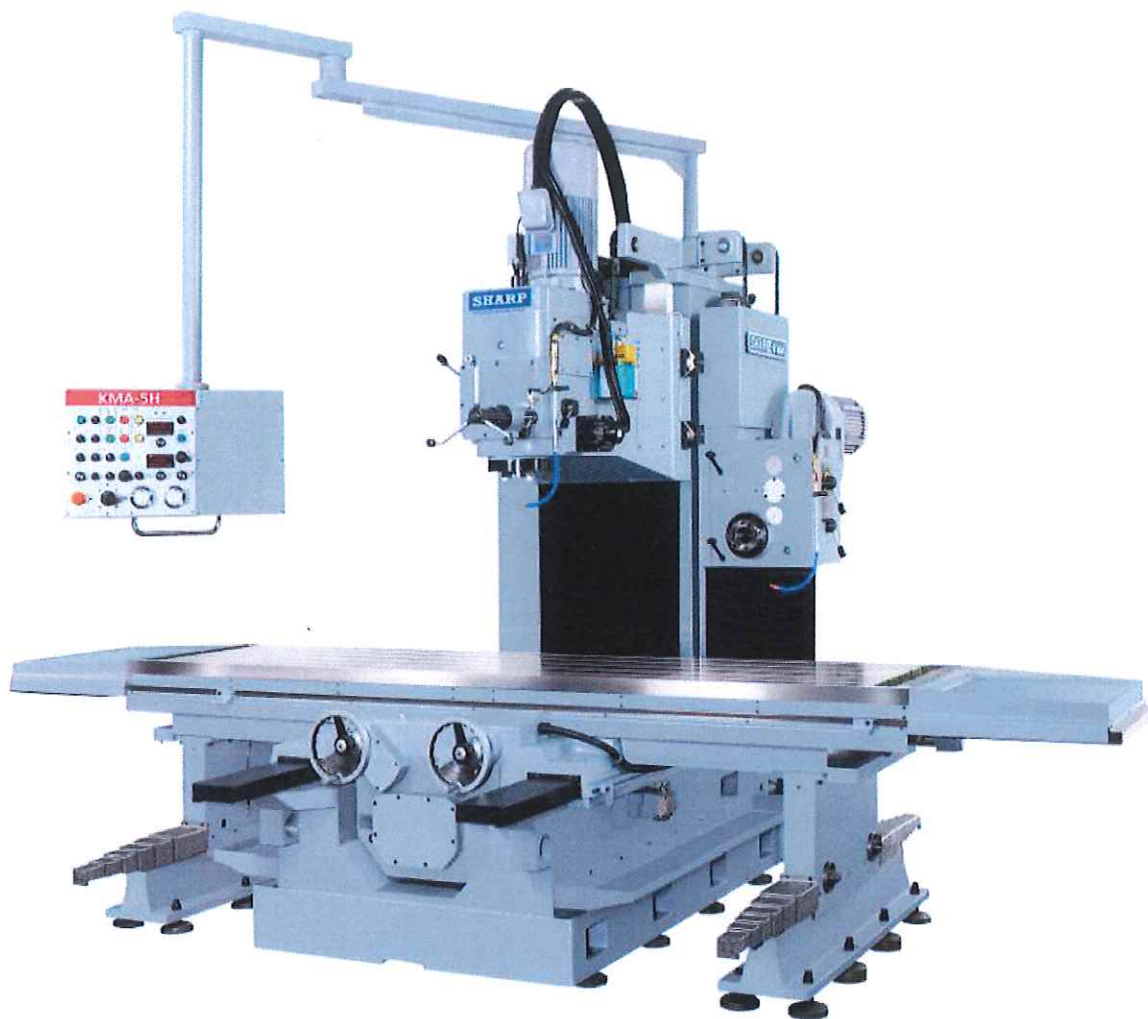


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VERTICAL BED TYPE MILLING & BORING MACHINE

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Operation & Parts Manual



MODEL KMA-5H
(WITH OPTIONAL FEATURES)

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PRECISION MACHINE TOOLS



SPINDLE HEAD (1)

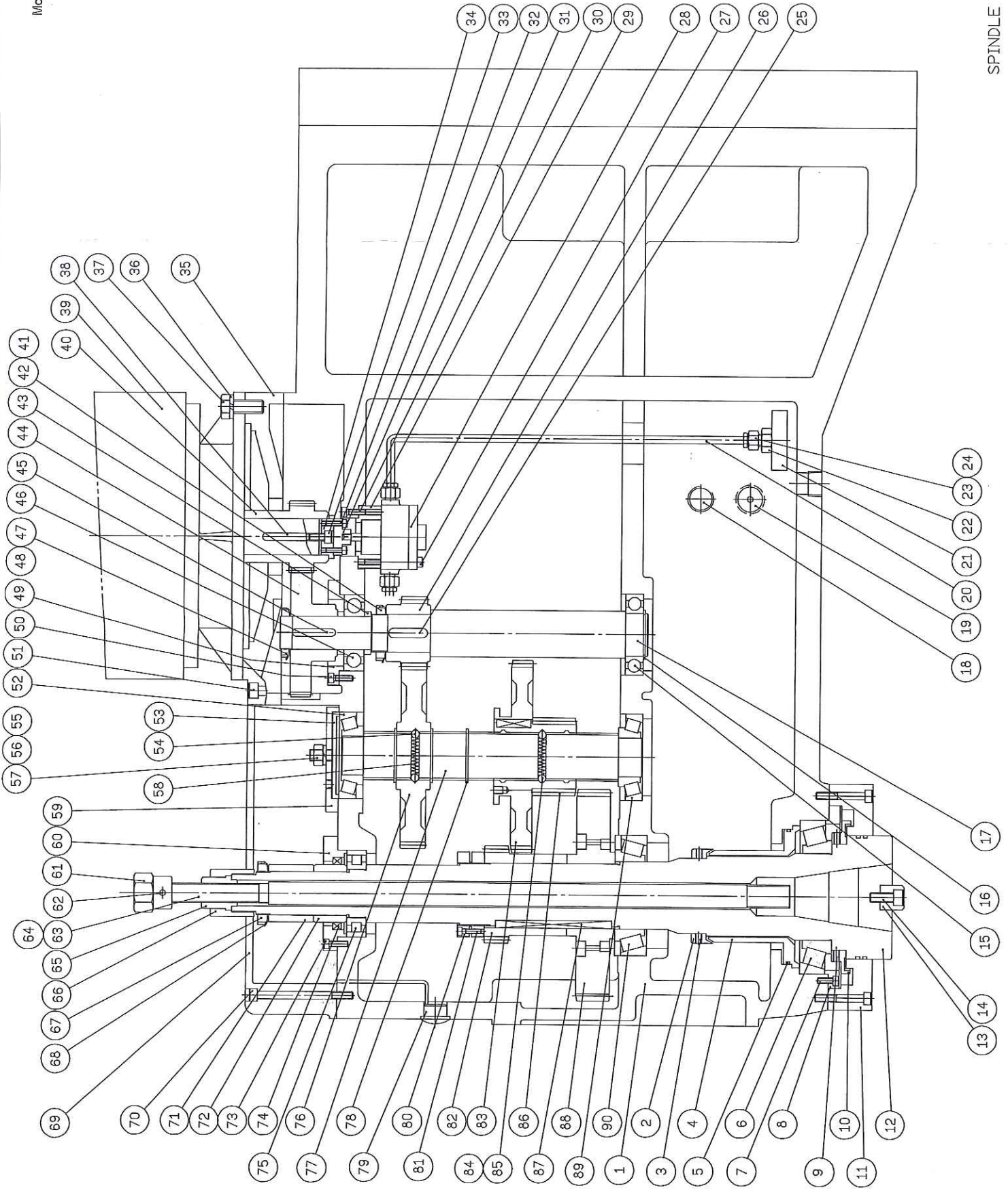
Item	Parts No.	Name	Q'ty	Remark
1	H8-1001	Spindle head	1	
2	H-3047	Oil ring	1	
3		Hex. socket set screw	2	M6x1Px10L
4	H-3048	Oil sleeve	1	
5		O-ring	1	G125
6		Taper roller bearing	1	30218
7		Hex. socket screw	6	M6x1Px16L
8	H-2990	Bearing cover	1	
9		Hex. socket set screw	2	M6x1Px10L
10	H-2991	Bearing cover	1	
11	H8-1039	Spindle cover	1	
12	H-3011	Spindle	1	
13	H-432	Key	2	
14		Hex. socket screw	2	M10x1.5Px25L
15		Bearing	1	6209
16		C-snap ring	1	S45
17	H8-1026	Shaft	1	
18		Plug	2	PT3/4
19		Oil level gage	1	
20		Aluminum pipe	1	∅ 8
21	C-514	Oil filter	1	
22		Joint	3	PD802
23		Thimble nut	3	PA8
24		Thimble	3	PB8
25		Hex. head screw	1	10x8x40L
26	H-2984	Spur gear	1	
27		Hex. socket screw	3	M6x1Px50L
28		Oil pump	1	AM2A

SPINDLE HEAD (1)

Item	Parts No.	Name	Q'ty	Remark
29	H-3049	Pump seat	1	
30		Hex. socket screw	3	M6x1Px25L
31	H5-1006	Oil pump joint	1	
32		Hex. socket screw	1	M5x0.8Px16L
33		Hex. socket screw	1	M8x1.25Px20L
34	H5-1005	Adapter	1	
35	H8-1029	Motor seat	1	
36		Spring washer	4	M14
37		Hex. head screw	4	M14x2Px35L
38		Parallel key	1	10x8x65L
39		Motor	1	AC15HP-4P
40	H5-1003	Spur gear	1	
41	H-377	Bearing nut	1	AN08
42		Bearing washer	1	AW08
43	H8-1028	Spacer	2	
44	H-2977	Spur gear	1	
45		Parallel key	1	8x8x45L
46		Ball bearing	1	6307
47		Bearing washer	1	AW07
48		Bearing nut	1	AN07
49	H8-1027	Bearing cover	1	
50		Hex. socket screw	4	M6x1Px16L
51		Hex. socket screw	6	M10x1.5Px40L
52		Taper roller bearing	1	30308
53	H-3349	Hex. head screw	1	10x8x40L
54		Parallel key	1	10x8x30L
55		Hex. nut	1	M12x1.75P
56		Hex. socket set screw	1	M12x1.75Px25L

SPINDLE HEAD (1)

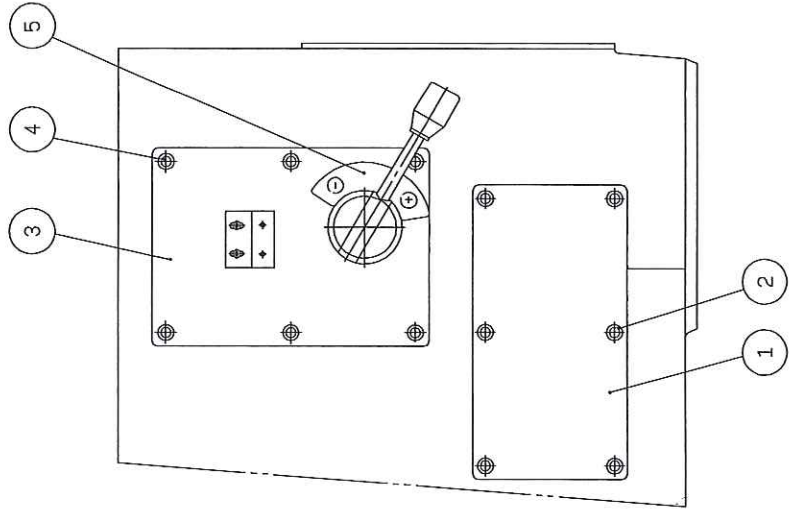
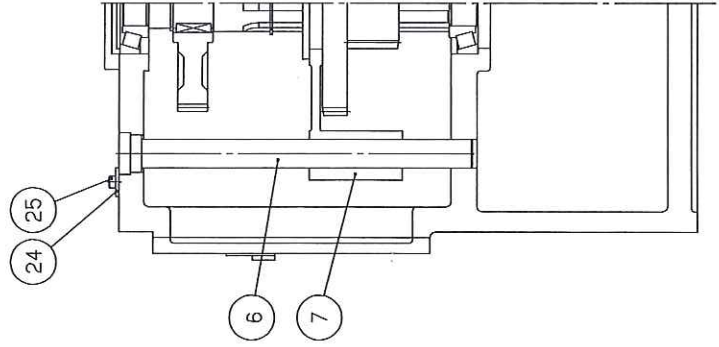
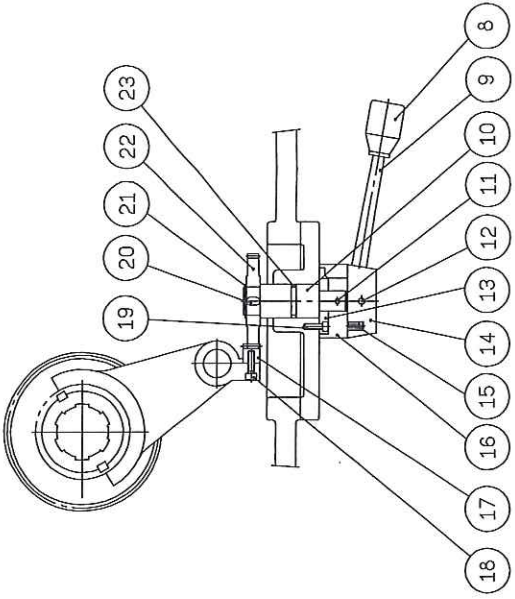
Item	Parts No.	Name	Q'ty	Remark
57		Spring washer	1	M12
58		C-snap ring	1	S45
59	H5-1008	Bearing cover	1	
60	H-3081	Bearing cover	1	
61	H-445	Nut	1	
62		Spring pin	1	φ 5x30L
63	H-2992	Draw bar	1	INCH
64	H-3337	Draw bar	1	MM
65	H-444	Nut	1	
66	H-780	Nut	1	
67	C-56	Bearing nut	1	AN09
68		Bearing washer	1	AW09
69	H8-1031	Cover	1	
70		Hex. socket screw	4	M8x1.25Px35L
71	H8-1040	Spacer	1	
72	H-2994	Collar	1	
73		Hex. socket screw	4	M6x1Px16L
74		Oil seal	1	TC60759
75		Roller bearing	1	N210
76	H8-1030	Spur gear	1	
77	H8-1025	Shaft	1	
78		C-snap ring	1	S50
79		Oil level gage	1	φ 26x φ 30
80	H-2993	Nut	1	
81		Hex. socket screw	6	M5x0.8Px25L
82	H-2989	Spur gear	1	
83	H-3626	Spur gear	1	
84		Steel ball	2	φ 8



SPINDLE HEAD (2)

Item	Parts No.	Name	Q'ty	Remark
1	H-3007	Cover	1	
2		Hex. socket screw	6	M8x1.25Px20L
3	H8-1006	Cover	1	
4		Hex. socket screw	6	M8x1.25Px20L
5	H-3038	Name plate	1	
6	H-2998	Support lever	1	
7	H8-1005	Swing arm	1	
8	H-149	Handle	1	
9	C-287	Handle lever	1	
10	H-3006	Gear shaft	1	
11		Spring pin	1	φ 5x60L
12		Straight pin	1	φ 6x55L
13	H-3004	Fixed plate	1	
14	H-2159	Handle seat	1	
15	H-459	Spring	1	
16	H-2160	Handle seat	1	
17	H-3002	Rack	1	
18		Hex. socket screw	2	M6x1Px16L
19		Hex. socket screw	3	M5x0.8Px10L
20		Parallel key	1	7x6x12L
21		C-snap ring	1	S25
22	H-505	Spur gear	1	
23		O ring	1	P24
24	C-509	Washer	1	
25		Hex. socket screw	1	M6x1Px10L
26				
27				
28				





