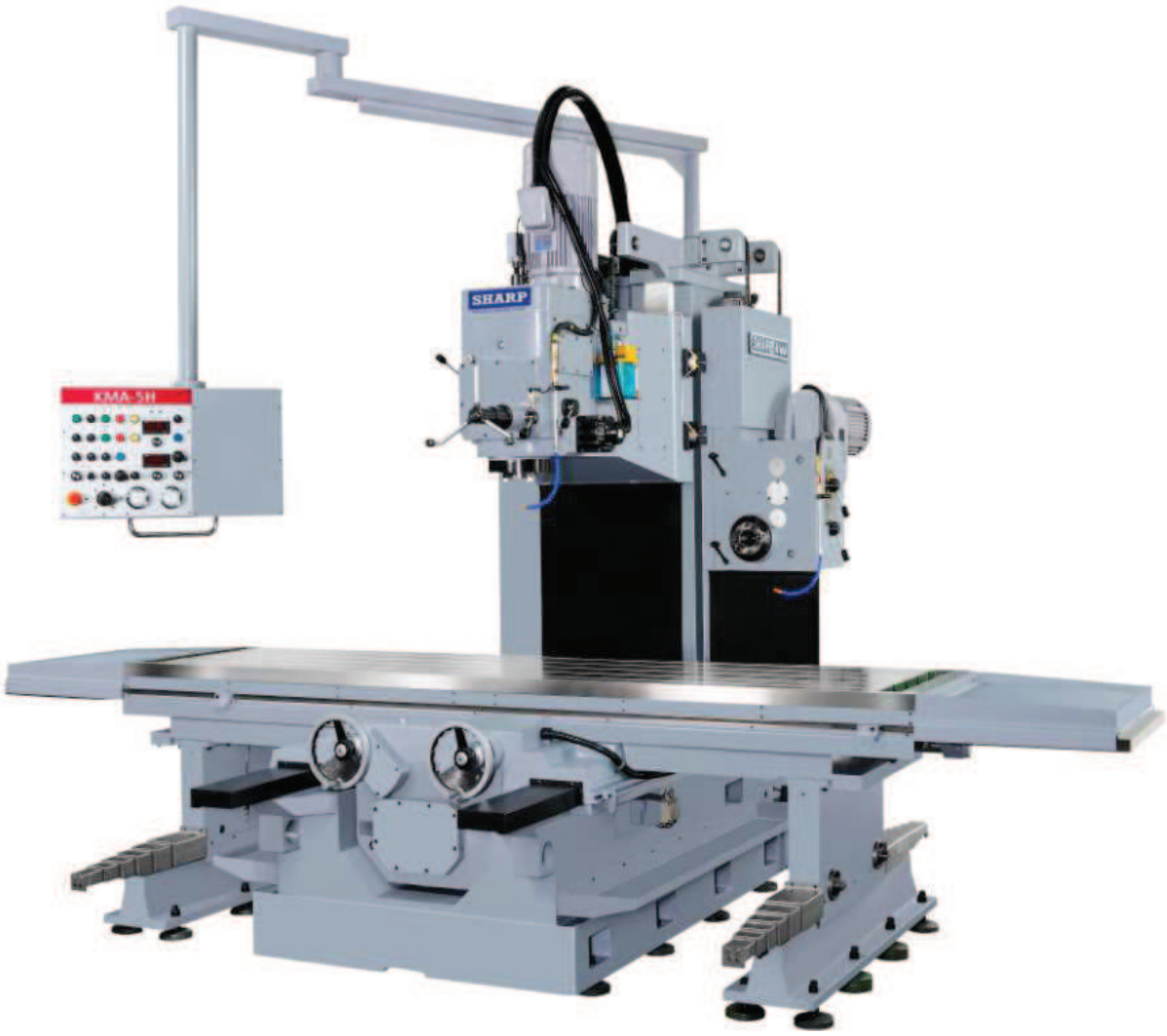
VERTICAL BED TYPE MILLING & BORING MACHINE

KMA-5, KMA-5H

Operation & Parts Manual



MODEL KMA-5H
(WITH OPTIONAL FEATURES)

SHARP
PRECISION MACHINE TOOLS

C O N T E N T S

1. Outline of machine

1-1 Specifications (Model: KMA-5H)

CAPACITY	
Working surface of table(length x width)	2700 x 750mm
Travel longitudinal x cross	2000 x 800mm
Vertical spindle head travel(vertical)	700mm
Horizontal spindle head travel(vertical)	650mm
Vertical spindle nose to table top	70-770mm
Vertical spindle center to column front	800mm
Horizontal spindle center to vertical spindle center distance	610mm
TABLE	
T-slot (Wide x No. x Pitch)	18mm x 5 x 150mm
Table top to floor	900mm
SPINDLE HEAD	
Spindle Nose	ISO R297 No.50
Vertical spindle speeds	45-1500RPM (60Hz) Infinitely variable
Horizontal spindle speeds	40-1450RPM (60Hz) 34-1210RPM (50Hz)
Change of vertical spindle speed	Infinitely variable
Change of horizontal spindle speed	12 steps
Automatic Feeds (vertical spindle)	3~300mm/min
Feed	
Rapid traverse (longitudinal & cross)	3100mm/min
Feed rates (longitudinal & cross) (Infinitely variable)	28-1000mm/min
Change of feed	Infinitely variable
Rapid feed of horizontal spindle	3800mm/min
Auto feed of horizontal spindle (Infinitely variable)	28-1000mm/min
MOTORS	
Vertical spindle	AC11KW (15HP)-4P
Horizontal spindle	AC5.5KW (7.5HP)-6P
X & Y Axes feed (servo motor)	AC3.5kW
Z Axis feed (servo motor) (vertical spindle)	AC1.3kW
W Axis feed (servo motor)	AC0.85kW
Lubrication	AC3.5W-2P
Cutting fluid	AC0.12kW(1/6HP)-2P
Machine size	
Floor space (longitudinal x cross)	5712 x 3075mm
Machine height	3198mm
Net weight (Approx.)	13000kgs
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:

1. Digital scale
2. Power draw bar

1. Outline of machine

1-1 Specifications (Model: KMA-5H)

CAPACITY	
Working surface of table(length x width)	3200 x 750mm
Travel longitudinal x cross	2500 x 800mm
Vertical spindle head travel(vertical)	700mm
Horizontal spindle head travel(vertical)	650mm
Vertical spindle nose to table top	70-770mm
Vertical spindle center to column front	800mm
Horizontal spindle center to vertical spindle center distance	610mm
TABLE	
T-slot (Wide x No. x Pitch)	18mm x 5 x 150mm
Table top to floor	900mm
SPINDLE HEAD	
Spindle Nose	ISO R297 No.50
Vertical spindle speeds	45-1500RPM (60Hz) Infinitely variable
Horizontal spindle speeds	40-1450RPM (60Hz) 34-1210RPM (50Hz)
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Z Axis feed (servo motor) (vertical spindle)	AC1.3kW
W Axis feed (servo motor)	AC0.85kW
Lubrication	AC3.5W-2P
Cutting fluid	AC0.12kW(1/6HP)-2P
Machine size	
Floor space (longitudinal x cross)	6962 x 3075mm
Machine height	3198mm
Net weight (Approx.)	13700kgs
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:

1. Digital scale
2. Power draw bar

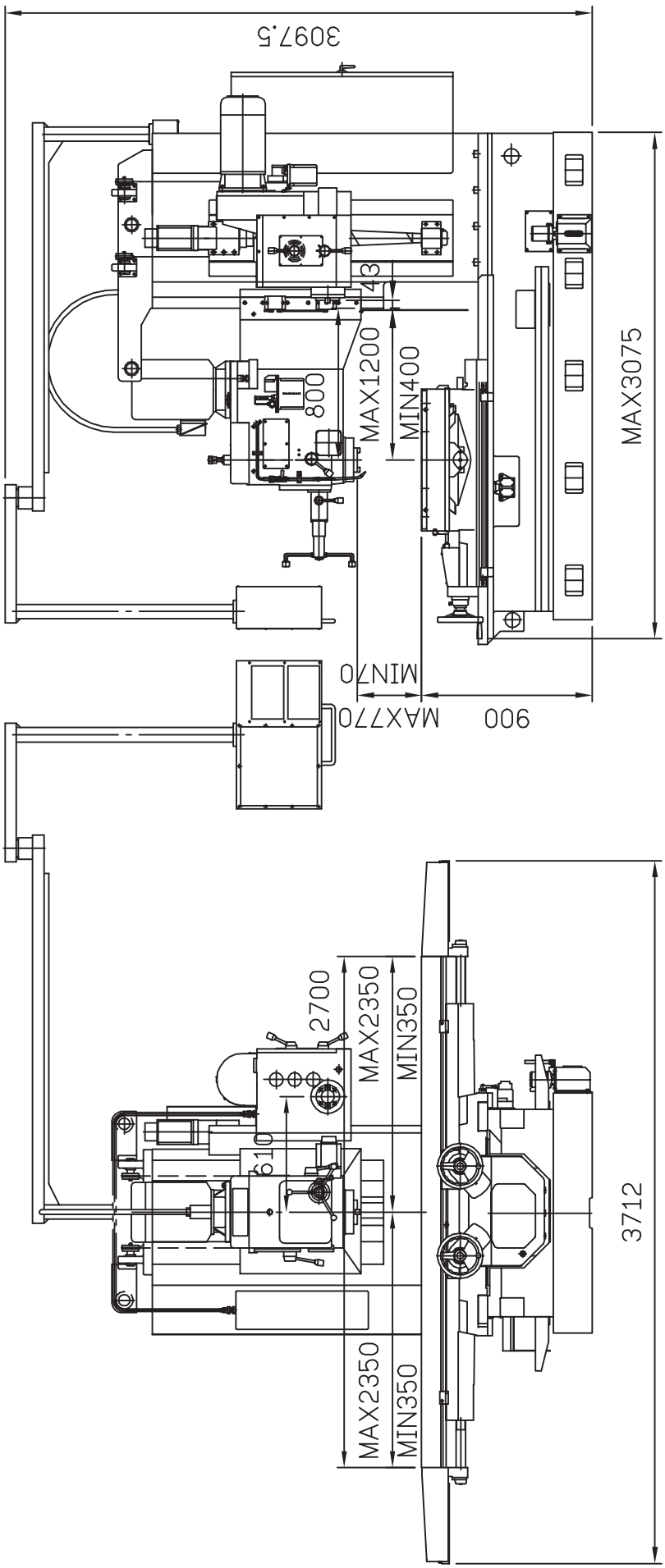


Fig. 1 The Dimension of Vertical Boring & Milling Machine

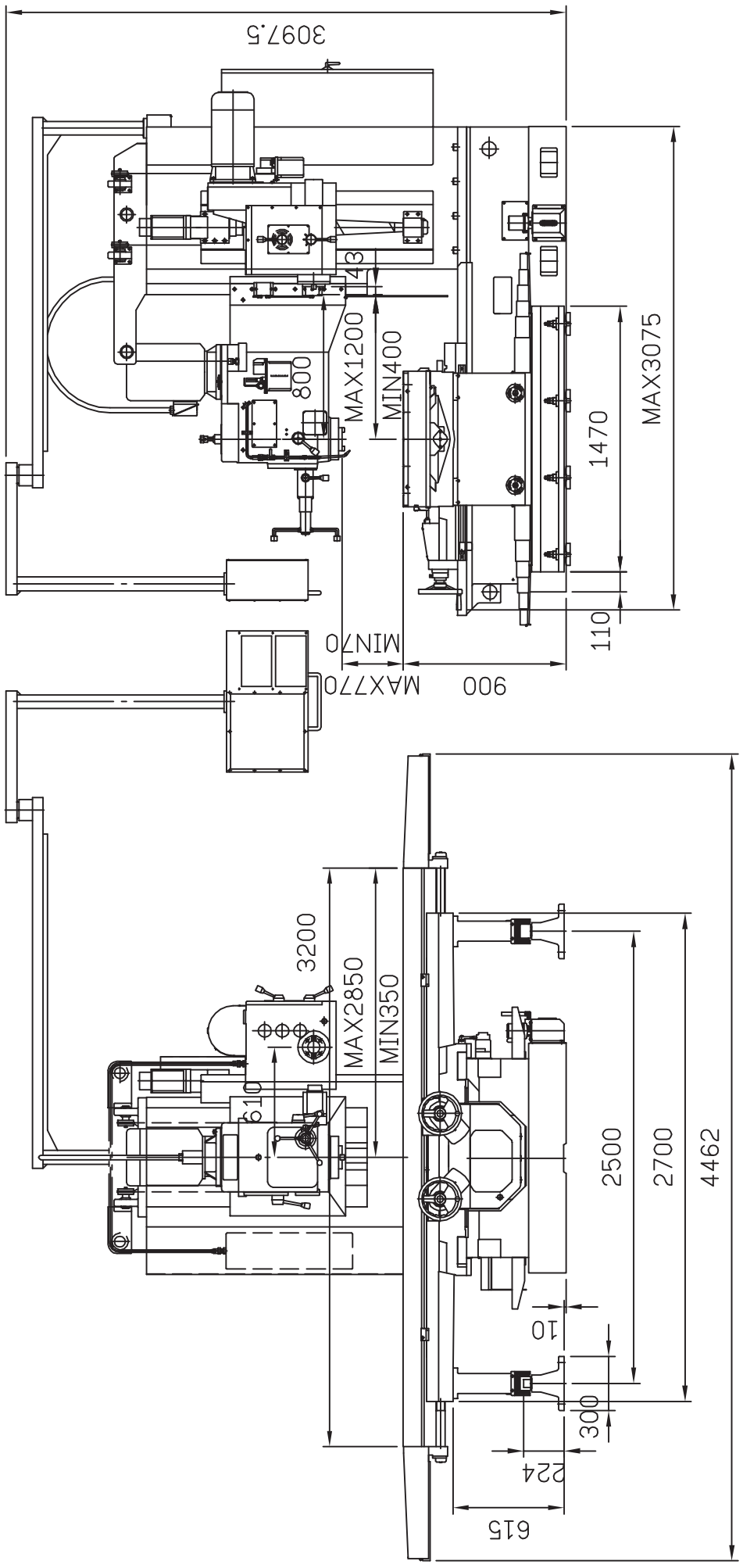


Fig. 1 The Dimension of Vertical Boring & Milling Machine

Fig. 2 Dimension of table

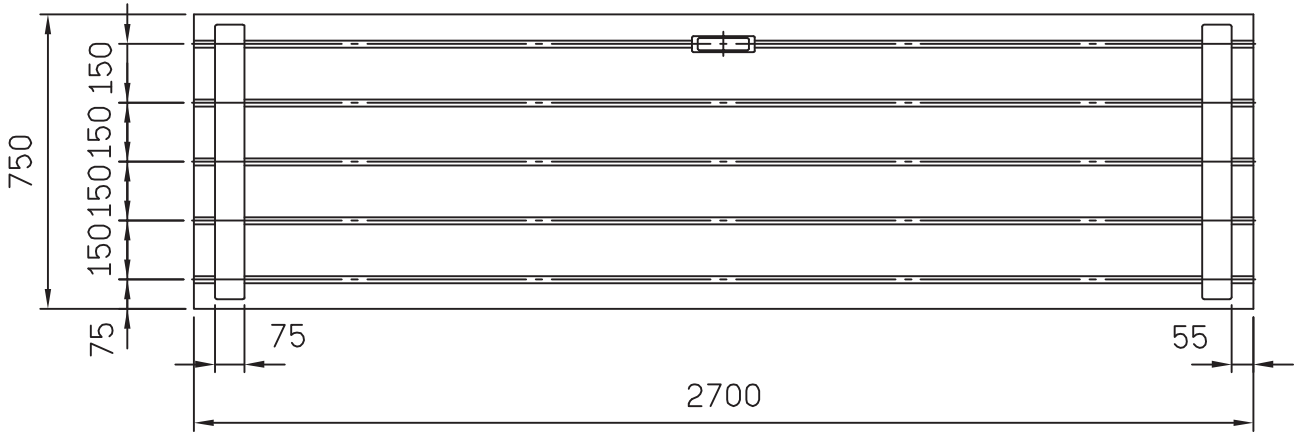


Fig. 3 Dimension of T- slot

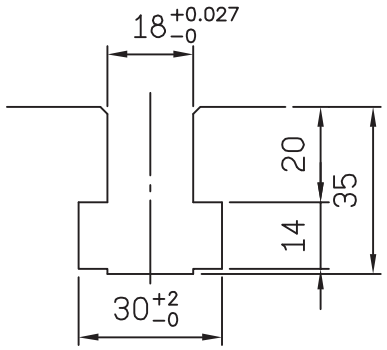
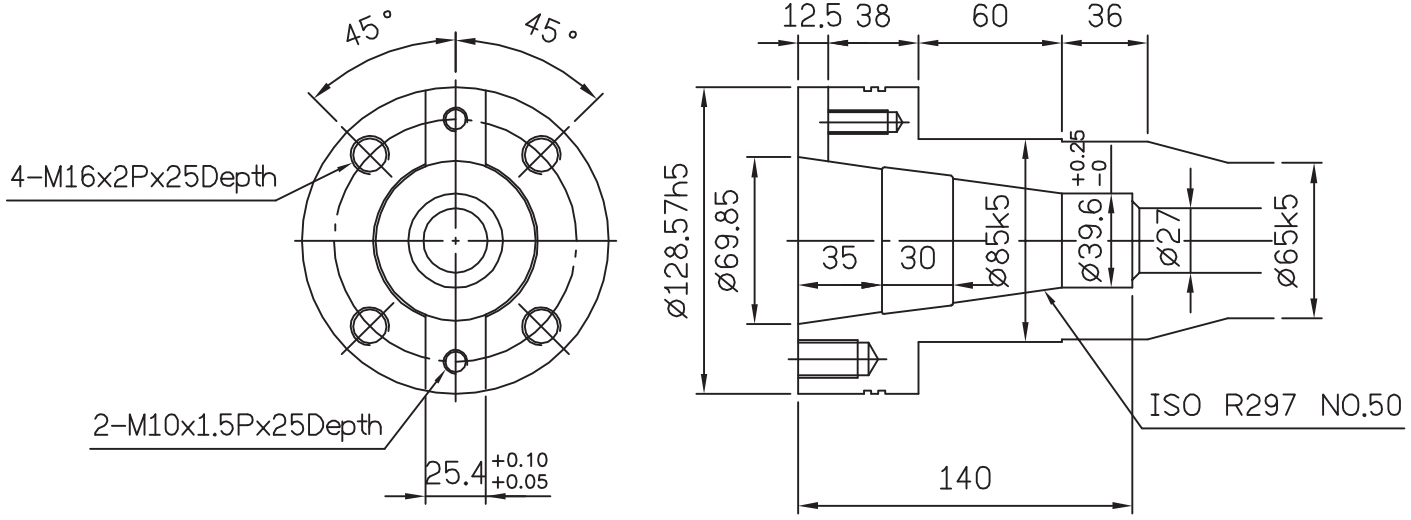