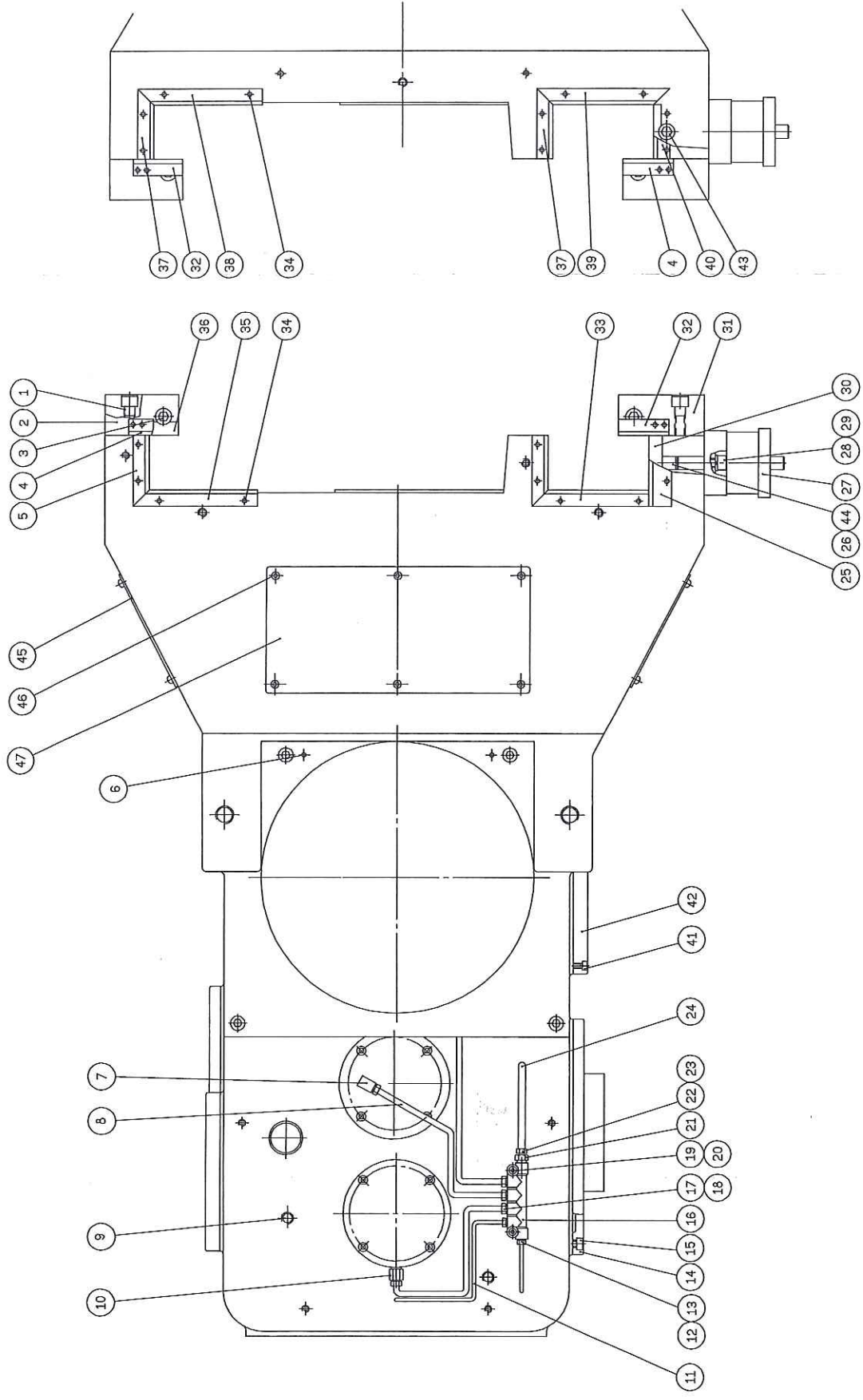


SPINDLE HEAD (3)

Item	Parts No.	Name	Q'ty	Remark
1		Hex. bolt	16	M12x1.75Px65L
2	H8-1049	Fixed plate	1	
3	S-198	Adjust bolt	4	
4	H-4247	Wiper	2	
5	H8-1010	Wiper	2	
6		Spring pin	2	φ 5x30L
7		Elbow joint	1	PH601
8		Aluminum Pipe	3	φ 6
9		Radiator	2	PT1/4
10		Straight joint	1	PD601
11		Aluminum pipe	2	φ 4
12		Thimble	2	PB4
13		Thimble nut	2	PA4
14	H-3007	Cover	1	
15		Hex. socket screw	6	M8x1.25Px20L
16		A type distributor	1	DB6
17		Thimble	5	PB6
18		Thimble nut	5	PA6
19		Hex. socket screw	2	M6x1Px25L
20		Hex. nut	2	M6
21		Straight joint	1	PD801
22		Thimble nut	1	PA8
23		Thimble	1	PB8
24		Oil pipe	1	φ 8
25	H8-1012	Wiper	1	
26	H8-1047	Fixed shaft	1	
27		Air cylinder	2	
28		Hex. socket screw	4	M10x1.5Px40L

SPINDLE HEAD (3)

Item	Parts No.	Name	Q'ty	Remark
29		Spring washer	4	M10
30	H8-1032	Gib	1	
31	H8-1050	Fixed plate	1	
32	H-4235	Wiper	2	
33	H8-1011	Wiper	1	
34		Round head screw	28	M4x0.7Px12L
35	H8-1013	Wiper	1	
36	H5-1012	Gib	2	
37	H8-1014	Wiper	2	
38	H8-1017	Wiper	1	
39	H8-1015	Wiper	1	
40	H8-1016	Wiper	1	
41		Hex. socket screw	4	M6x1Px20L
42	K-484	Cover	1	
43	S-198	Adjusting bolt	2	
44	H8-1048	Fixed shaft	1	
45	H8-1046	Cover	2	
46		Round head screw	18	M4x0.7Px12L
47	H8-1045	Cover	1	
48				
49				
50				
51				
52				
53				
54				
55				
56				





SPINDLE HEAD (4)

Item	Parts No.	Name	Q'ty	Remark
1	H8-1033	Handle seat	1	
2	H8-1051	Washer	1	
3	H8-1035	Hex. nut	3	
4	H8-1034	Handle lever	3	
5	H8-1036	Handle	3	
6		Hex. socket screw	3	M10x1.5Px30L
7	H8-1020	Transmission shaft	1	
8		C-snap ring	1	R62
9	H8-1022	Collar	1	
10		Ball bearing	2	6206zz
11		C-snap ring	1	S34
12	H8-1019	Clutch	1	
13		Hex. socket screw	4	M6x1Px16L
14	H8-1007	Cover	1	
15		Hex. socket screw	4	M6x1Px16L
16		Oil seal	1	40558
17	H-581	Bearing seat	1	
18		O-ring	1	G30
19		Ball bearing	3	6206
20	H8-1008	Transmission shaft	1	
21	H-572	Washer	1	
22		Ball bearing	3	6205
23		Parallel key	2	8x7x20L
24	H-1312	Spur gear	1	
25	H-1334	Washer	1	
26		Spring washer	1	M12
27		Hex. socket screw	1	M12x1.75Px25L
28	H-1468	Spacer ring	1	

SPINDLE HEAD (4)

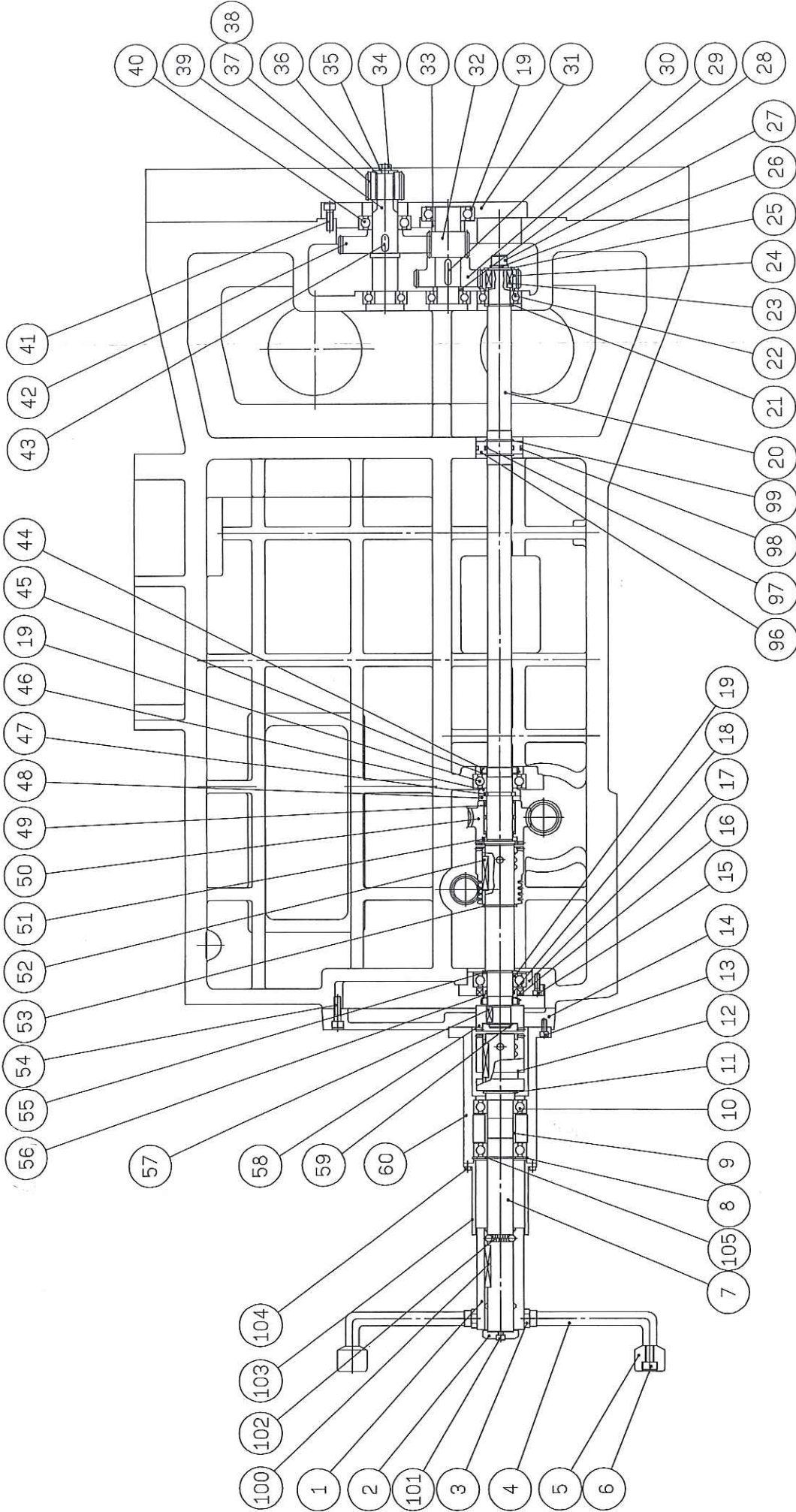
Item	Parts No.	Name	Q'ty	Remark
29	H-1314	Spur gear	1	
30		Parallel key	1	7x7x30L
31	H8-1009	Bearing housing	1	
32	H-1469	Gear shaft	1	
33	G-372	Washer	1	
34		Hex. head screw	1	M8x1.25Px20L
35		Spring washer	1	M8
36	H-574	Washer	1	
37	H8-1003	Spur gear	1	
38	H8-1004	Spur gear	1	
39	H-1471	Gear shaft	1	
40		Ball bearing	1	6206LLB
41		Hex. socket screw	5	M8x1.25Px25L
42	H-1470	Spur gear	1	
43		Parallel key	1	8x7x20L
44	K-144	Bearing nut	2	AN06
45		Bearing washer	2	AW06
46	H-569	Washer	1	
47	H-568	Washer	1	
48	H-567	Washer	1	
49		Needle bearing	1	TLAW3038Z
50	H8-1043	Clutch	1	
51	H-566	Washer	1	
52		Parallel key	1	7x7x40L
53		C-snap ring	1	S34
54		Hex. socket screw	7	M8x1.25Px30L
55	H-580	Washer	1	
56	H8-1041	Spacing ring	1	

SPINDLE HEAD (4)

Item	Parts No.	Name	Q'ty	Remark
57		Parallel key	1	7x7x18L
58	H8-1018	Clutch	1	
59		C snap ring	1	S25
60	H8-1021	Bearing housing	1	
61		Hex. head screw	9	M8x1.25Px35L
62	C8-1002	Rack	1	MM
63	C8-1003	Rack	1	INCH
64		Parallel key	1	5x5x12L
65		Hex. head screw	1	M6x1Px20L
66	H-616	Handle seat	1	
67	H-480	Handle lever	2	
68	H-149	Handle	2	
69		Hex. socket screw	4	M6x1Px16L
70	H-789	Name plate	1	
71	H-3336	Name plate	1	
72	H-614	Control lever sleeve	1	
73	H-613	Control lever	1	
74	H-571	Spring	2	
75		Steel ball	4	ϕ 8
76	H-570	Clutch	1	
77	H-615	Spur gear	1	
78		C-snap ring	1	S15
79		Parallel key	1	5x5x20L
80		Round head screw	1	M5x0.8Px10L
81	H8-1024	Cam shaft	1	
82	H8-1023	Fixed seat	1	
83		Hex. socket screw	4	M5x0.8Px10L
84	H8-1037	Handle seat	1	

SPINDLE HEAD (4)

Item	Parts No.	Name	Q'ty	Remark
85		Spring pin	1	ϕ 5x30L
86		Ball bearing	1	6206
87	H8-1002	Worm	1	
88		Oil seal	1	507010
89		Bearing	1	5208
90	H8-1042	Bearing cover	1	
91		Hex. socket screw	4	M6x1Px16L
92	H-377	Bearing nut	1	AN08
93		Bearing washer	1	AW08
94		Parallel key	1	6x6x25L
95		Servo motor	1	SGMGH-13A
96	H8-1044	Sleeve	1	
97		O ring	1	P28
98		O ring	1	P49
99		C-snap ring	2	S28
100		Parallel key	1	7x7x50L
101		Hex. socket screw	1	M6x1Px16L
102	H8-1052	Spring	1	
103	H8-1053	Sleeve	1	
104		Hex. socket screw	3	M4x0.7Px16L
105		C-snap ring	1	S30
106				
107				
108				
109				
110				
111				
112				





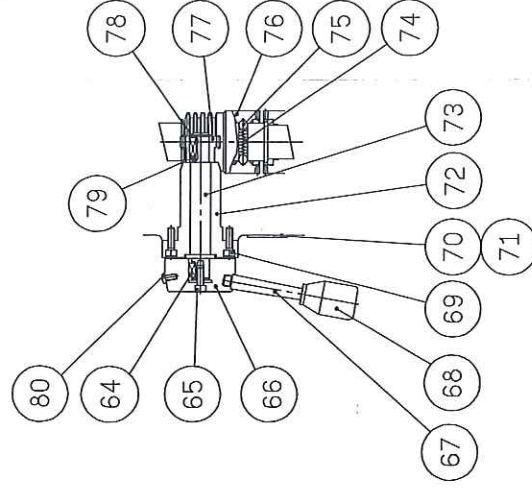
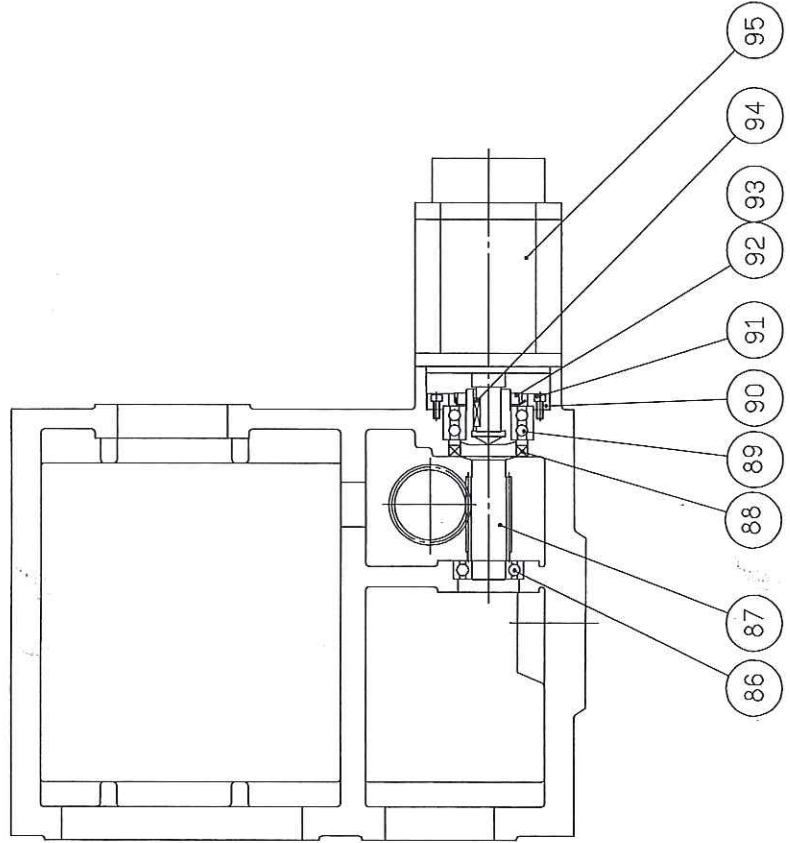
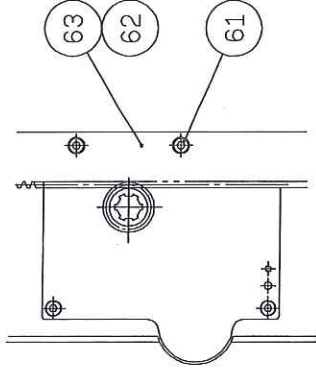
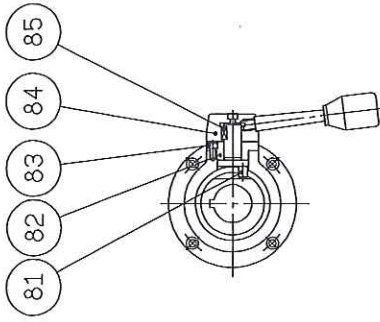