Fig. 4 Dimension of spindle nose



1-2 Main dimension

Fig. 2 Dimension of table

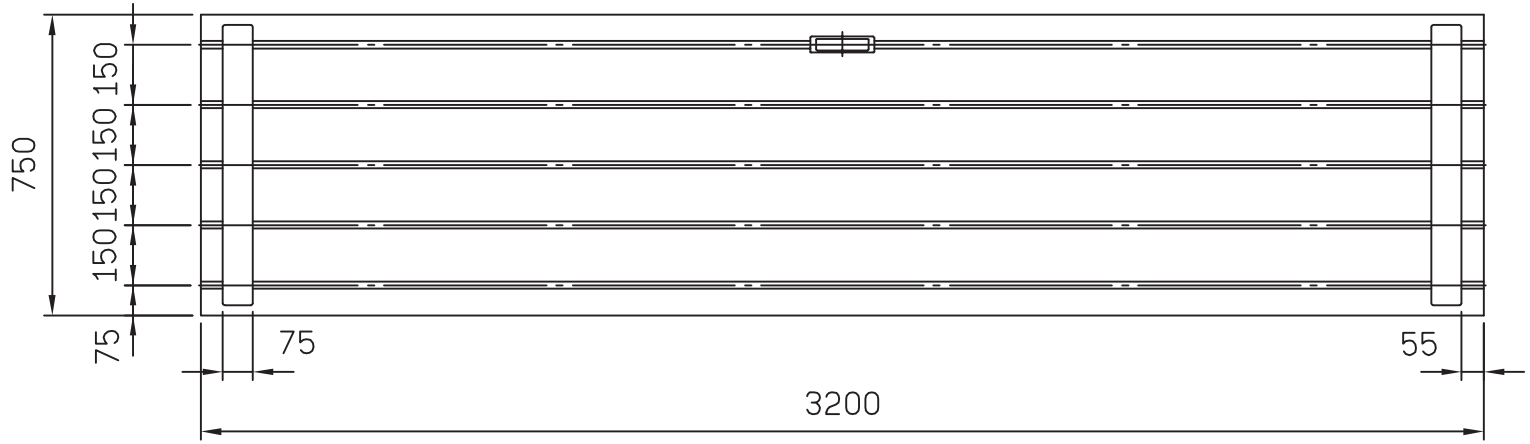


Fig. 3 Dimension of T- slot

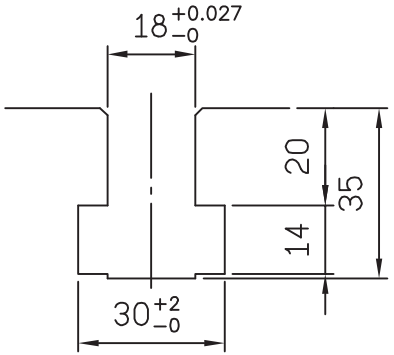
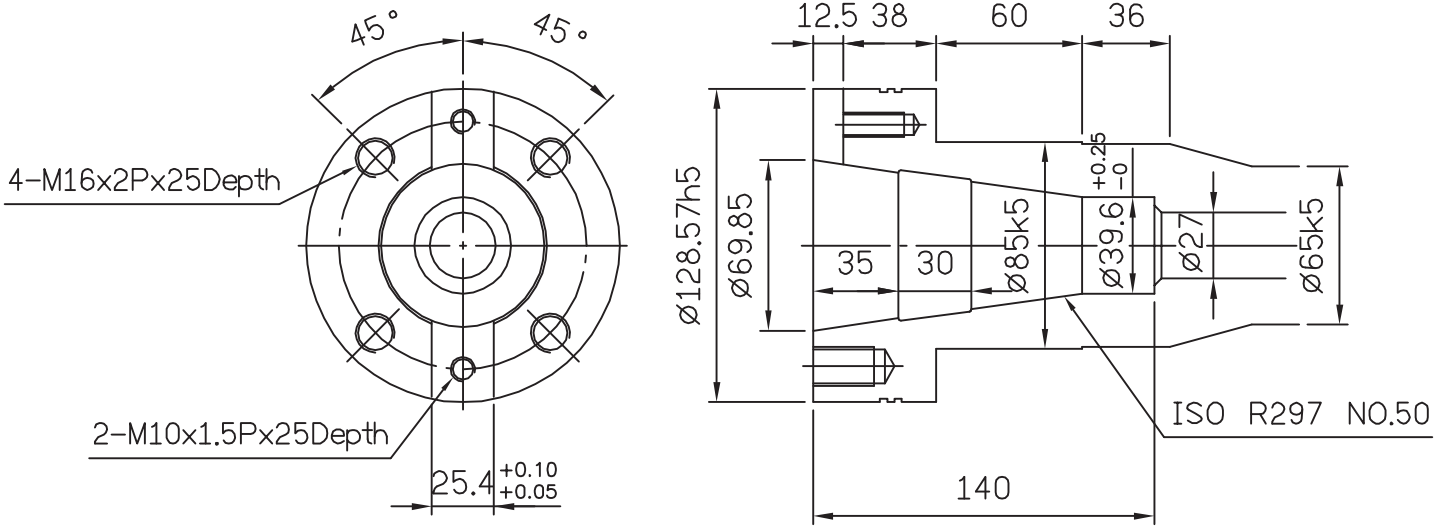


Fig. 4 Dimension of spindle nose



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
17. Horizontal spindle head
18. Horizontal spindle speed selection lever
19. Horizontal spindle speed range selection lever

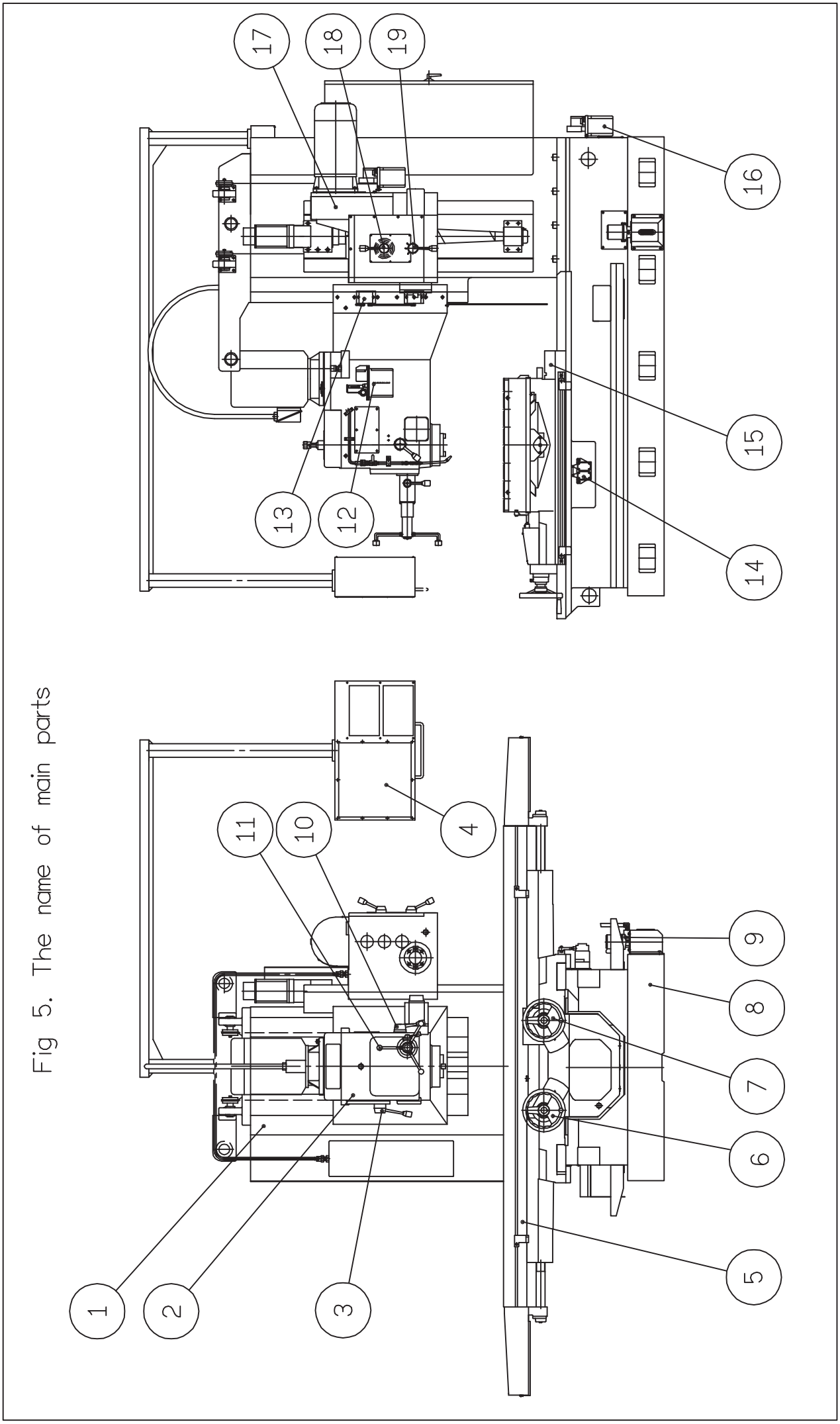


Fig 5. The name of main parts

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 both balancing weight at the position of side of column by using the hand wheel for vertical spindle head rapid feed (2), and rotate MPG (Fig.15 ,S18) for horizontal spindle head. 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 and move horizontal spindle head upward, then insert the support bar (4) between column and horizontal spindle head, 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 machin base and floor.

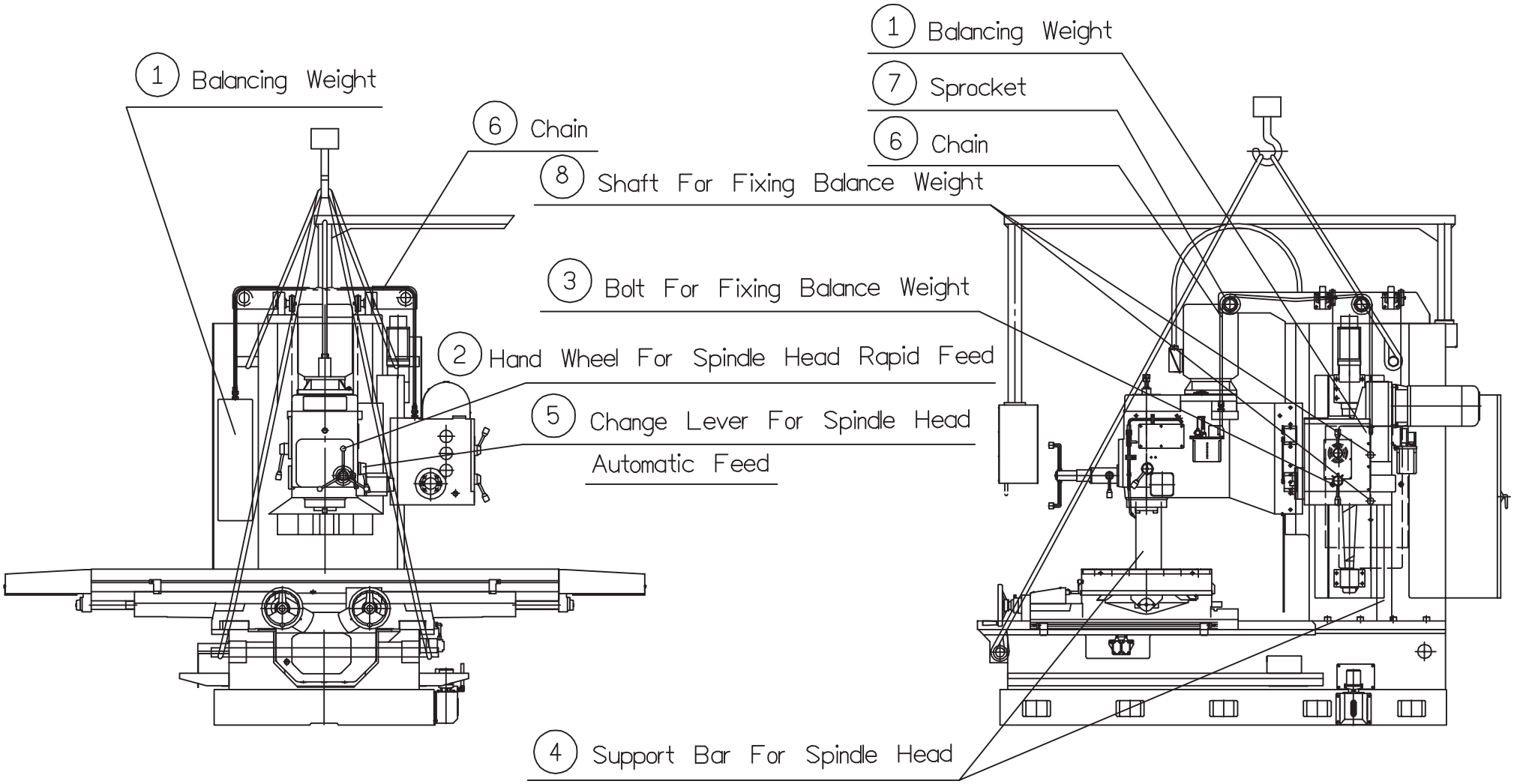
2-4 Cleaning the machine

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.