TABLE UNITS

Item	Parts No.	Name	Q'ty	Remark
1	T8-1001	Table	1	
2	T8-1010	Adjusting block	1	
3		Hex. socket screw	2	M6x1Px10L
4		Hex. socket screw	4	M12x1.75Px40L
5	T-82	Taper pin	2	
6		Hex. socket screw	4	M10x1.5Px35L
7	T5-1011c	Stopper	4	
8		Hex. socket screw	4	M5x0.8Px16L
9	T8-1007	Table side cover	2	
10		Round head screw	6	M5x0.8Px8L
11	T8-1009	Wiper	2	
12	T8-1008	Cover	2	
13	T5-1011d	Spring	4	
14	T5-1015	Fixed plate	4	
15		Hex. socket screw	2	M5x0.8Px8L
16		Hex. socket screw	4	M6x1Px60L
17	T-83a	Bearing cover	2	
18		Hex. nut	4	M6
19	T8-1005	Bearing housing	1	
20	T8-1002	Ball screw	1	
21		Hex. socket screw	4	M10x1.5Px25L
22	T8-1013	Nut seat	1	
23		Needle bearing	1	TAF759225
24		Thrust bearing	1	51115
25		Thrust bearing	1	51114
26		Needle bearing	1	TAF708525
27	T8-1014	Bearing cover	1	
28		Hex. socket screw	4	M6x1Px16L

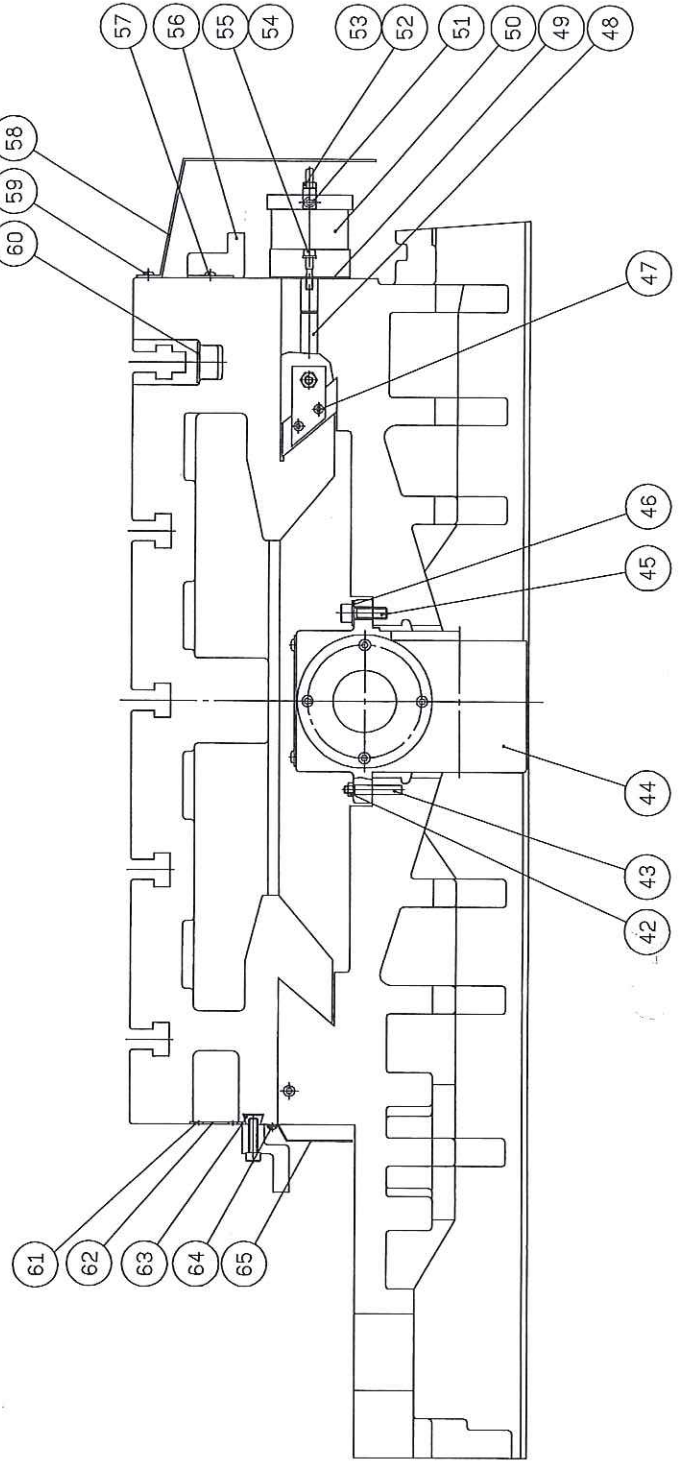
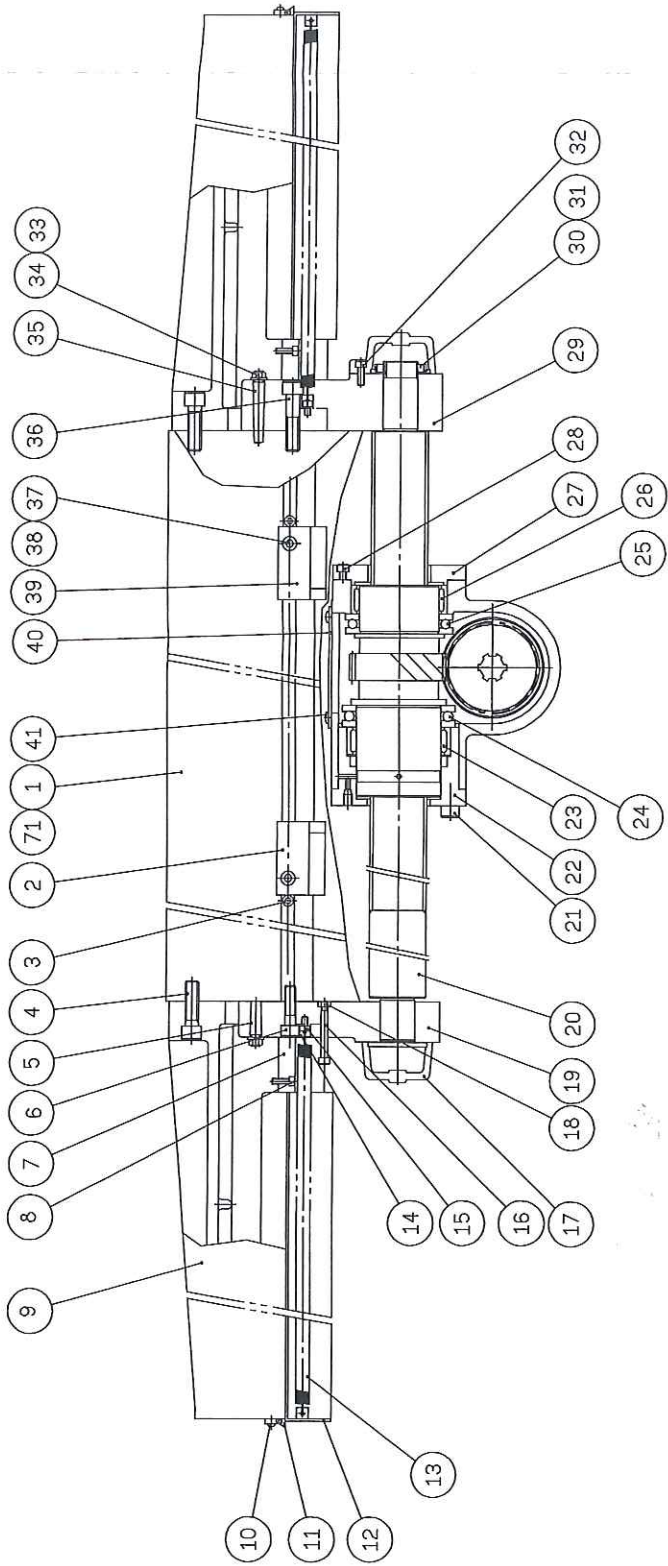
TABLE UNITS

Item	Parts No.	Name	Q'ty	Remark
29	T8-1004	Bearing housing	1	
30	K-144	Bearing nut	1	AN06
31		Bearing washer	1	AW06
32		Hex. socket screw	4	M6x1Px16L
33		Hex. nut	4	M8
34		Spring washer	1	M8
35	T-89	Taper pin	2	
36		Hex. socket screw	4	M12x1.75Px45L
37		Hex. socket screw	2	M8x1.25Px20L
38		Spring washer	2	M8
39	T8-1011	Adjusting block	1	
40	T8-1006	Cover	1	
41		Round head screw	4	M6x1Px10L
42		Hex. nut	2	M6
43	T-78	Taper pin	2	
44	T8-1003	Gear bracket	1	
45		Hex. socket screw	4	M10x1.5Px30L
46		Washer	4	M10
47		Hex. socket screw	4	M5x0.8Px20L
48	S8-1024	Fixed shaft	2	
49	S-2084	Washer	2	
50		Air cylinder	2	
51		Elbow joint	4	PH601
52		Thimble nut	5	PA6
53		Thimble	5	PB6
54		Hex. socket screw	4	M10x1.5Px30L
55		Spring washer	4	M10
56	T5-1014	Cover	1	

TABLE UNITS

Item	Parts No.	Name	Q'ty	Remark
57		Hex. socket screw	2	M6x1Px16L
58	T8-1018	Cover	1	
59		Round head screw	6	M5x0.8Px8L
60	T-109	Oil filter	1	
61		Flat head screw	12	M5x0.8Px8L
62	T8-1019	Cover	1	
63	T-91	T block	2	
64		Round head screw	6	M5x0.8Px8L
65	T8-1017	Cover	1	
66		Hex. nut	6	M8
67	T8-1012	Fixed plate	2	
68	T8-1015	Gib	1	
69	T8-1016	Gib	1	
70		Hex. socket set screw	2	M8x1.25Px80L
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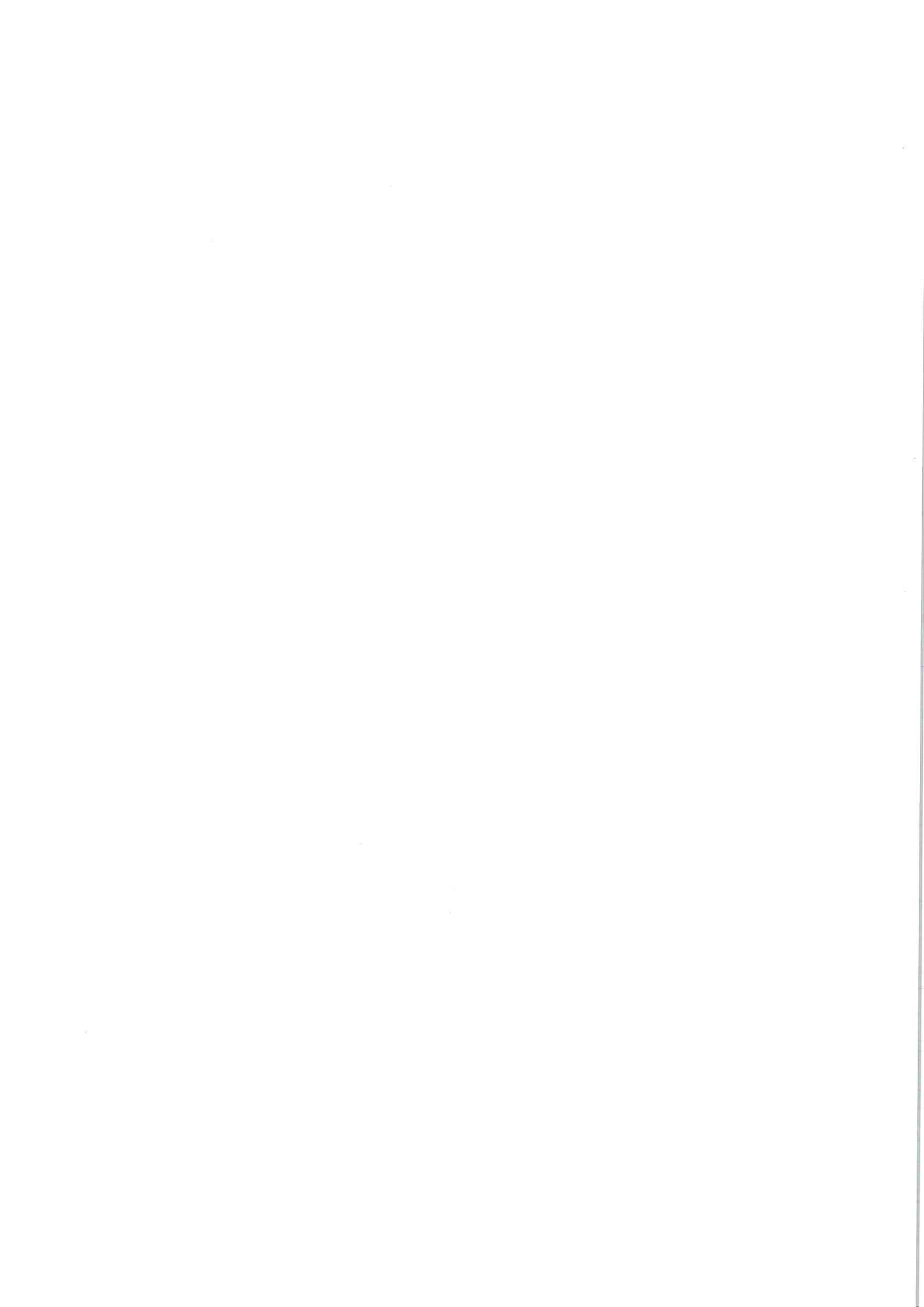


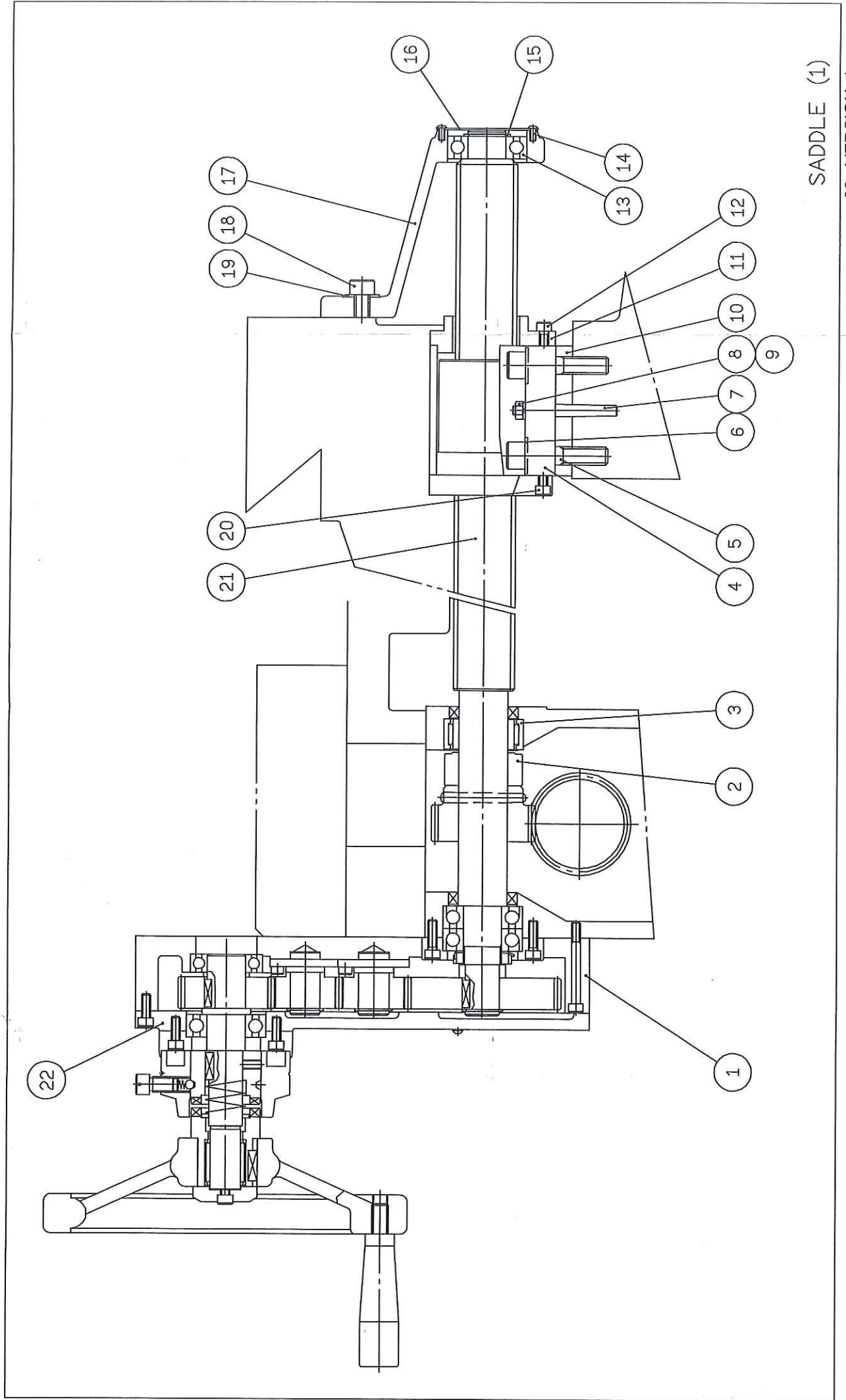




SADDLE UNITS (1)

Item	Parts No.	Name	Q'ty	Remark
1	S8-1019	Bearing housing	1	
2	S-107	Washer	1	
3		Needle bearing	1	NA49/32
4	S-2075	Balls crew nut seat	1	
5		Hex. socket screw	4	M12x1.75Px55L
6		Washer	4	M12
7	S-114	Taper pin	2	
8		Hex. nut	2	M6
9		Spring washer	2	M6
10	S8-1023	Block	1	
11	S8-1004	Washer	1	
12		Hex. socket screw	2	M6x1Px20L
13		Bearing	1	6205zz
14		Round head screw	3	M4x0.7Px8L
15		C-snap ring	1	S25
16	S-116a	Bearing cover	1	
17	S-115a	Bearing housing	1	
18		Hex. socket screw	2	M10x1.5Px30L
19		Washer	2	M10
20		Hex. socket screw	7	M6x1Px25L
21	S8-1002	Ball screw	1	
22	S8-1020	Bearing cover	1	
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SADDLE (1)

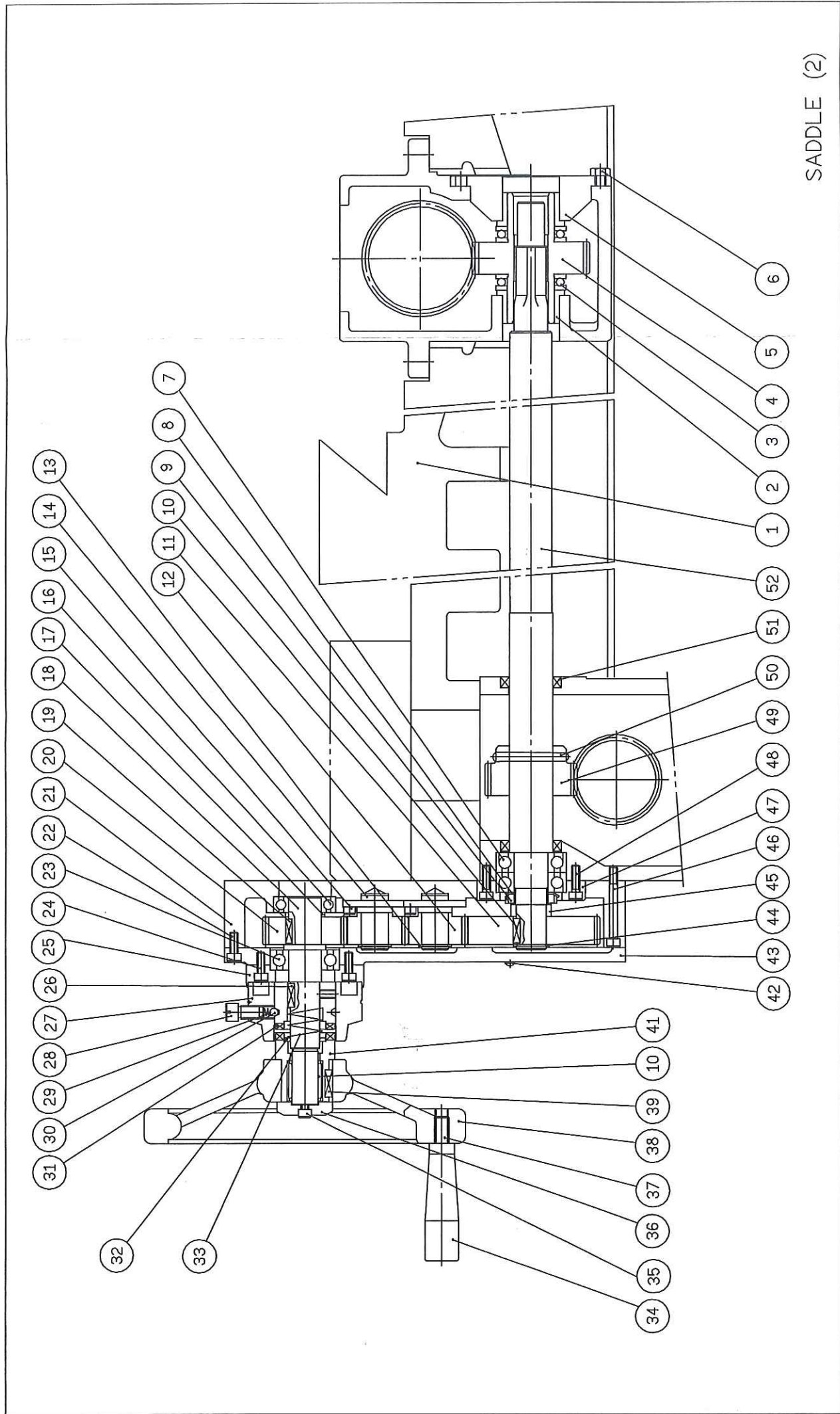


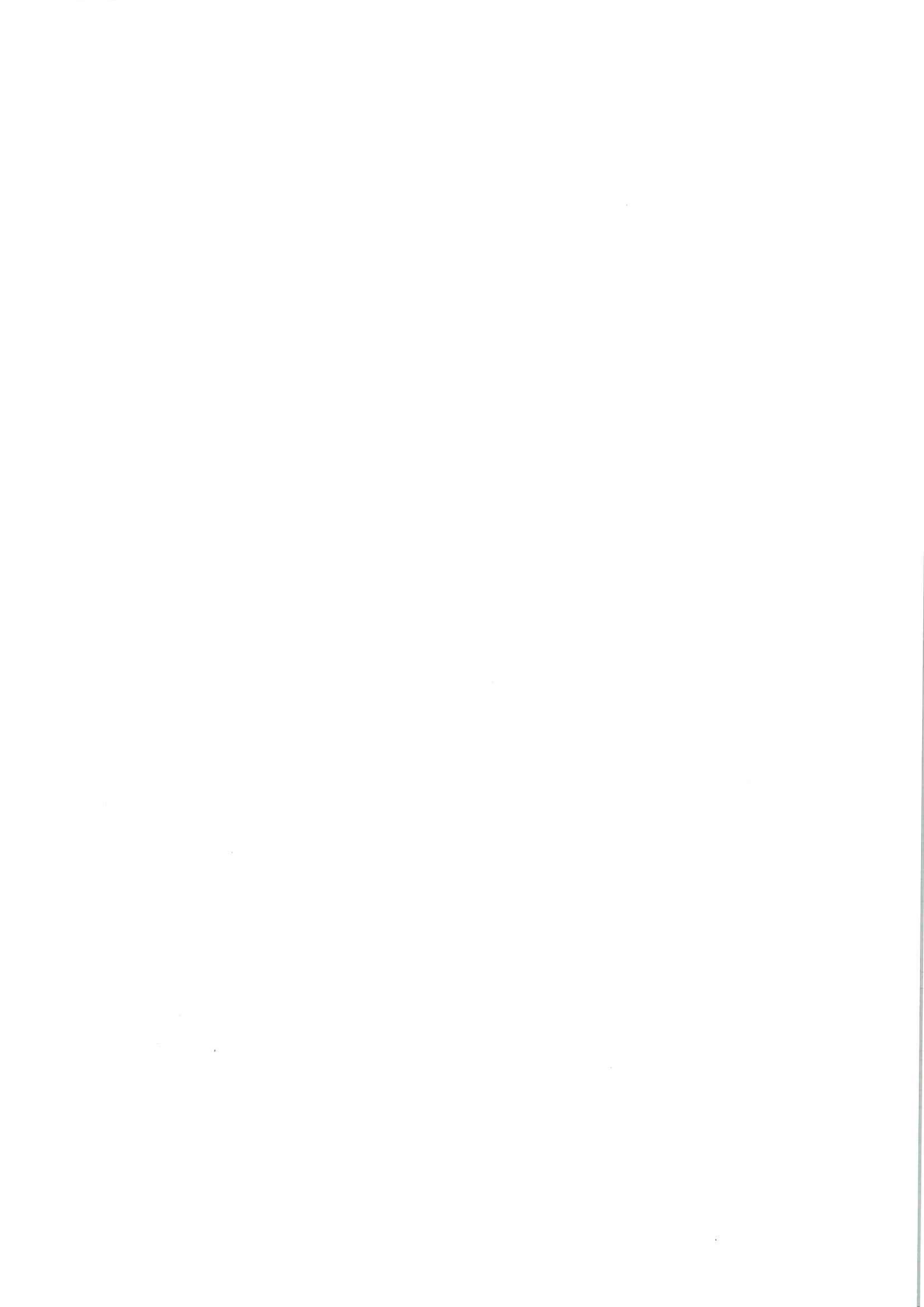
SADDLE UNITS (2)

Item	Parts No.	Name	Q'ty	Remark
1	S8-1001	Saddle	1	
2	S-90	Copper bushing	2	
3		Thrust bearing	2	51107
4	S8-1006	Helical gear	1	
5	S8-1007	Copper bushing seat	1	
6		Hex. head screw	4	M8x1.25Px20L
7		Angular bearing	4	7205B
8		Bearing washer	2	AW05
9	K-105	Bearing nut	2	AN05
10		Parallel key	2	5x5x18L
11	S-494	Spur gear	2	
12	S8-1021	Spur gear	4	
13		C-snap ring	2	S20
14	S8-1022	Transmission shaft	4	
15		Hex. socket screw	8	M5x0.8Px15L
16		Ball bearing	2	6005zz
17	S-313	Spacing ring	2	
18	S-316	Transmission shaft	2	
19		Parallel key	2	5x5x18L
20	S-493	Spur gear	2	
21	S8-1017	Ball housing	1	
22		Hex. socket screw	10	M6x1Px16L
23		Ball bearing	2	6205zz
24		Hex. socket screw	8	M6x1Px16L
25	S-310	Bearing housing	2	
26		Parallel key	2	5x5x18L
27	S-97	Graduating ring	2	
28	S-100	Fixing screw	2	

SADDLE UNITS (2)

Item	Parts No.	Name	Q'ty	Remark
29	H-593	Spring	2	
30		Steel ball	2	ϕ 8
31	S-94	Clutch	2	
32	S-96	Washer	2	
33	S-95	Spring	2	
34	S-105	Handle	2	
35		Hex. socket screw	2	M6x1Px16L
36	S-103	Washer	2	
37	S-104	Handle screw	2	
38	S-288	Handle wheel	2	
39		Parallel key	2	7x5x20L
40		Needle bearing	2	TA2030
41	S-101	Handle wheel clutch	2	
42		Spring pin	4	ϕ 5x30L
43	S8-1018	Bearing cover	1	
44		C-snap ring	2	S22
45	C-553	Spacing ring	2	
46		Hex. socket screw	8	M6x1Px55L
47	S-318	Bearing cover	2	
48		Hex. socket screw	8	M6x1Px20L
49	S-92	Helical gear	2	
50	S-499	Taper pin	2	#6x50L
51		Oil seal	4	32458
52	S8-1005	Shaft	1	
53				
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GEAR BOX

Item	Parts No.	Name	Q'ty	Remark
1	G8-1001	Gear box	1	
2		Ball bearing	3	6205
3		Hex. socket screw	6	M10x1.5Px40L
4	G5-1023	Washer	2	
5		Parallel key	1	7x7x18L
6	G8-1009	Spur gear	1	
7	G5-1003	Shaft	1	
8	G8-1004	Shaft	1	
9	G-121	Worm gear	1	
10		Parallel key	2	7x7x16L
11	K-105	Bearing nut	2	AN05
12		Bearing washer	1	AW05
13		Ball bearing	1	6204
14	G5-1012	Bearing cover	1	
15		Round head screw	2	M4x0.7Px8L
16		Pump	1	YEM-2502-60L
17		Elbow joint	1	PH601
18		Thimble	1	PB6
19		Thimble nut	1	PA6
20	G8-1003	Spur gear	1	
21	G-135	Washer	1	
22		C-snap ring	1	S25
23		Parallel key	2	7x7x20L
24		Hex. socket screw	8	M8x1.25Px20L
25	G-382	Bearing housing	2	
26		Hex. nut	2	M10
27		Hex. socket set screw	2	M10x1.5Px25L
28	G-168	Bearing adjust shim	2	