Fig 6. Method Of Lifting The Machine



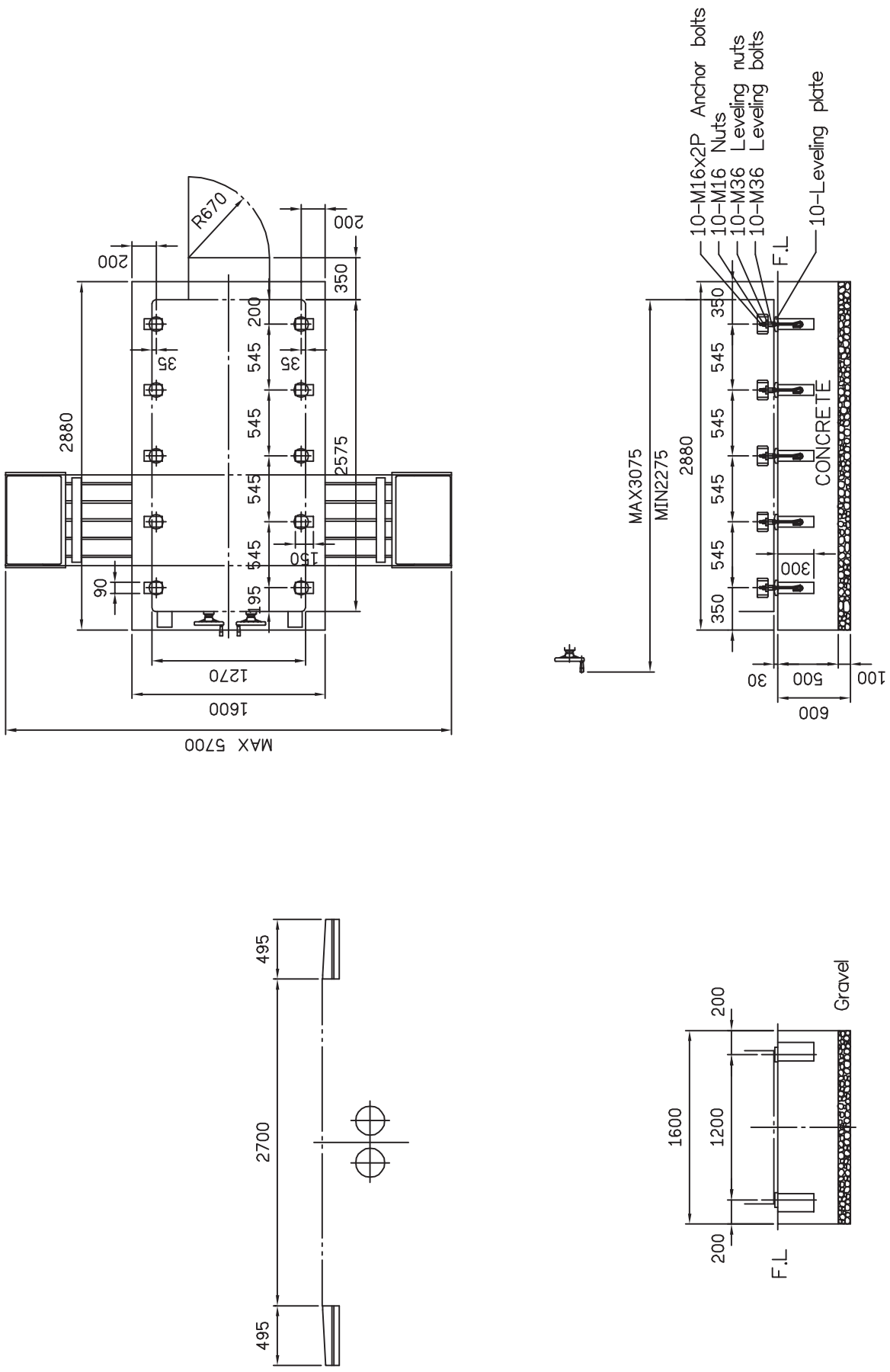
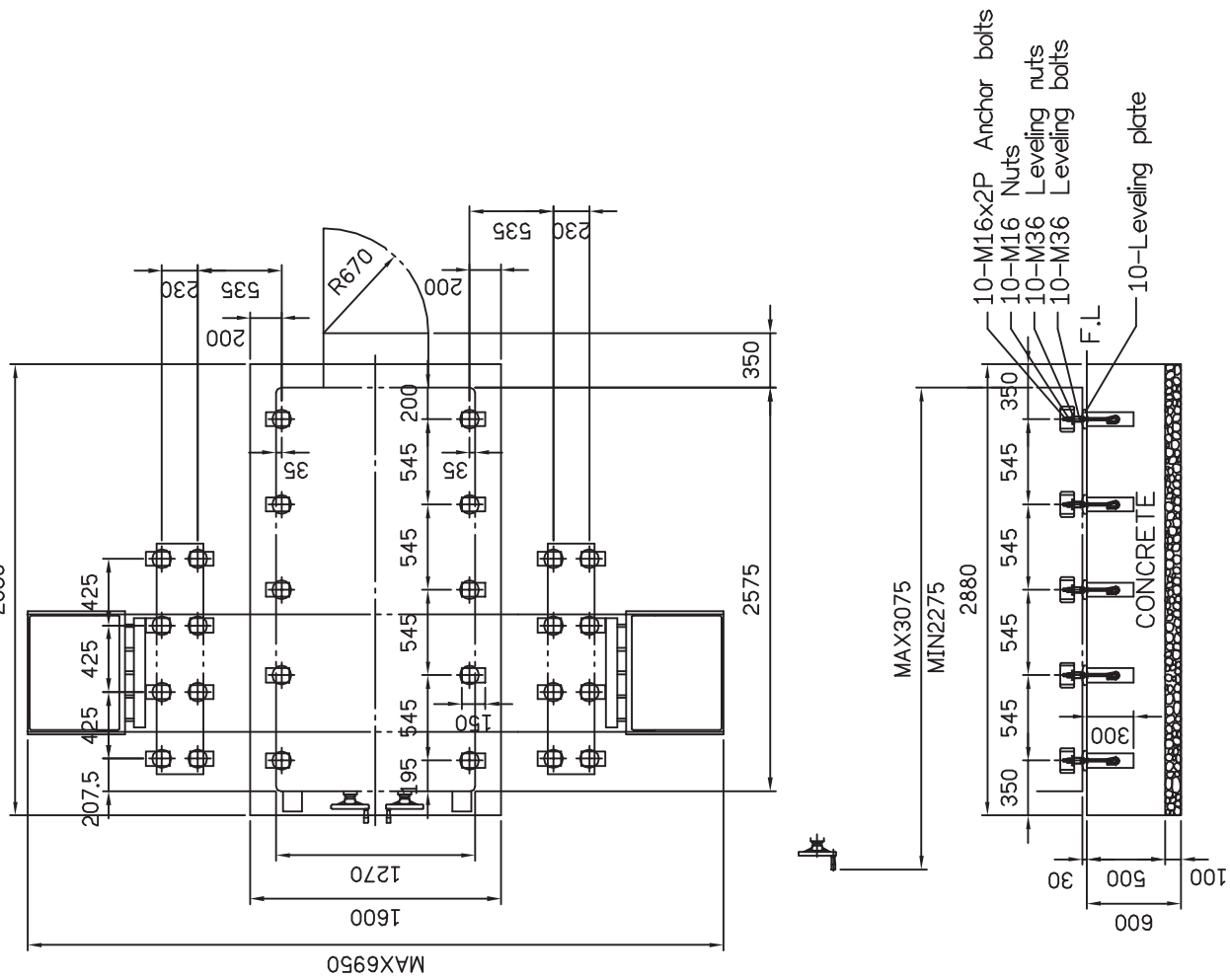
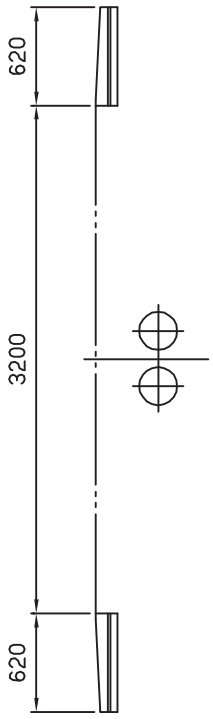


Fig. 7 Foundation drawing (8VL&8VHL)