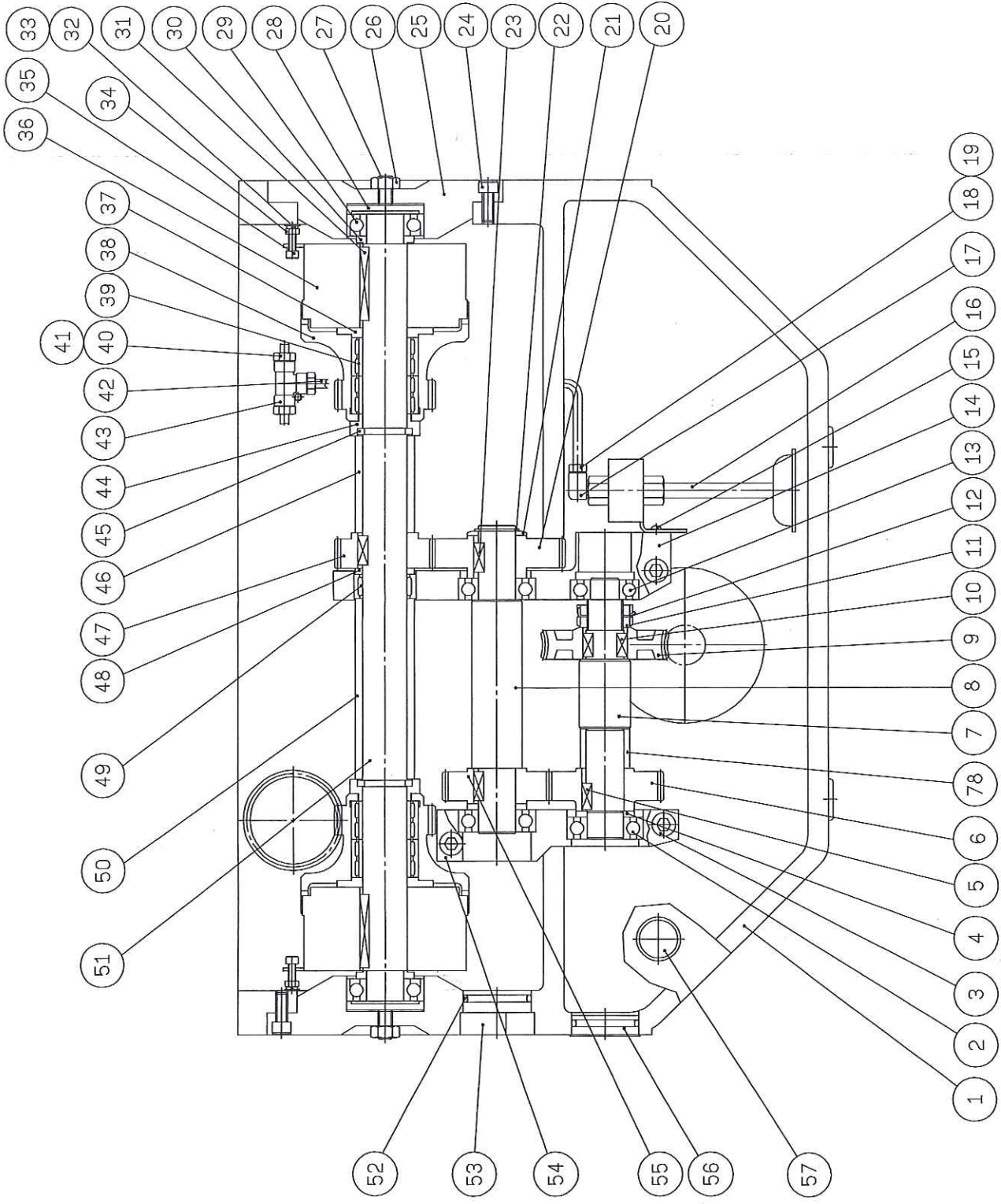
GEAR BOX

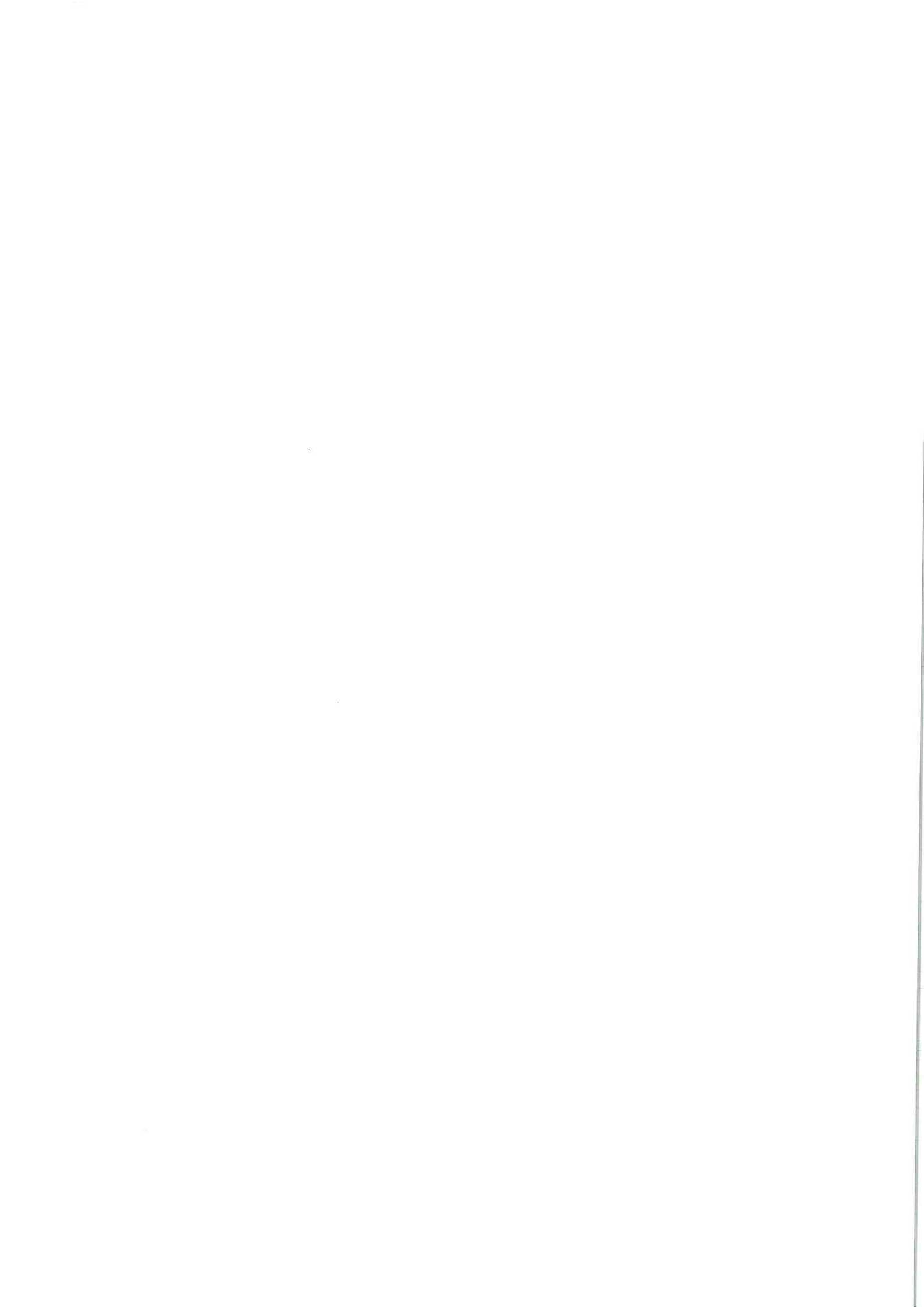
Item	Parts No.	Name	Q'ty	Remark
29		Angular bearing	2	7205B
30	G-369	Spacing ring	2	
31		Parallel key	4	8x7x50L
32		Spring washer	4	M5
33		Washer	2	M5
34		Hex. nut	2	M5
35		Hex. socket screw	2	M5x0.8Px30L
36		Magnetic clutch	4	MWC-5
37	G-370	Washer	2	
38	G-371	Helical gear	2	
39		Needle bearing	4	NAFW304526
40		Thimble	3	PB6
41		Thimble nut	3	PA6
42		Oil pipe	2	ϕ 6
43		T-joint	2	PKD-6
44	G-373	Spacing ring	2	
45	H-568	Washer	4	
46	G8-1008	Spacing ring	1	
47	G8-1006	Spur gear	1	
48	G5-1020	Washer	2	
49		Needle bearing	1	RNA4905
50	G8-1007	Spacing ring	1	
51	G-669	Shaft	1	
52		O ring	2	P40
53	G-391	Plug	1	
54	G5-1011	Bearing cover	1	
55	G8-1005	Spur gear	1	
56	G-155	Plug	1	

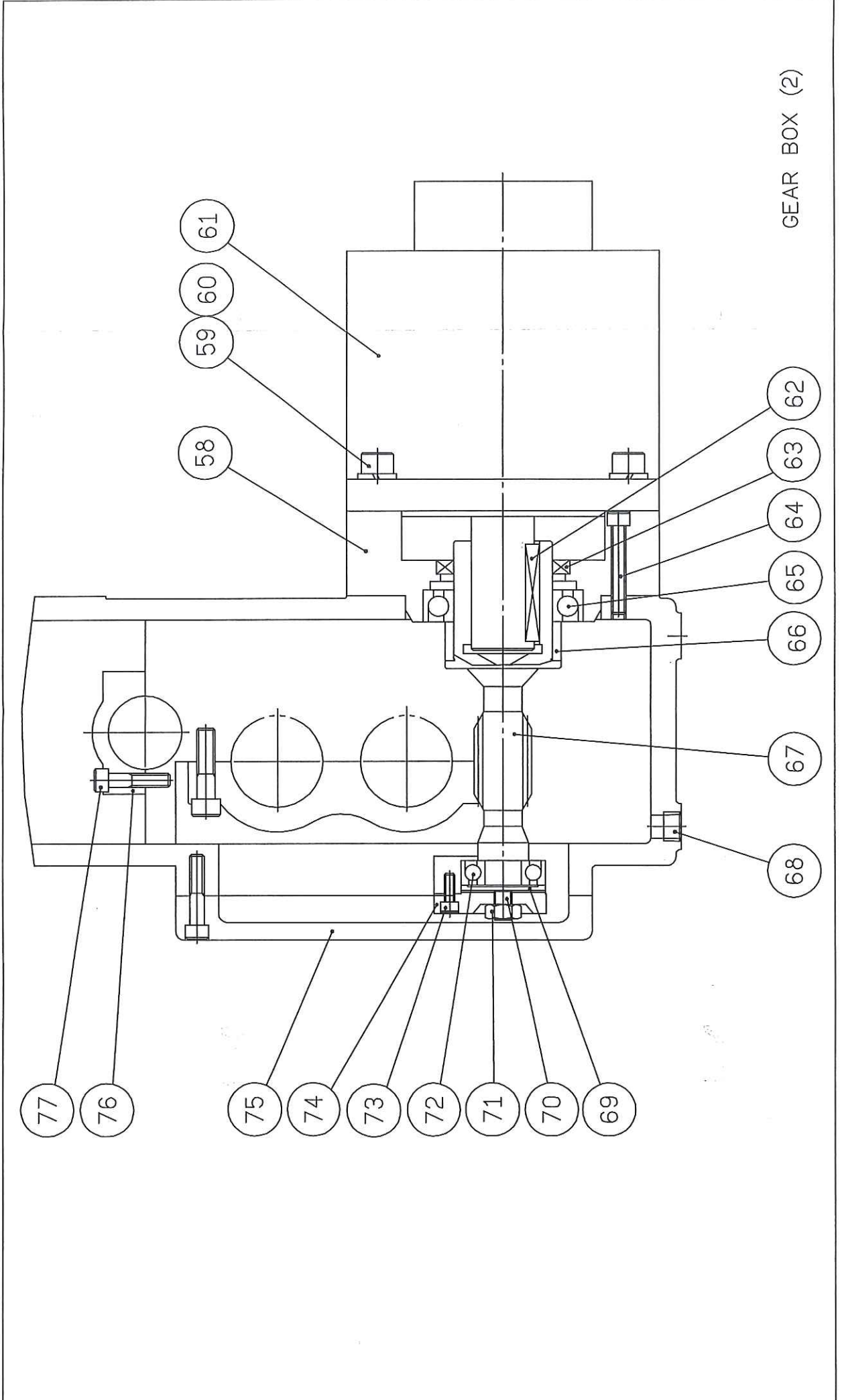
GEAR BOX

Item	Parts No.	Name	Q'ty	Remark
57		Oil gage	1	§ 26x § 30
58	G-671	Bearing cover	1	
59		Hex. socket screw	4	M12x1.75Px40L
60		Spring washer	4	M12
61		Servo motor	1	HC-SF352
62		Parallel key	1	10x8x55L
63		Oil seal	1	55759
64		Hex. socket screw	4	M8x1.25Px60L
65		Angular bearing	1	7011
66	G8-1010	Spacing ring	1	
67	G-826	Transmission shaft	1	
68		Plug	1	PT3/8
69	G-111	Washer	1	
70		Hex. socket set screw	1	M10x1.5Px16L
71		Hex. nut	1	M10
72		Angular bearing	1	7204B
73		Hex. socket screw	4	M6x1Px16L
74	G-112	Bearing cover	1	
75	G5-1019	Front cover	1	
76	G5-1018	Bearing cover	1	
77		Hex. socket screw	2	M8x1.25Px30L
78	G8-1011	Spacing ring	1	
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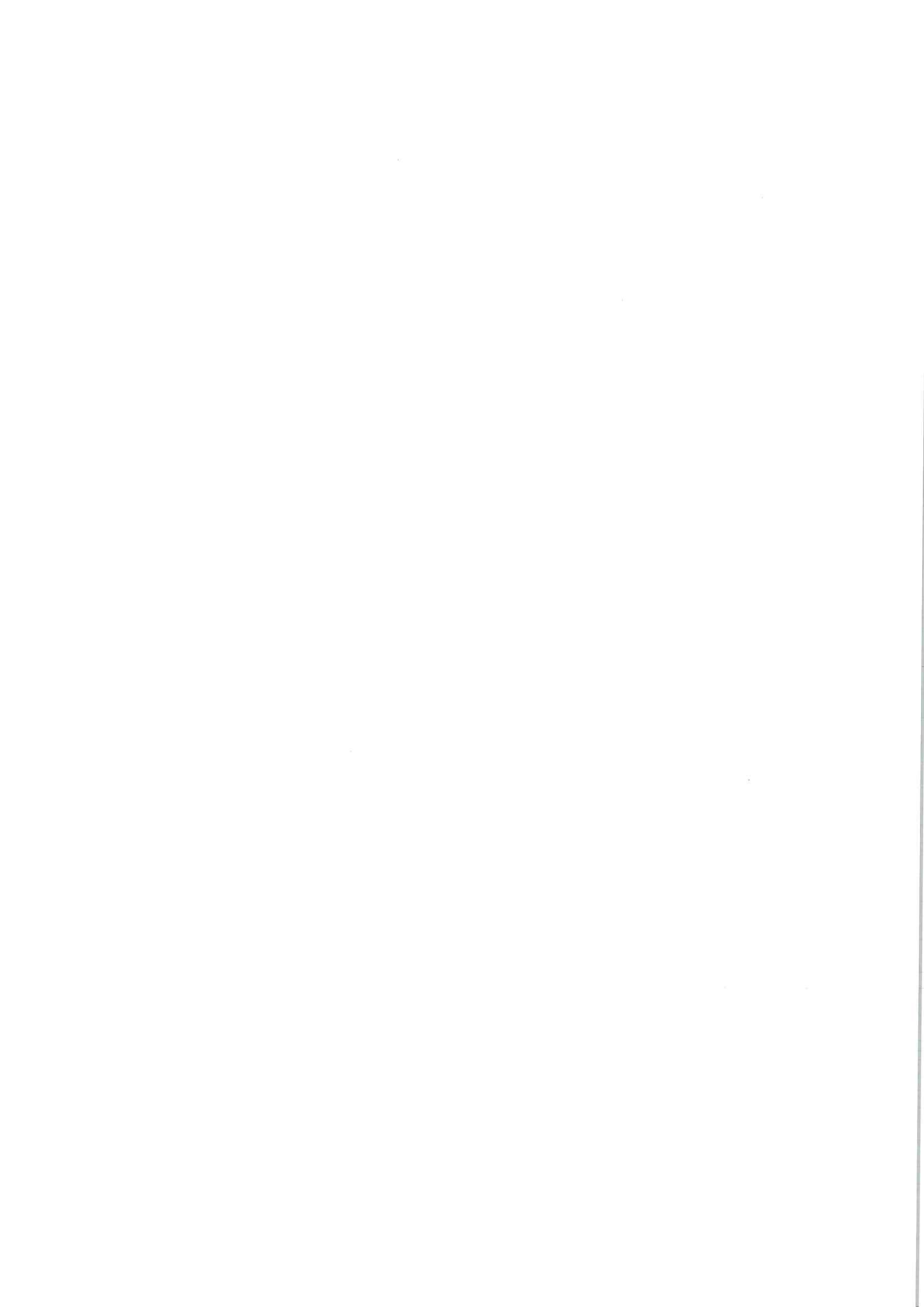