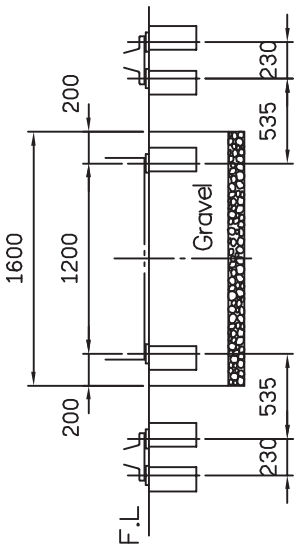
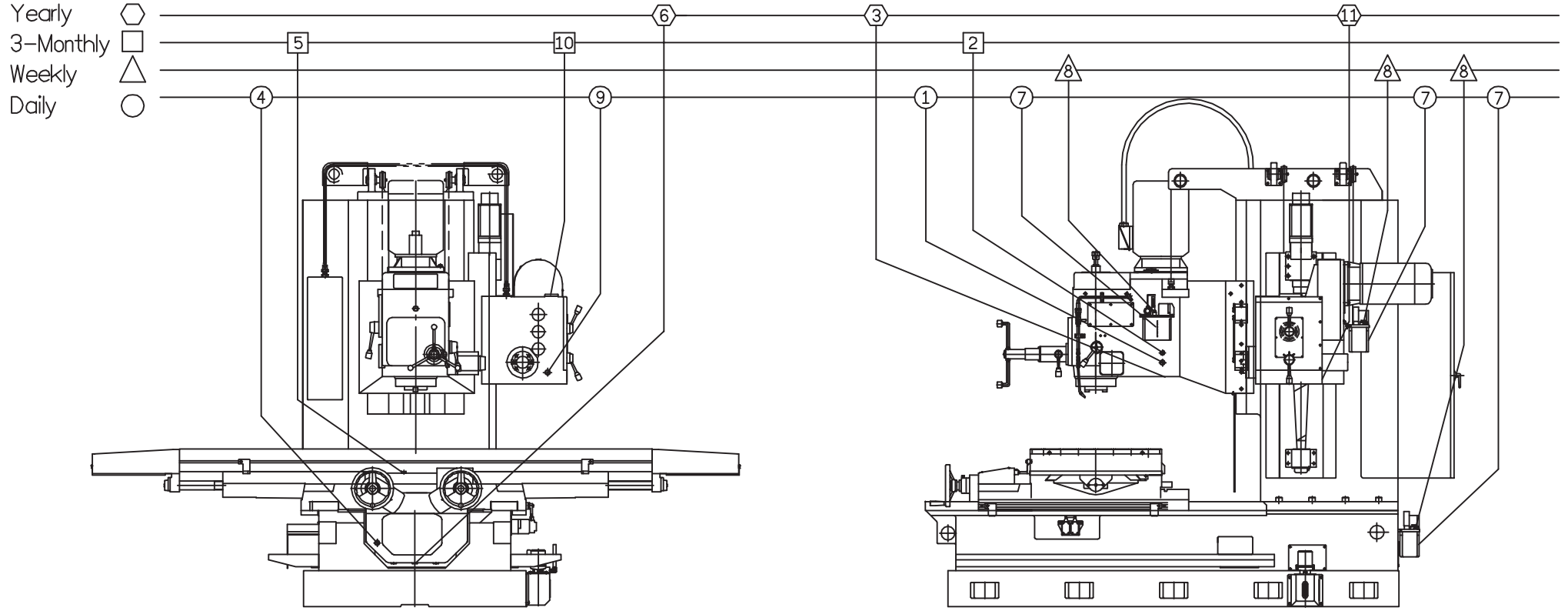


Fig. 7 Foundation drawing (8VLL&8VHLL)

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



	Vertical Spindle head gear			Gear box			Ball screw & Slide way		Horizontal spindle head gear		
Action points	1	2	3	4	5	6	7	8	9	10	11
Symbol / Item											
Check	Daily			Daily			Daily		Daily		
Fill		3-Monthly			3-Monthly			Weekly		3-Monthly	
Clean & Replace			Yearly			Yearly					Yearly
Lubricant	CB32			CB68			G68		CB32		
Quantity		6L	12L		1.2L	5L		0.5L		6L	12L
Remarks											

TABLE 3 Instruction for correct lubricant

	Application Fields	Properties	Symbol and Viscority Grade	Kinemntic Viscosity(40°C) Menn.	min.	max.	REKARKS
CEARS	Enclosed moderately loaded gear (spur gear,bevel gear)	Refined mineral oils with good wxidation stability	CB 32 CB 68 CB 150	32 68 150	28.8 61.2 135	35.2 74.8 165	Pinion speeds(motor output) 2000-5000 rpm(within 3.7kw) 1000-2000 rpm(within 7.5kw) -1000 rpm(within 15kw)
	Enclosed heavily loaded gears (worm and wheel)	Refined oils with good oxidation stability and with improved load-carrying ability	CC 150 CC 320 CC 460	150 320 460	135 288 414	165 352 506	Worm speeds 2000- rpm 1000- rpm -1000 rpm
BEARJNGS	Spindles bearings and associated clutches	Refined mineral oils with superior anticorrosion and anti-oxidation performnces.	FC 2 FC 10 FC 22	2.2 10 22	1.98 9.00 19.8	2.42 11.0 24.2	Shaft speeds(shaft dia.) 10,000- rpm(-30mm) 2000-10,000 rpm(30-150mm) -2000 rpm(150- mm)
SLIDE WAYS	Slide ways	Refined mineral oils with imoroved lubricity and tackiness perfromance preventing stickslip	G68 G220	68 220	61.2 198	74.8 242	Slide way(surface pressure) Horizontel(under 4kgf/cm²) Vertical(under 4kgf/cm²)
HYDRAULIC SYSTEMS	Hydraulic systems	Refined mineral oils with superior anti-corrosion and anti-oxidation performance	HL32 HL68	32 68	28.8 61.2	35.2 74.8	Oil perature(Rated pressure) 0-50°C(under35kgf/cm²) 15-65°C(under140kgf/cm²)
		Refined moneral oils with superior anti-corrosion, anti-oxidation and antiwear performances.	HM32 HM68	32 68	28.8 61.2	32.2 74.8	Oil temperature(Reted pressure) 0-50°C(under140kgf/cm²) 15-65°C(under140kgf/cm²)
	Hydraulic and Slide ways	Refined mineral oils of HM type with anti-stick-slip propertlcs.	HG 32 HG 68	32 68	28.8 61.2	32.2 74.8	Oil temperature(Reted pressure) 0-50°C(under70kgf/cm²) 15-65°c(under70kgf/cm²)
CREASE		Premlum quality greases with superior anti-oxidation and anti-corrosion pronertics.	XM 1 XM 2	Viscosity (25°C) SSU 310 - 340 265 - 295			Centralized systems Cup or hand gun

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.

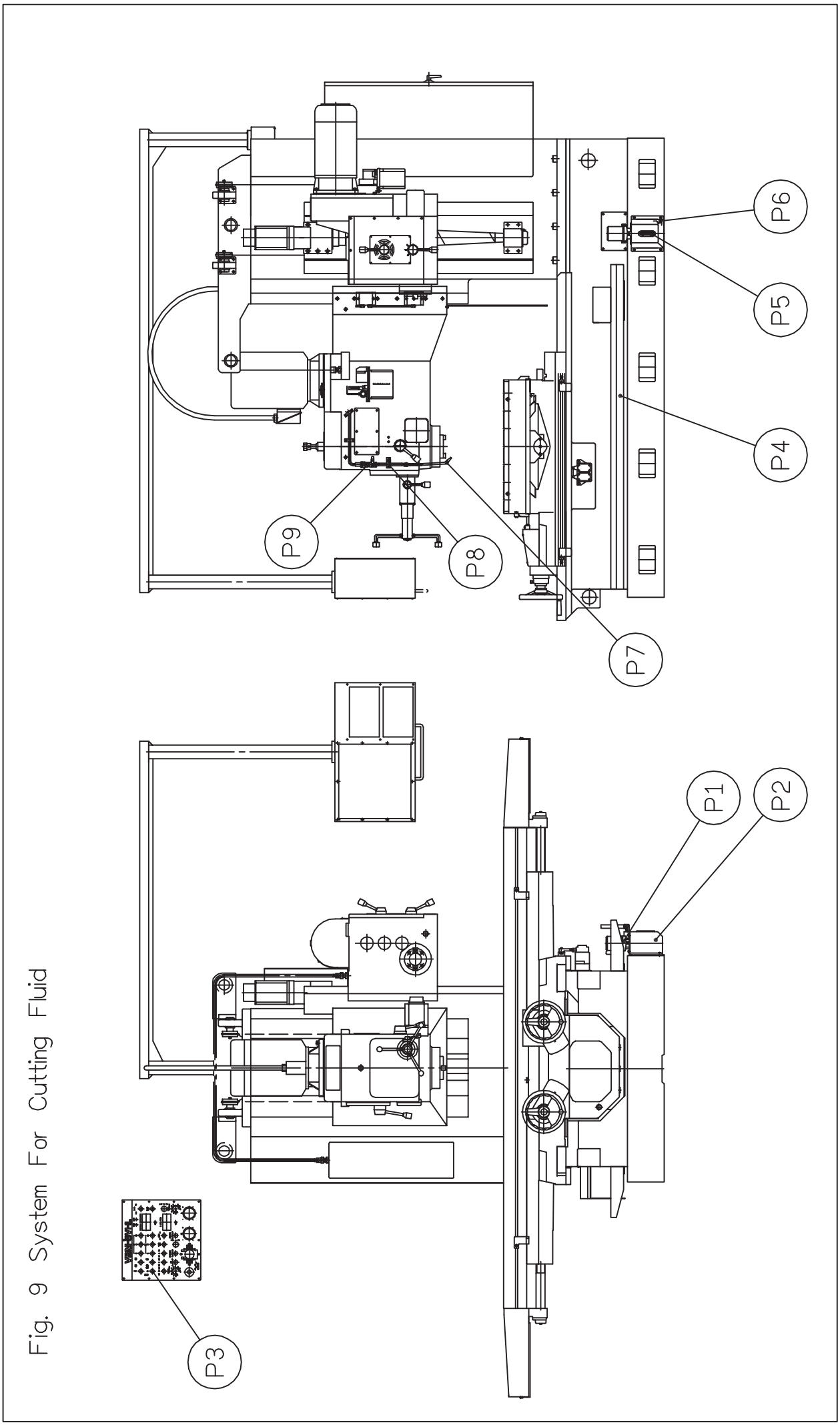


Fig. 9 System For Cutting Fluid

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 (S29) 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 automatically 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.

Turn the knob (S27) 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 (L11), (L12) and saddle feed stop block (D5), (D6) and saddle feed limit switches (L13), (L14). 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 (L11) (L12), and saddle feed stop block (D5), (D6) contact the limit switches (L13), (L14).

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), (L11) and (D5), (L13) operating same time.

(2) (D4), (L12) and (D6), (L14) 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 .

5-4. Operation Of Horizontal Spindle (Fig. 12)

(A) Rapid Feed Of Horizontal Spindle Head

Turn the select switch (S22) on the "Jog" position and move the spindle head upward or downward direction lever (S24) and depress the rapid button (S25) in the same time.

(B) Cutting Feed Of Horizontal Head

Turn the select switch (S22) on the "Jog" position and move the spindle head upward or downward direction lever (S24) .It is depending upon required to adjustment the "Feed Override" button (S23) .