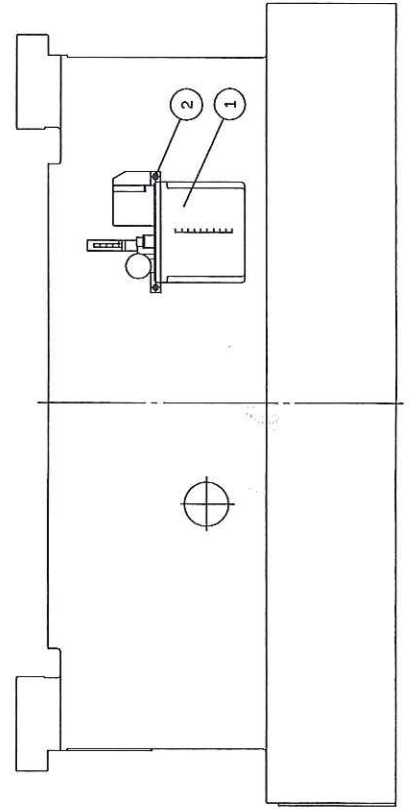
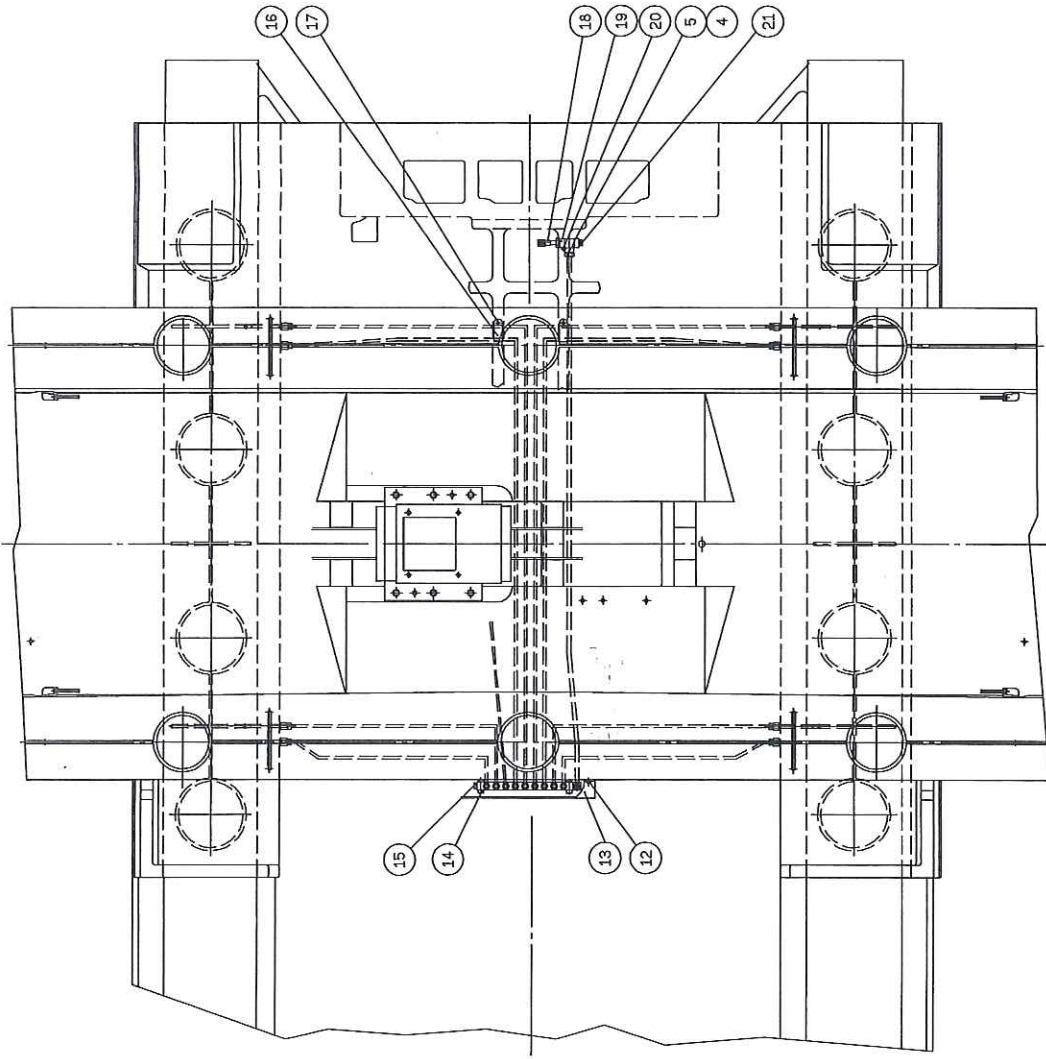
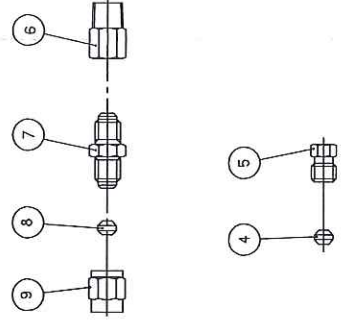
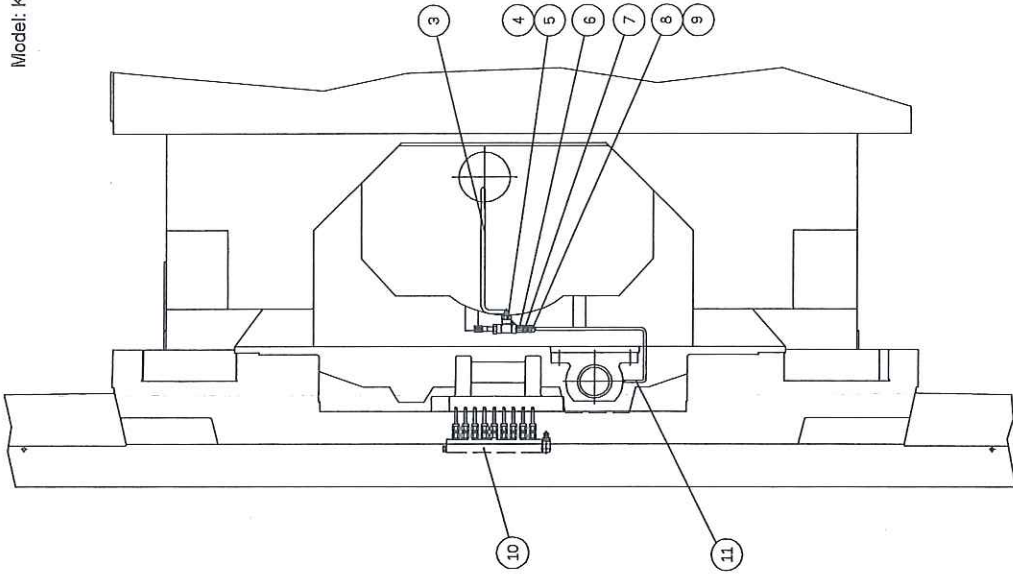


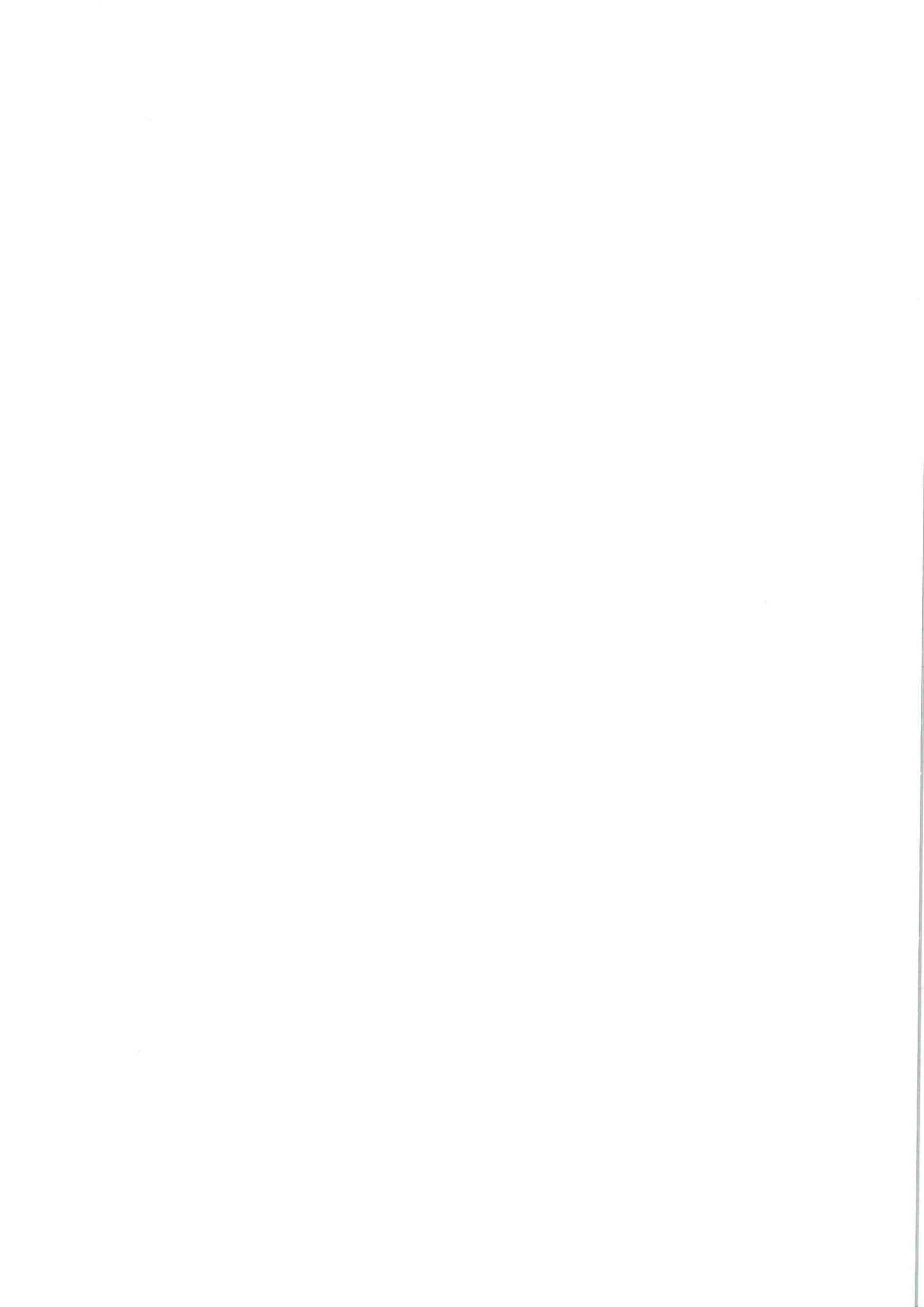


SADDLE LUBRICATION

Item	Parts No.	Name	Q'ty	Remark
1		Lubrication pump	1	CESA-10
2		Hex. socket screw	2	M6x1Px16L
3		Aluminum pipe	1	ϕ 6
4		Thimble	2	PB6
5		Thimble nut	2	PA6
6		Straight joint	1	PD401
7		Joint	1	CPB3
8		Thimble	1	PB4
9		Nut	1	PAN4
10		A type distributor	1	A10
11		Aluminum pipe	1	ϕ 4
12		Hex. socket screw	3	M6x1Px16L
13	S-1226	Cover	1	
14		Hex. socket screw	2	M5x0.8Px20L
15		Hex. nut	2	M5
16		Tube clips	2	ϕ 4
17		Round head screw	2	M5x0.8Px8L
18		Wire soft tube	1	ϕ 6x950L
19		T-joint	2	PKD6
20		Hex. socket screw	2	M6x1Px16L
21		Union	1	PG006
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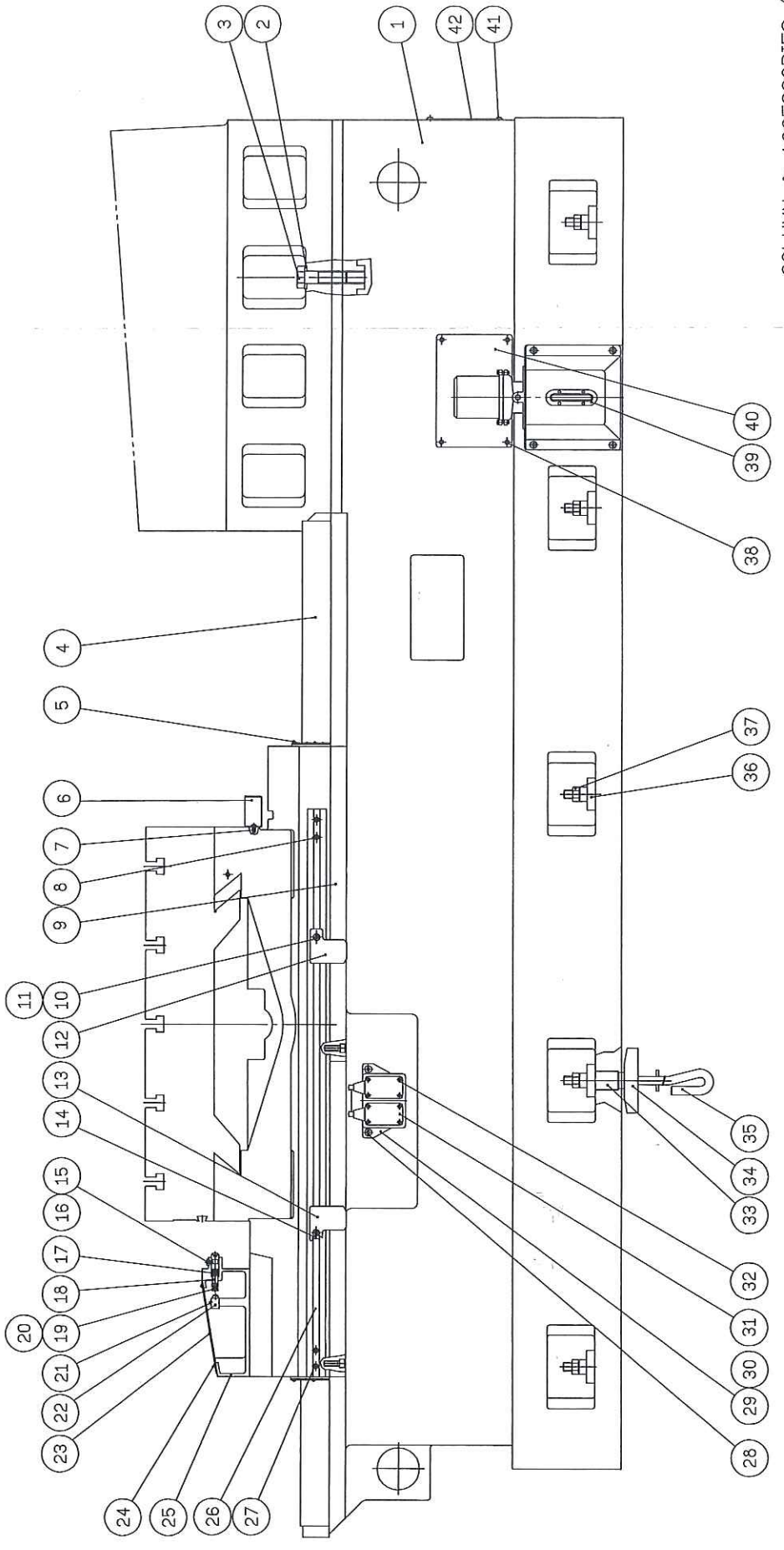
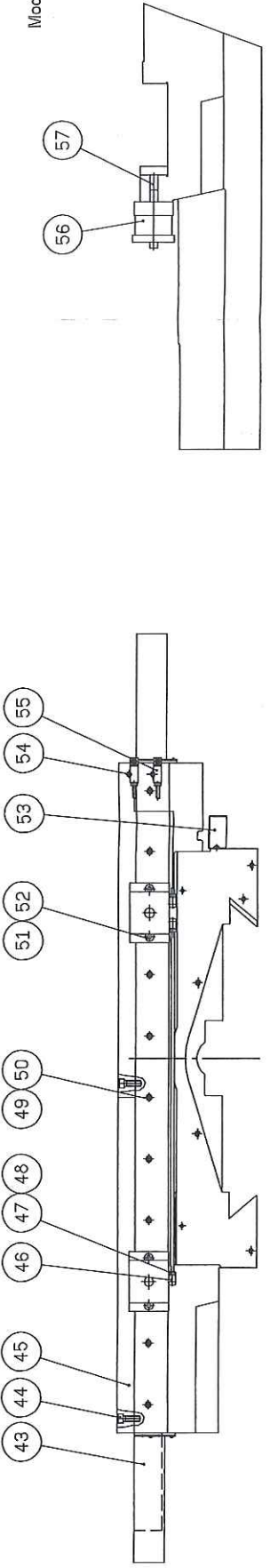


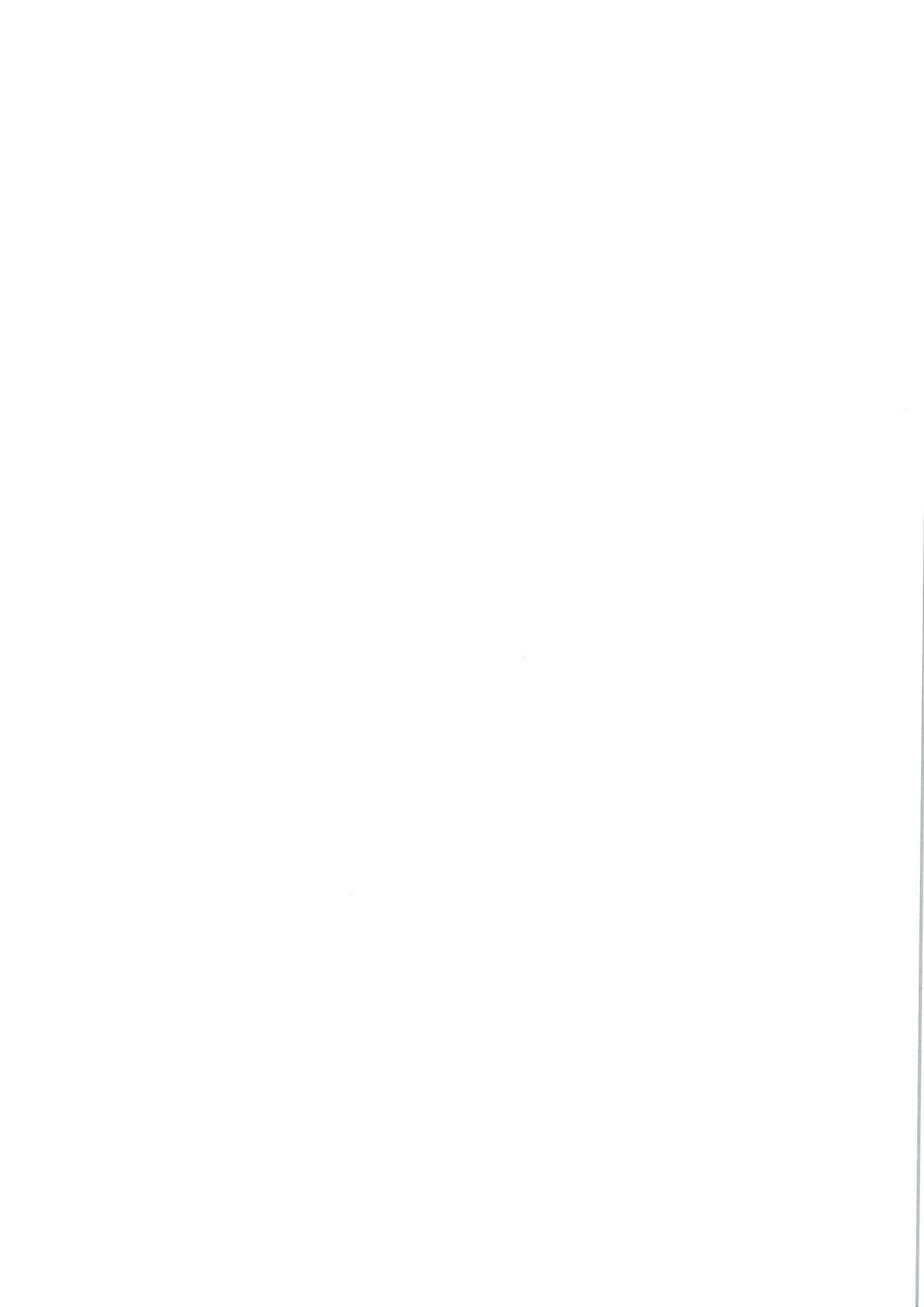
COLUMN & ACCESSORIES (1)

Item	Parts No.	Name	Q'ty	Remark
1	B8-1001	Base	1	
2		Washer	11	M24
3		Hex. head screw	11	M24x3Px90L
4	S8-1032	Cover	2	
5		Round head screw	16	M4x0.7Px16L
6	S5-1020	Cooling guide plate	1	
7		Round head screw	6	M6x1Px8L
8		Hex. socket screw	2	M5x0.8Px8L
9	S8-1014	Saddle fixing block	1	
10		Hex. socket screw	2	M8x1.25Px25L
11		Spring washer	2	M8
12	S-1230	Adjusting block	1	
13	S-1231	Adjusting block	1	
14	T-91	T block	2	
15		Hex. nut	2	M6
16		Hex. socket set screw	2	M6x1Px12L
17	S-150	Spring	2	
18	S-149	Switch touch lever	2	
19		Hex. head screw	2	M6x1Px25L
20		Hex. nut	2	M6
21		Round head screw	4	M4x0.7Px25L
22		Limit switch	2	IM1306
23	S5-1008	Cover	12	
24		Round head screw	4	M4x0.7Px8L
25	S5-1007	Electric switch seat	1	
26	S8-1013	Adjusting block seat	1	
27		Hex. socket screw	2	M6x1Px20L
28		Hex. socket screw	2	M8x1.25Px55L

COLUMN & ACCESSORIES (1)

Item	Parts No.	Name	Q'ty	Remark
29	B-14	Switch seat	1	
30	B8-1005	Block	1	
31		Limit switch	2	WLD2-0
32		Round head screw	8	M5x0.8Px40L
33	B-11	Adjust bolt	10	
34	B-16	Foundation washer	10	
35	B-10	Foundation bolt	10	
36	B-230	Adjusting nut	10	
37		Hex. nut	10	M16
38		Round head screw	4	M6x1Px8L
39		Oil level gage	1	
40	B5-1006	Cover	1	
41		Round head screw	4	M6x1Px8L
42	B5-1007	Cover	1	
43	S8-1031	Cover	2	
44		Hex. socket screw	24	M10x1.5Px35L
45	S8-1015	Saddle fixed block	2	
46		Elbow joint	4	PH601
47		Thimble nut	5	PA6
48		Thimble	5	PB6
49	H-641	Adjustable bolt	9	M10x1.5Px55L
50		Hex. nut	9	M10
51		Hex. socket screw	4	M10x1.5Px40L
52		Spring washer	4	M10
53	S5-1019	Cooling guide plate	1	
54		Hex. socket screw	2	M5x0.8Px25L
55		Joint	2	JD601
56		Air cylinder	2	
57	S8-1025	Locating pin	2	





COLUMN & ACCESSORIES (2)

Item	Parts No.	Name	Q'ty	Remark
1	C8-1001	Column	1	
2		Hex. socket screw	1	M16x2Px130L
3	C-385	Washer	2	
4		Hex. socket screw	6	M8x1.25Px25L
5	C8-1007	Fixed shaft	2	
6		Hex. socket screw	6	M8x1.25Px25L
7	C-85	Cover	1	
8		Rivet	4	φ 2x5L
9		Name plate	1	
10	C8-1006	Balance weight	1	
11		Hex. nut	4	M20
12	C-403	Blot	4	
13		Chain	2	RS50x131P
14	C-1197	Name plate	2	
15		Round head screw	8	M4x0.7Px10L
16		C-snap ring	2	R115
17		Ball bearing	1	6015z
18		Thrust bearing	1	51215
19	E-528	Bracket	1	
20		Hex. socket screw	4	M8x1.25Px30L
21	E8-1001	Link	1	
22		Hex. socket screw	5	M16x2Px65L
23	C8-1004	Top cover	1	
24		Hex. socket screw	4	M5x0.8Px16L
25	C-431	Fixed seat	1	
26	C5-1006	Spring steel belt	1	
27		Round head screw	4	M5x0.8Px8L
28		Elbow joint	3	PH601

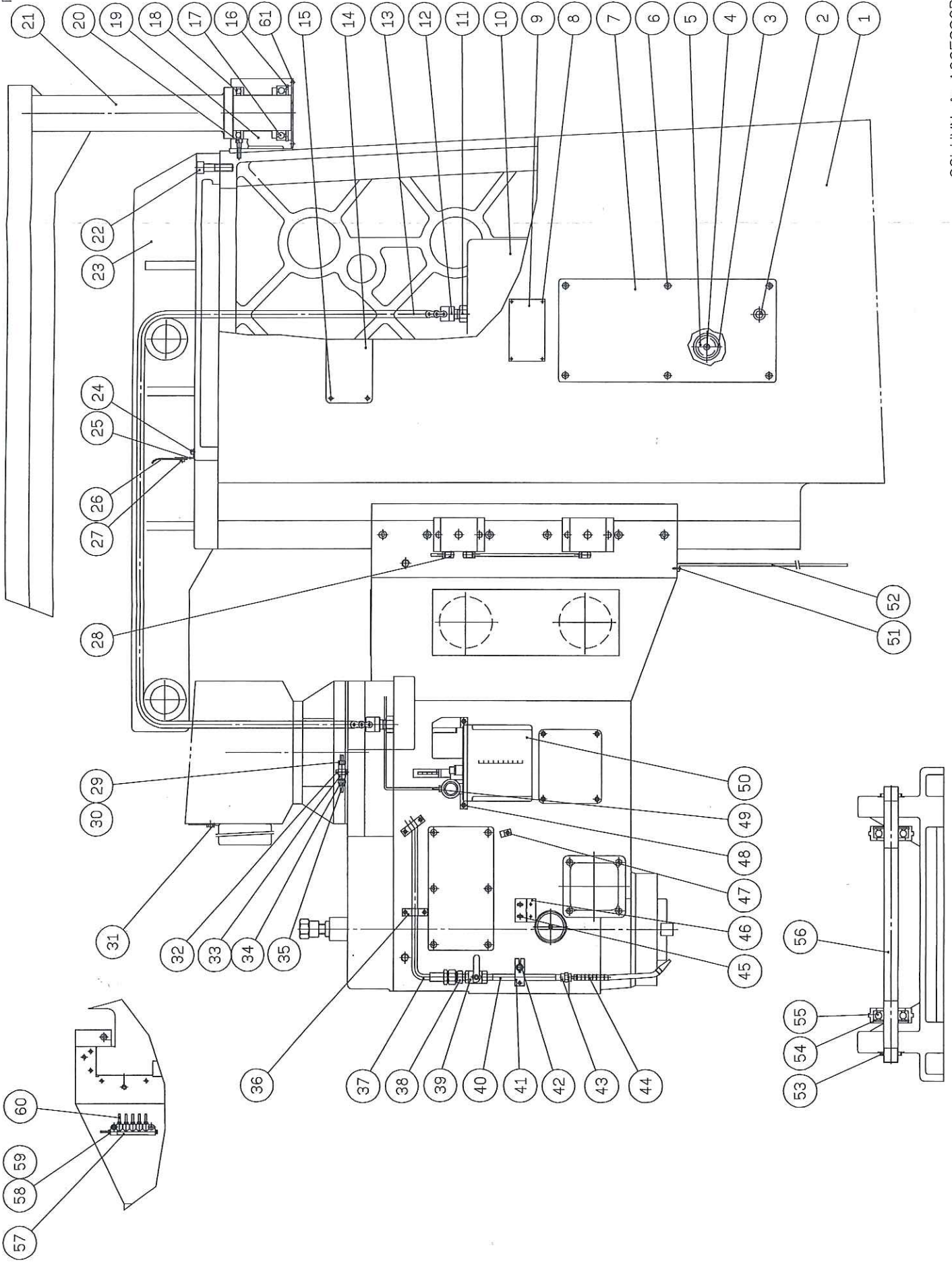
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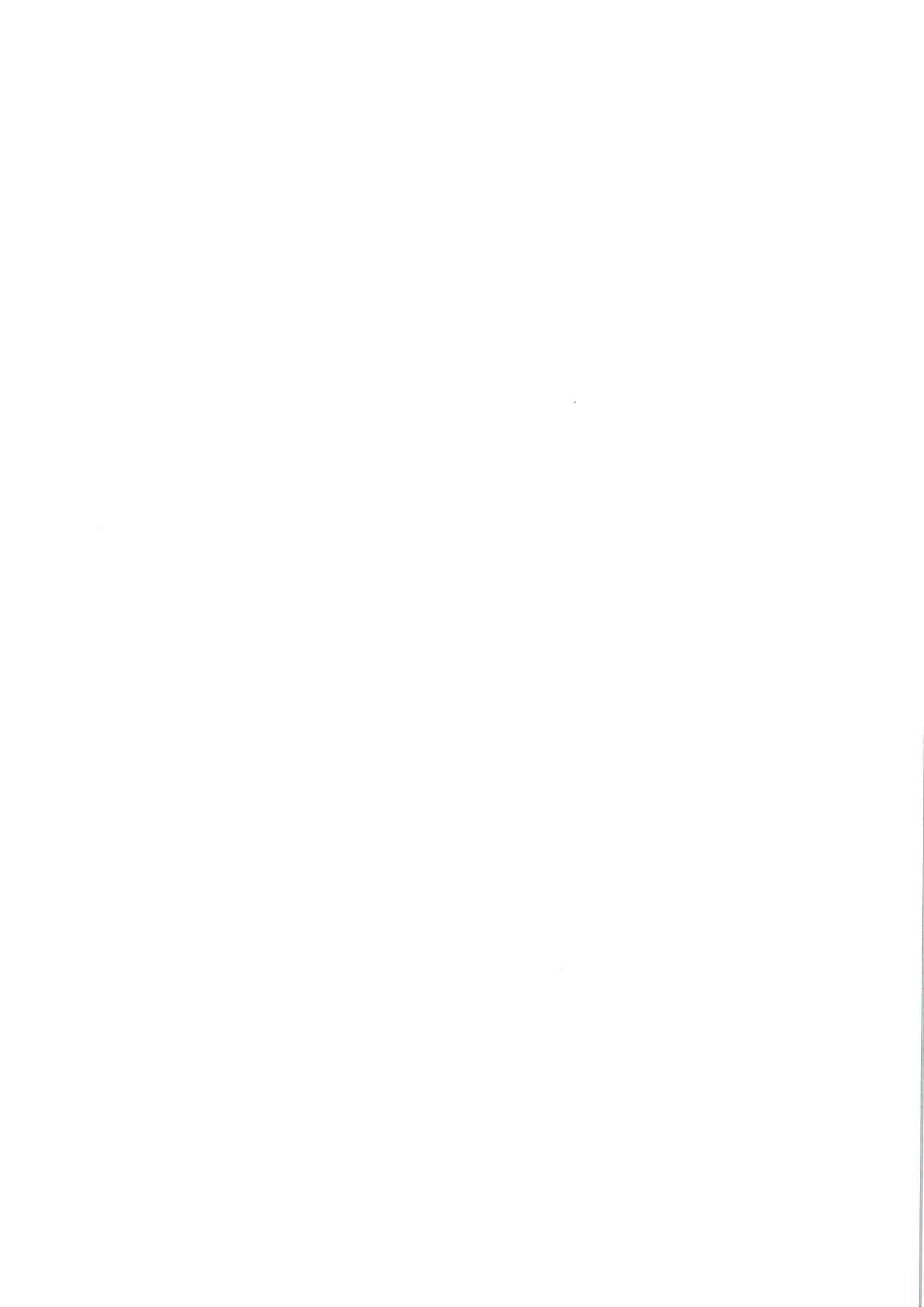
Item	Parts No.	Name	Q'ty	Remark
29		Thimble nut	4	PA6
30		Thimble	4	PB6
31	C-429	Spring fixed plate	1	
32		Hex. socket screw	1	M5x0.8Px25L
33		Joint	1	JD601
34		Connector	1	SPC601
35		Hex. nut	1	M5
36		Pipe clip	2	1/2
37		Oil hose	1	1/2x5000L
38		Hose connector	1	PS1/2xPT1/4
39		Cock	1	PT1/4
40	C-11	Pipe	1	
41	H-2805	Fixed block	1	
42	H-315	Shaft	1	
43		Joint	1	PT1/4
44		Nozzle pipe	1	PT1/4x250L
45		Round head screw	2	M4x0.7Px25L
46	E-1039	Switch seat	1	
47		Round head screw	7	M4x0.7Px8L
48		Hex. socket screw	2	M6x1Px20L
49		Aluminum pipe	1	φ 6
50		Oil pump	1	CESMA-15
51		Round head screw	3	M6x1Px12L
52	C8-1005	Dust guard	1	
53	K-144	Lock nut	2	
54		C-snap ring	2	R72
55		Ball bearing	2	6306zz
56	C-406a	Sprocket shaft	1	

COLUMN & ACCESSORIES (2)

Item	Parts No.	Name	Q'ty	Remark
57		A type distributor	1	DB6
58		Thimble	6	PB4
59		Thimble nut	6	PA4
60		Aluminum pipe	1	ϕ 4
61	E8-1014	Cover	1	
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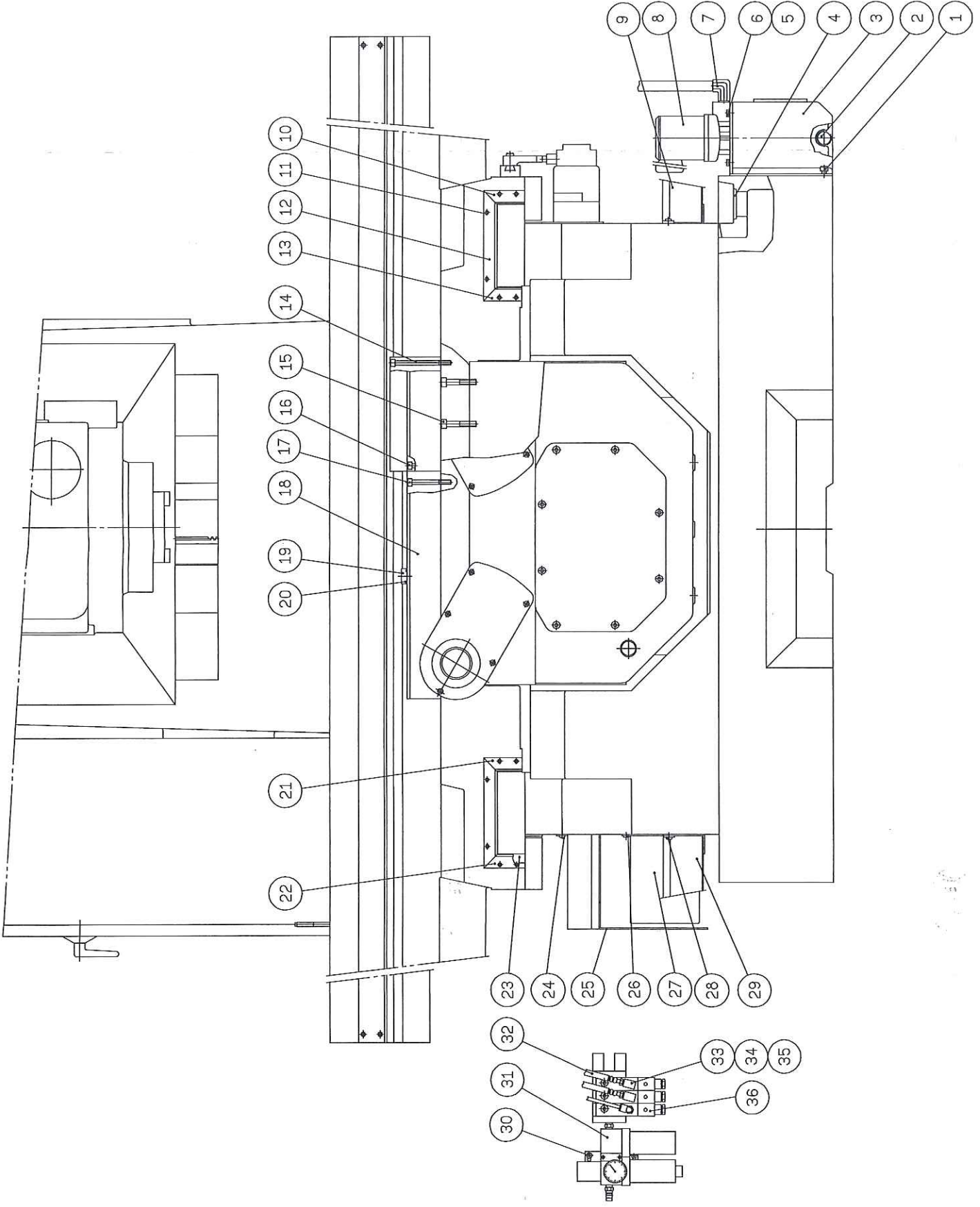