(C) Manual Feed Of Horizontal Head

Turn the select switch (S22) on the "Handle" position and turn the multiple button (S16) to rotate and move the spindle to upward & downward by hand wheel "M.P.G." (S18) .

(D) Starting And Stopping Of Spindle

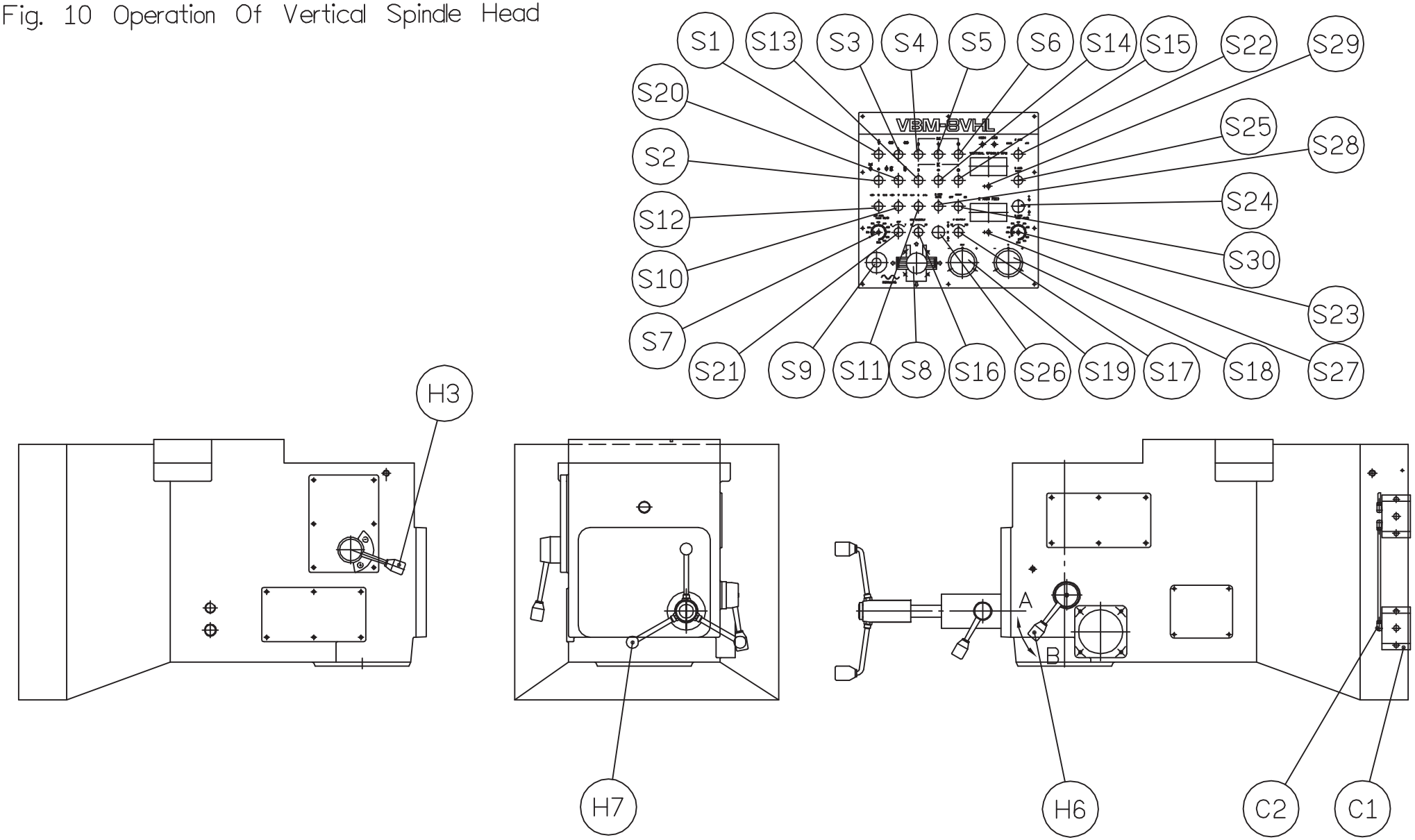
The spindle will be started or stopped by switches (S13),(S14), (S15),and (S13) is starting switch , (S15) is inching switch and (S14) is stopping . Starting switch (S13) can only be operated when everything goes right operate (S14) to stop the machine .

(E) Change Of Horizontal Spindle Speed

Move lever (H2) to position ↘ . ↓ or ↙ depending upon the spindle speed range required , and move lever (H1) the position of the particular speed required .

Speed change must be made while the motor is stop.

Fig. 10 Operation Of Vertical Spindle Head



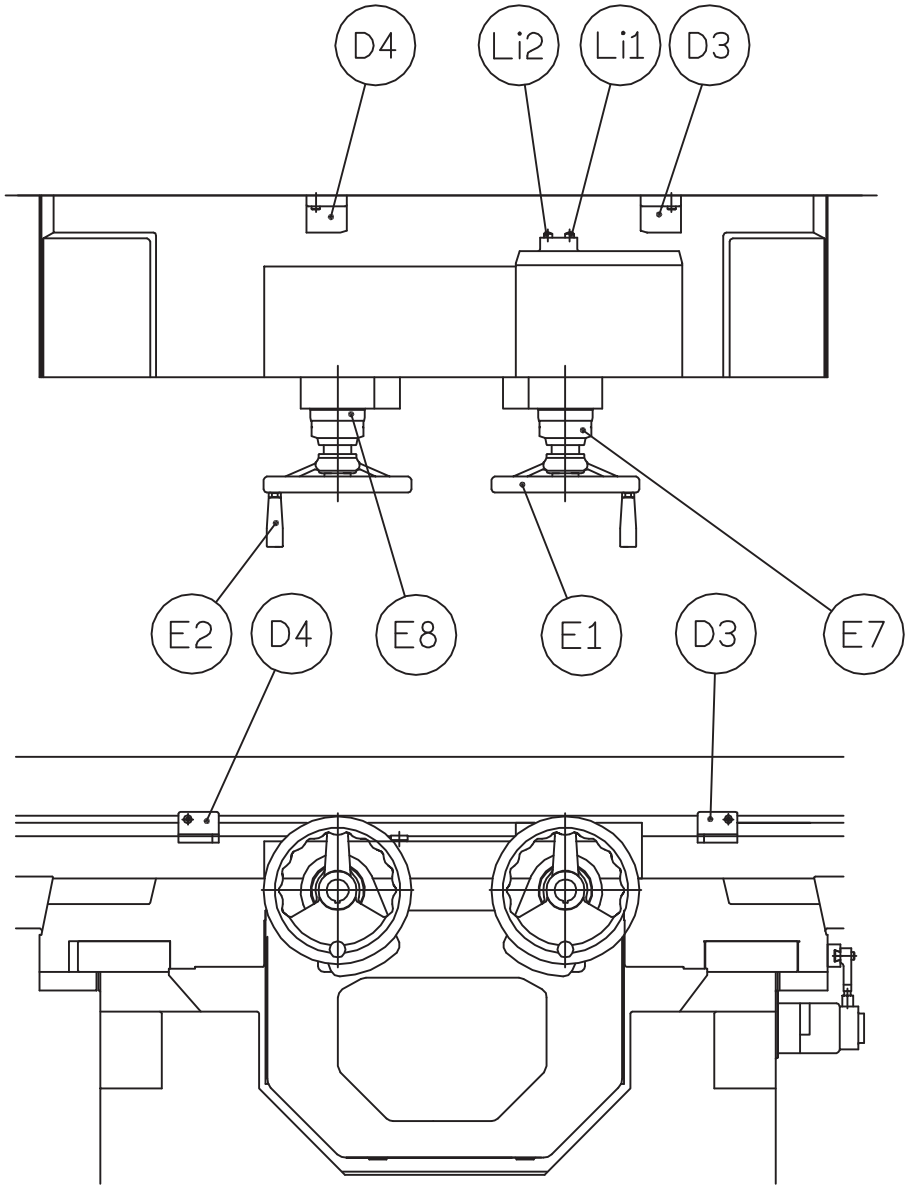
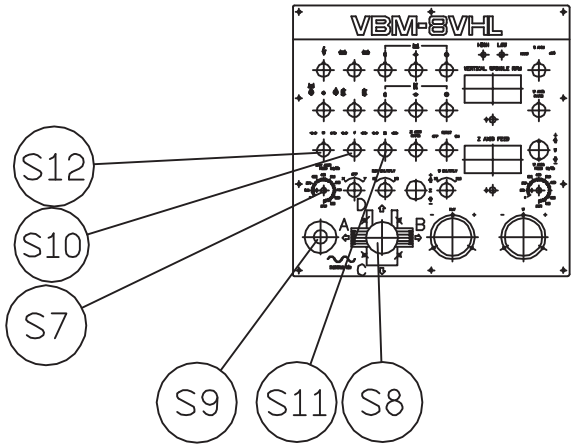
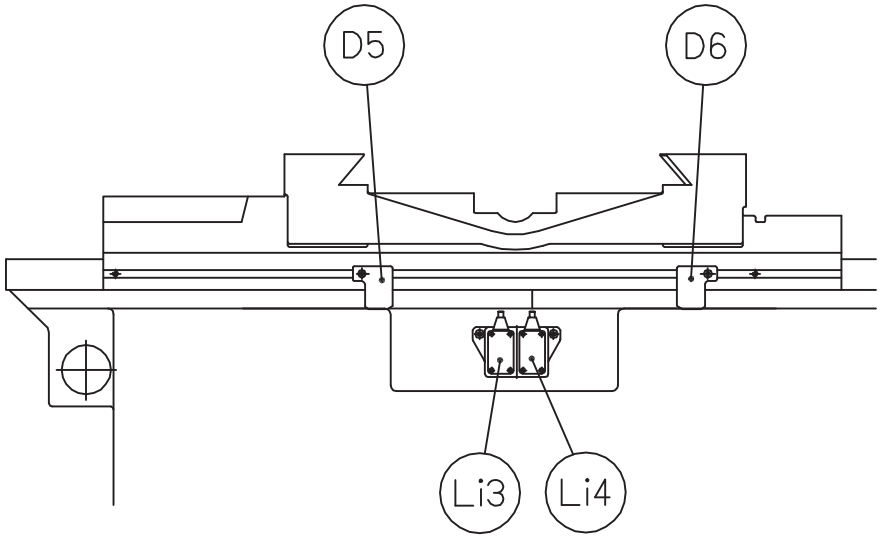