COLUMN & ACCESSORIES (3)

Item	Parts No.	Name	Q'ty	Remark
1		Hex. socket screw	4	M8x1.25Px25L
2		Plug	1	PT3/4
3	B-289	Coolant pump frame	1	
4	B-284a	Fuel filter screen	2	
5		Spring washer	4	M6
6		Hex. socket screw	4	M6x1Px20L
7		Elbow joint	1	PT1/2
8		Pump	1	1/6HPx150L
9	B8-1003	Cooling guide plate	1	
10	S8-1029	Wiper	2	
11		Round head screw	24	M4x0.7Px10L
12	S8-1027	Wiper	2	
13	S8-1030	Wiper	2	
14		Hex. socket screw	2	M8x1.25Px90L
15		Hex. socket screw	12	M10x1.5Px55L
16		Hex. socket screw	2	M8x1.25Px60L
17		Hex. socket screw	10	M8x1.25Px60L
18	S5-1009	Control seat	1	
19	S-143	Bolt	1	
20		O ring	1	P18
21	S8-1028	Wiper	2	
22	S8-1026	Wiper	2	
23	S8-1016	Gib	1	
24		Round head screw	2	M6x1Px8L
25	B-637	Cover	1	
26		Round head screw	4	M6x1Px8L
27	B-288	Connection box	1	
28		Round head screw	12	M6x1Px12L

COLUMN & ACCESSORIES (3)

Item	Parts No.	Name	Q'ty	Remark
29	B8-1002	Cooling guide plate	1	
30		Hex. socket screw	2	M6x1Px20L
31		Air unit	1set	MACP300-8A
32		Wire soft tube	2	φ 6x700L
33		Elbow joint	2	PH601
34		Thimble nut	2	PA6
35		Thimble	2	PB6
36		Solenoid valve	3	MVSC-220-4EI
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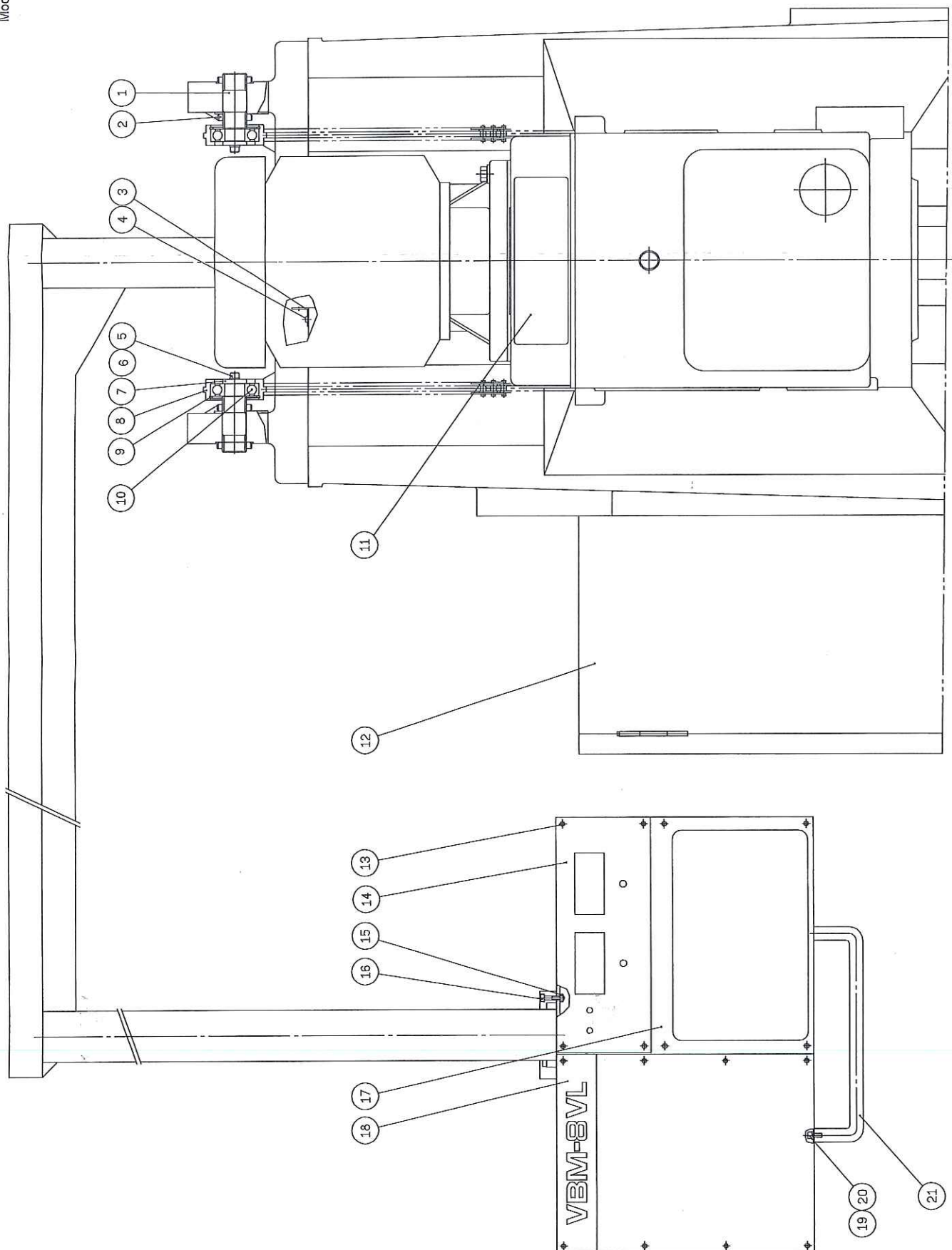




COLUMN & ACCESSORIES (4)

Item	Parts No.	Name	Q'ty	Remark
1	C-411	Guard rubber	2	
2	C-410	Adjusting nut	4	
3	E8-1013	Switch seat	1	
4		Round head screw	2	M5x0.8Px10L
5		Hex. socket screw	2	M8x1.25Px16L
6		Spring washer	2	M8
7	C-408	Washer	2	
8	C-409	Sprocket	4	
9		C-snap ring	2	R72
10		Ball bearing	2	6306zz
11	C-1196	Name plate	1	
12	E8-1006	Electric box	1	
13		Round head screw	18	M4x0.7Px8L
14	E8-1005	Name plate	1	
15		Hex. nut	4	M6
16		Hex. socket screw	4	M6x1Px30L
17	E8-1004	Operation box	1	
18	E8-1003	Name plate	1	
19		Hex. socket screw	2	M8x1.25Px16L
20		Spring washer	1	M8
21	E-1009	Handle	1	
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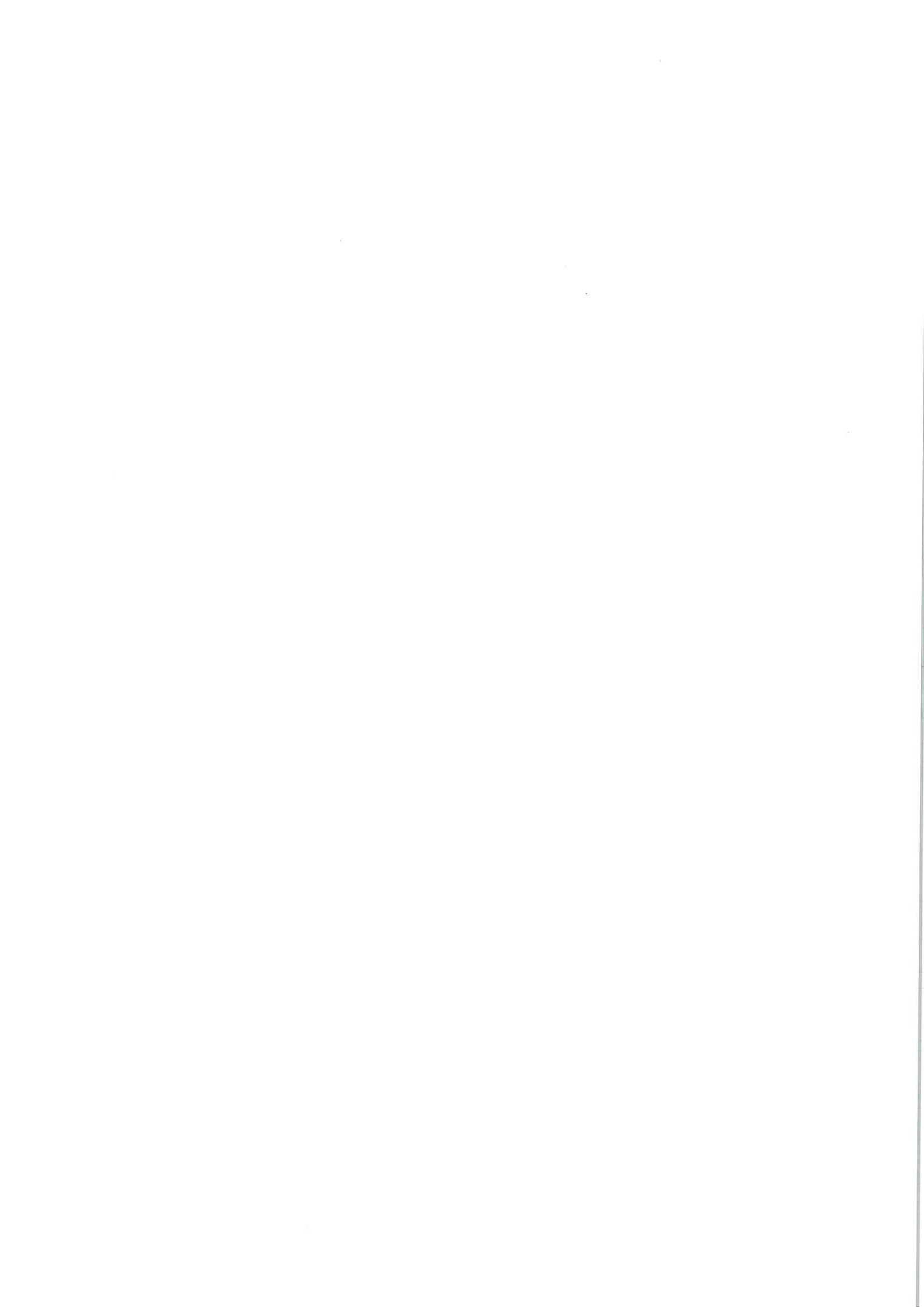


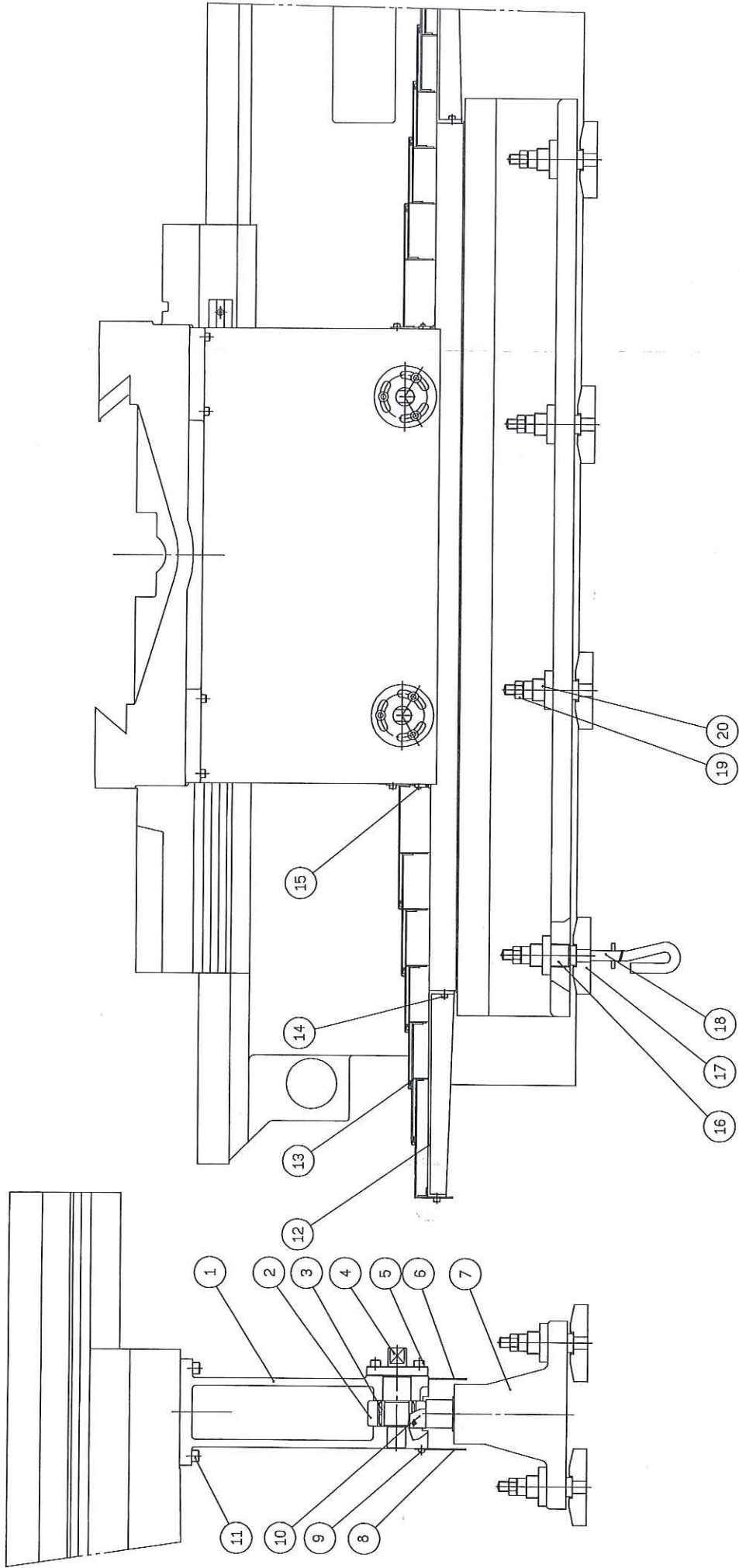




COLUMN & ACCESSORIES (5)

Item	Parts No.	Name	Q'ty	Remark
1	S8-1008	Support	2	
2	S-2184	Collar	4	
3		Needle bearing	4	NA6908
4	S5-1022	Fixed shaft	4	
5		Hex. socket screw	12	M10x1.5Px30L
6	S8-1011	Cover	2	
7	B8-1004	Aux. slide way	2	
8	S8-1012	Cover	2	
9		Round head screw	16	M6x1Px10L
10	S-2216	Wiper	4	
11		Hex. socket screw	16	M8x1.25Px35L
12	S8-1010	Bracket	4	
13	S8-1009	Telescopic cover	4	
14		Hex. socket screw	24	M6x1Px15L
15		Round head screw	8	M6x1Px10L
16	B-11	Adjust bolt	8	
17	B-16	Foundation washer	8	
18	B-10	Foundation bolt	8	
19		Hex. nut	8	M16
20	B-230	Adjusting nut	8	
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Sharp Industries, Inc.
3501 Challenger Street
Torrance, CA 90503 USA
Tel (310) 370-5990, Fax (310) 542-6162
www.sharp-industries.com