Fig. 11 Illustration Of Working Table and Saddle





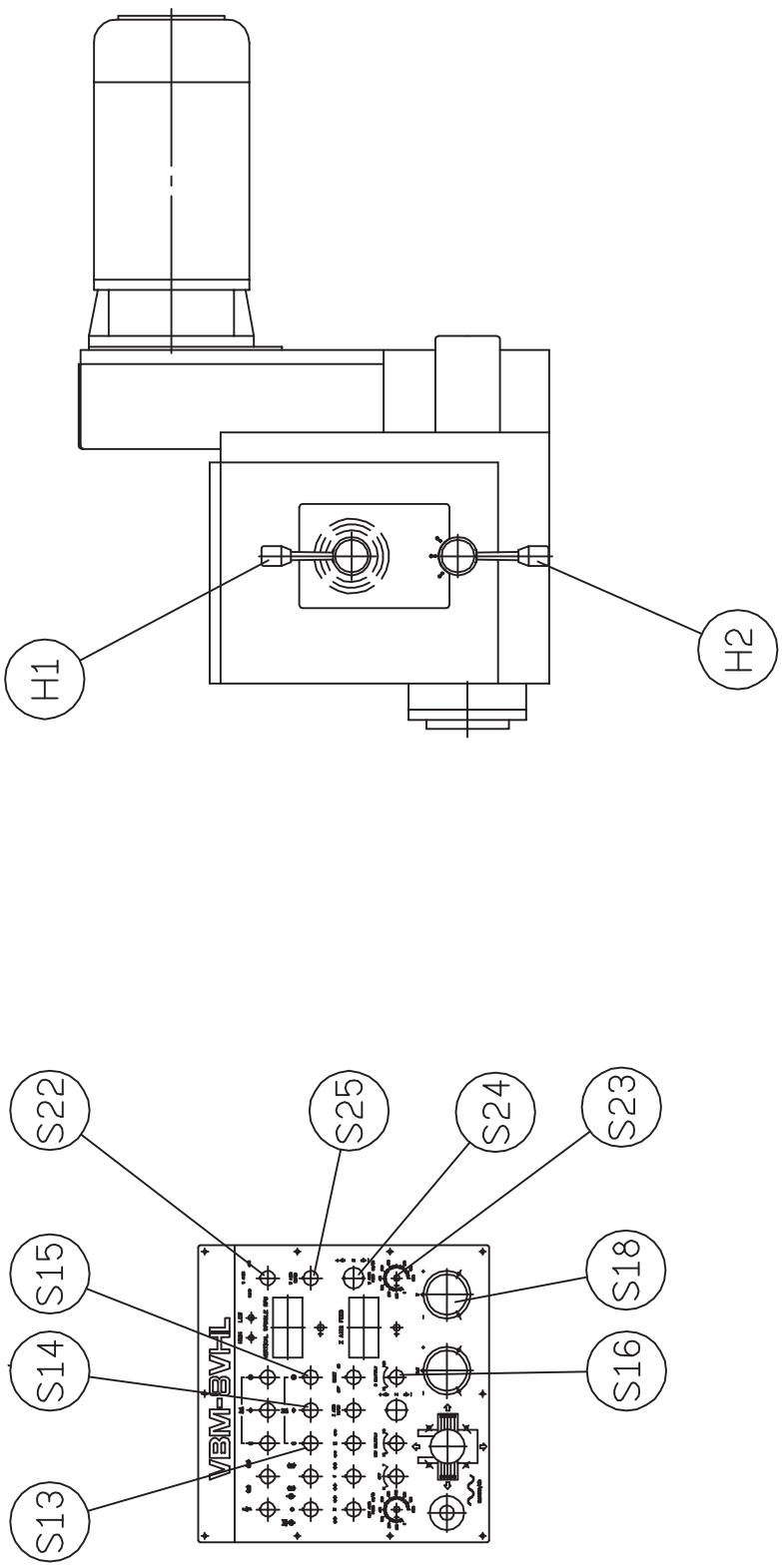


Fig. 12 Operation Of Horizontal Spindle

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

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.

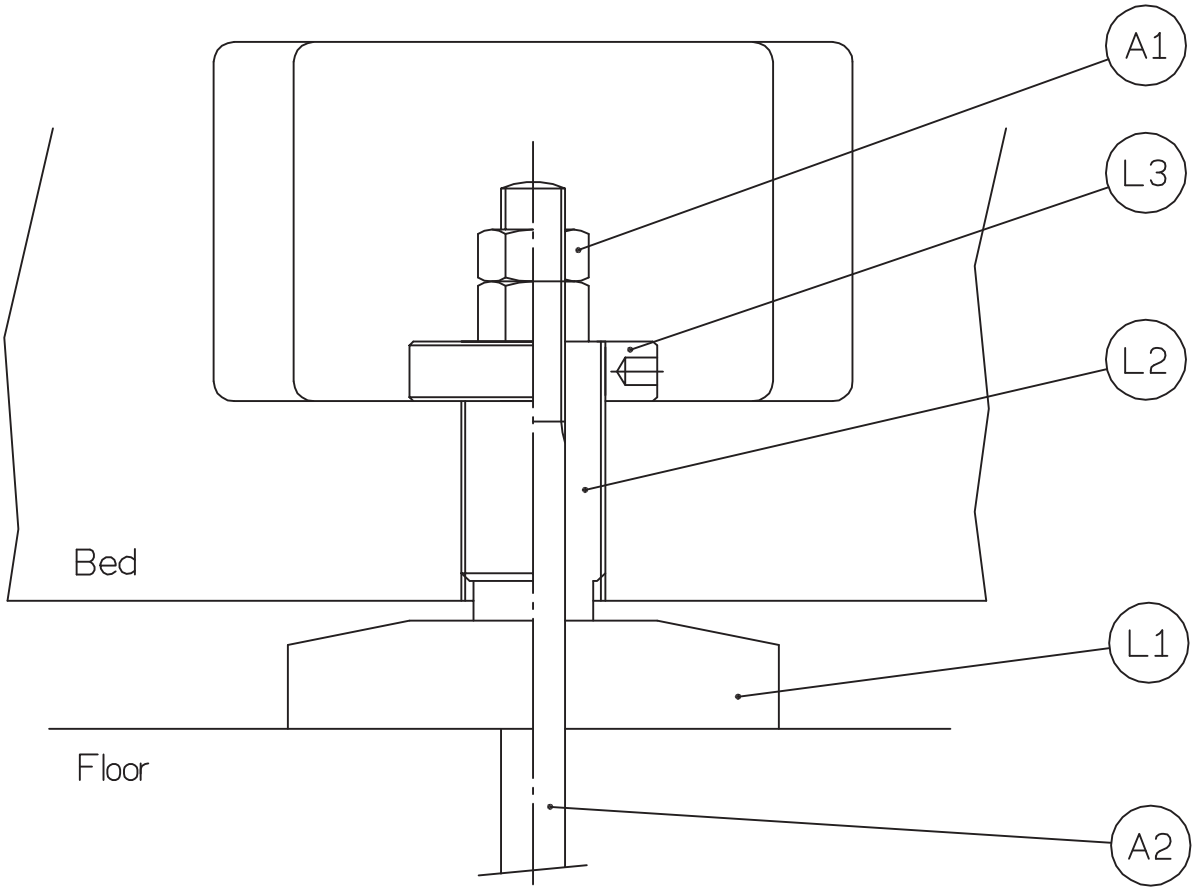


Fig. 12 Adjusting Machines Level

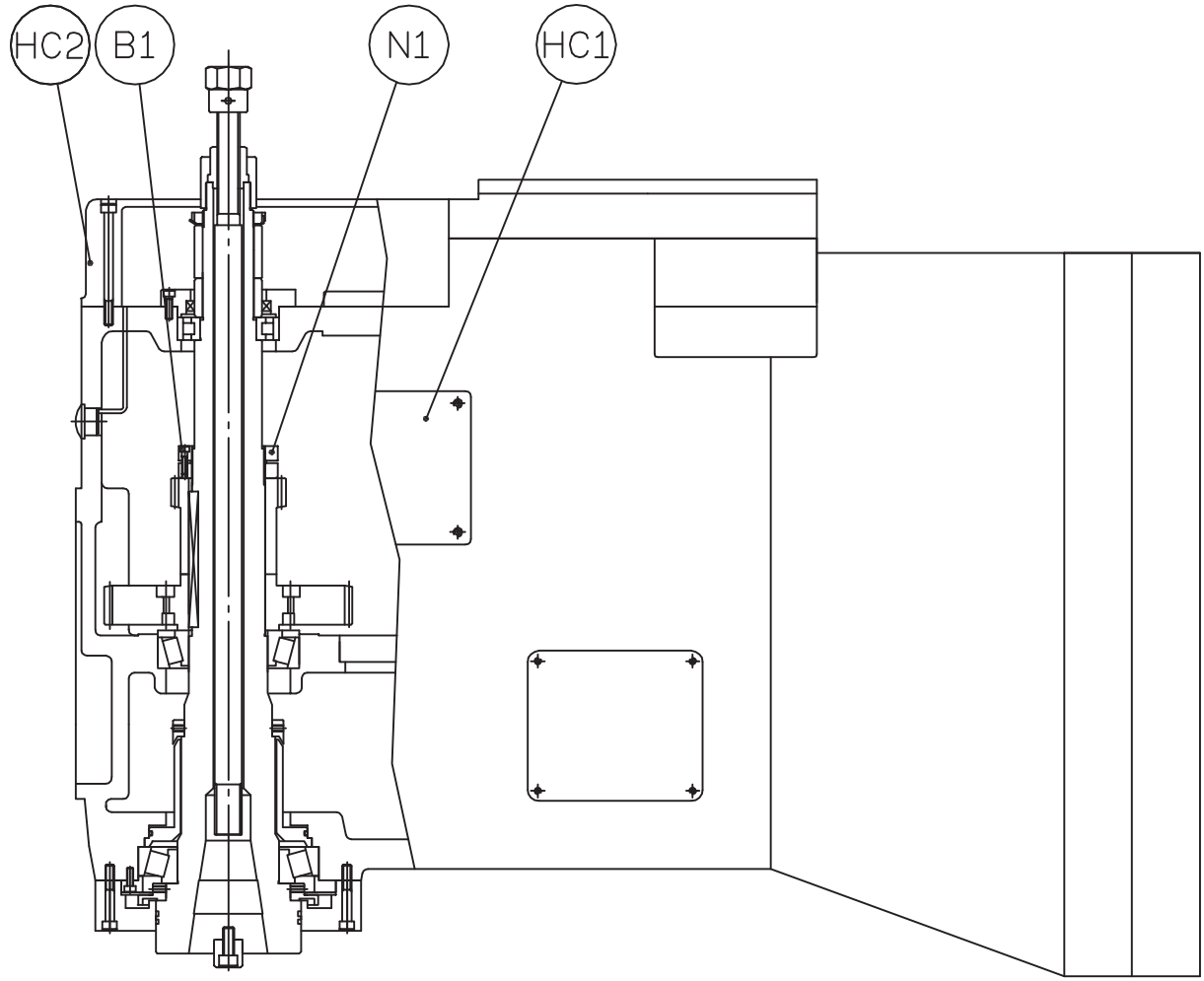
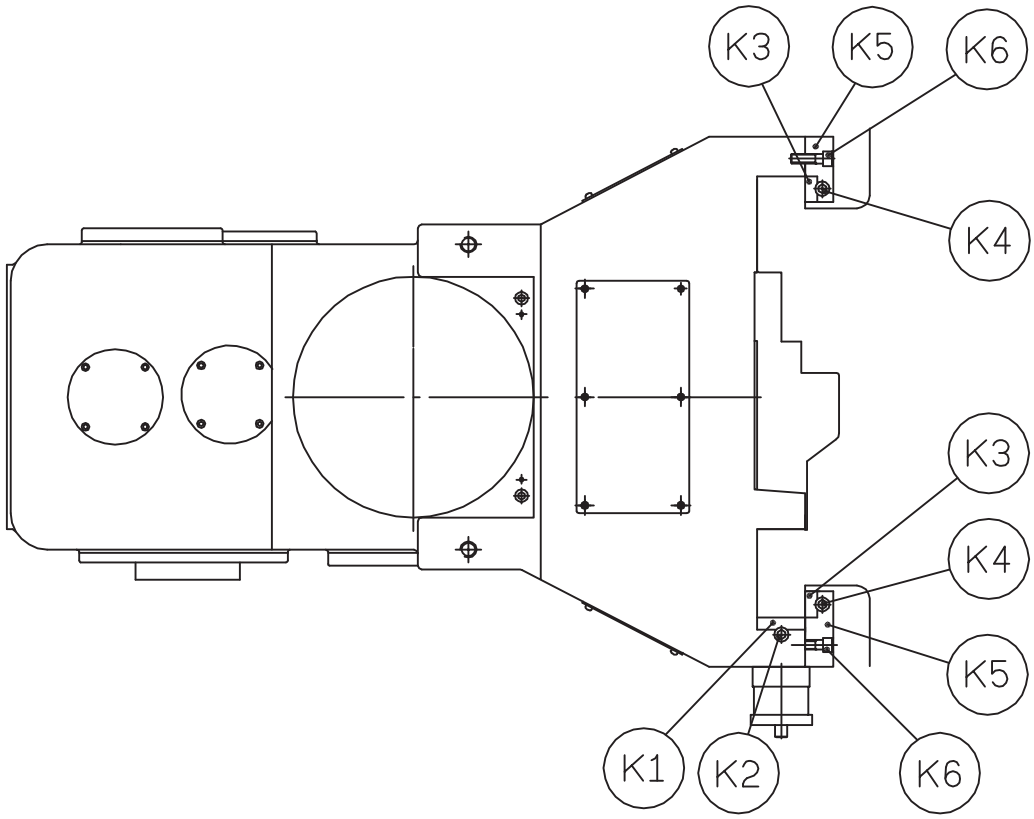


Fig. 13 Adjustment Of Vertical Spindle



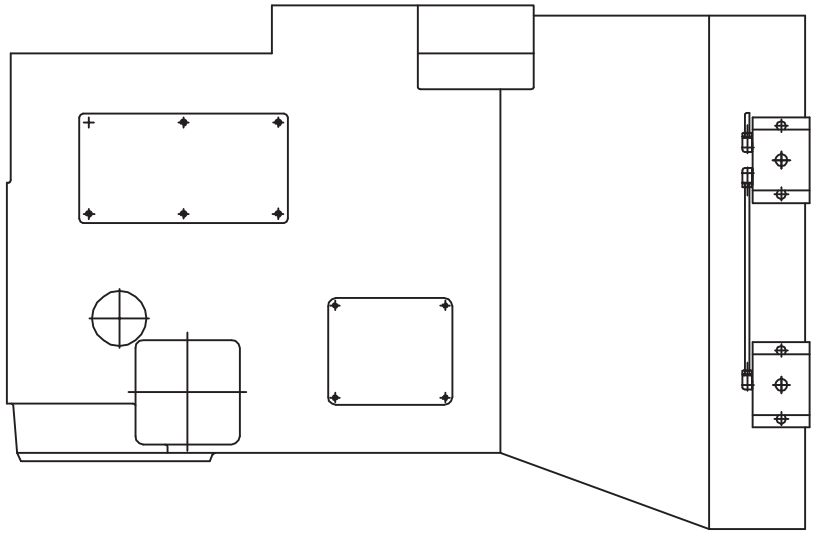


Fig. 14 Adjustment Of Slide Gibs Of Vertical Spindle

Fig. 15 Adjustment Of Working Table And Saddle Gibs

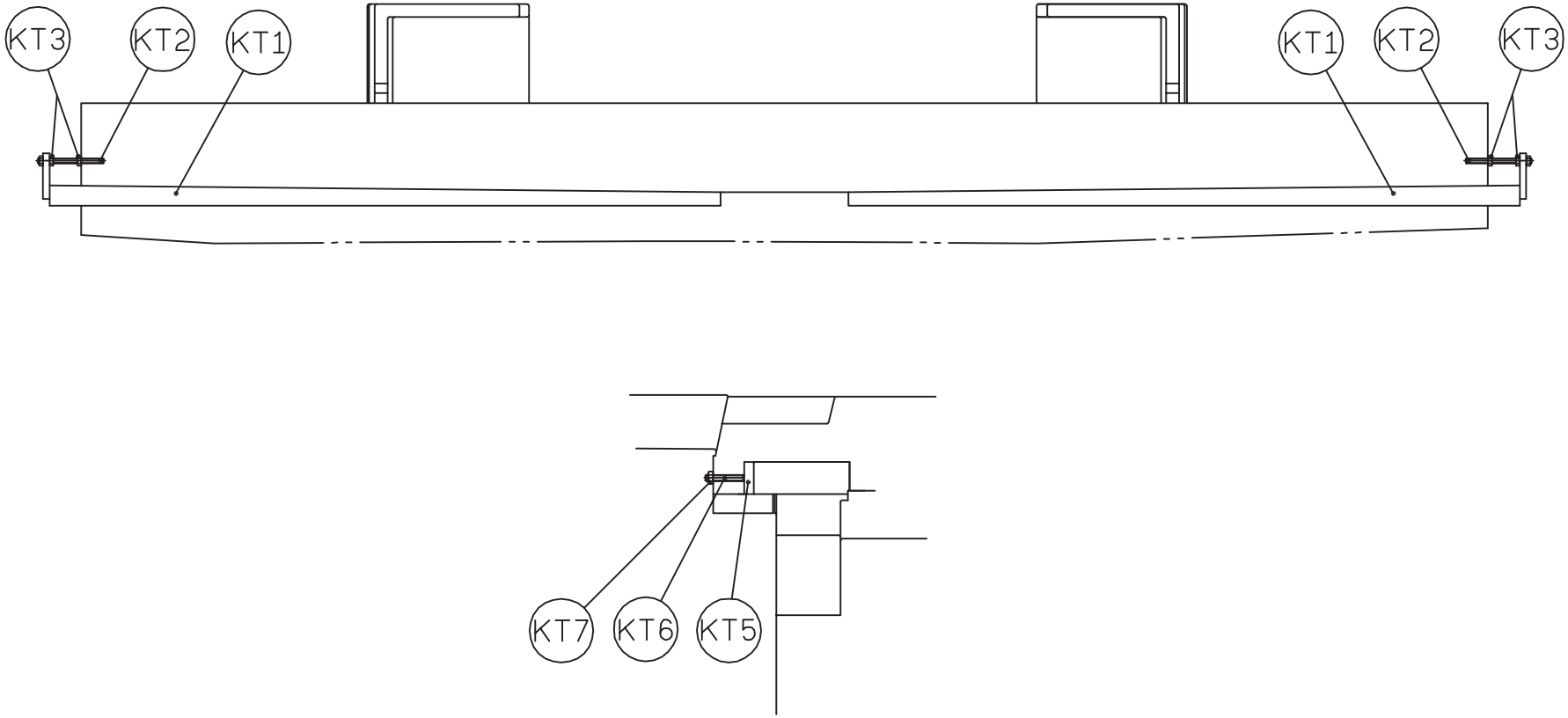


TABLE 6

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 anneal -ed	300-400 220-300 180-22	0.1 0.13 0.2	0.075 0.125 0.175	0.075 0.1 0.125	0.05 0.075 0.1	0.05 0.05 0.025	0.025 0.05 0.05
	Low-carbon steel	Mallea-ble cuts well	152-197 150-180	0.25 0.3	0.2 0.25	0.13 0.175	0.125 0.13	0.075 0.1	0.075 0.035
	Cast iron	Hard medium hard soft	220-300 150-250 150-180	0.27 0.325 0.4	0.2 0.25 0.325	0.13 0.175 0.225	0.13 0.175 0.2	0.1 0.1 0.125	0.075 0.075 0.1
	Brass and bronze	Hard medium hard soft	150-250 100-150 80-100	0.225 0.35 0.55	0.225 0.35 0.55	0.13 0.2 0.325	0.125 0.175 0.27	0.075 0.1 0.175	0.05 0.075 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	300-400 220-300 180-220	0.25 0.3 0.35	0.2 0.25 0.27	0.13 0.175 0.2	0.125 0.13 0.175	0.075 0.1 0.1	0.075 0.075 0.1
	Low carbon steel	Mallea-ble cuts well	152-197 150-180	0.35 0.4	0.27 0.325	0.2 0.225	0.175 0.2	0.1 0.125	0.1 0.1
	Cast iron	Hard medium hard soft	220-300 180-220 150-180	0.3 0.4 0.5	0.25 0.325 0.4	0.175 0.25 0.3	0.13 0.2 0.25	0.1 0.125 0.13	0.075 0.1 0.125
	Brass and bronze	Hard medium hard cuts well	150-250 100-150 80-100	0.25 0.3 0.5	0.2 0.25 0.4	0.13 0.175 0.3	0.125 0.13 0.25	0.075 0.1 0.13	0.075 0.075 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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