

Clausing

OPERATION MANUAL & PARTS LIST

VERTICAL TURRET MILLING MACHINE

MODEL: 2VS / 3VS / 4VSQ
2EVS / 3EVS / 4EVSQ

***** INTRODUCTION *****

THIS MANUAL HAS BEEN CAREFULLY PREPARED, PLEASE STUDY IT THOROUGHLY BEFORE TRYING TO OPERATE THE MACHINE.

A FEW MINUTES GIVEN TO READING THIS MANUAL CAREFULLY, COULD ENSURE YOU ACHIEVE PERFORMANCE FROM THE MACHINE & REDUCE THE RISK OF INJURY TO THE OPERATOR OR DAMAGE TO THE MACHINE OR WORKPIECE.

EVERY EFFORT HAS BEEN MADE DURING CONSTRUCTION & TESTING TO ENSURE THIS MACHINE MEETS INTERNATIONAL QUALITY & PERFORMANCE REQUIREMENTS. WE WISH IT SERVES YOU WELL.

MODEL: _____ SERIAL NUMBER: _____

IN OUR CONSTANT EFFORTS TO IMPROVE OUR PRODUCTS, WE RESERVE THE RIGHT TO CHANGE SPECIFICATIONS, WITHOUT PRIOR NOTICE.

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CHAPTER 1. SAFETY INFORMATION

1-1 IMPORTANT SAFETY INFORMATION:

A). APPLICATION OF THE MILLING MACHINE :

- THE MILLING MACHINE IS DESIGNED AND CONSTRUCTED FOR THE CUTTING OF METAL AND SIMILAR MATERIALS. THE MACHINE IS ALONG WITH ALL THE NECESSARY SAFETY REQUIREMENTS. ONLY FULLY TRAINED & FULLY QUALIFIED OPERATORS SHOULD BE ALLOWED TO OPERATE THIS MACHINE.

B). PROHIBITATION:

- UNTRAINED OPERATORS ARE PROHIBITED FROM USING THIS MACHINE.
- MODIFICATIONS THAT CHANGE THE FUNCTION OR SPECIFICATION OF THIS MACHINE IS PROHIBITED.
- OPERATION OF THIS MACHINE BEFORE READING THROUGH THIS INSTRUCTION MANUAL, IS PROHIBITED.

C). AIRBORNE NOISE LEVEL:

- THE AIRBORNE NOISE LEVEL DURING OPERATION IS ABOUT 70~75 Db (A).

D). LIGHTING:

- APPROPRIATE LIGHTING MUST BE PROVIDED, ACCORDING TO LOCAL REGULATION.
- MINIMUM LIGHTING FOR THIS MACHINE IS 300 LUX, IF THERE ARE NO ANY LOCAL OTHER LOCAL REGULATIONS.

E). ENVIRONMENT:

- AMBIENT AIR TEMPERATURE : +5°C ~ +55°C IN FREE AIR, AND THE AVERAGE AMBIENT AIR TEMPERATURE OVER A PERIOD OF 24 HOURS SHALL NOT EXCEED +50°C.
- HUMIDITY: 30%~95%.
- ALTITUDE: UP TO 1000M ABOVE MEAN SEE LEVEL.
- TRANSPORTATION & STORAGE CONDITION: -25°C~ +55°C, AND FOR SHORT PERIODS NOT EXCEEDING 24 HOURS UP TO +70°C.

1-2 SAFETY RULES DURING AND/OR BEFORE OPERATION

- A). BE SURE THE INSTRUCTION MANUAL ARE FULLY UNDERSTOOD.
- B). USE SAFETY PROTECTIVE EQUIPMENT SUCH AS SAFETY SHOES, GOGGLES, CLOTHES, ETC.
- C). WORK TABLE NEAR THE MACHINE MUST BE STRONG ENOUGH TO PREVENT ACCIDENTS AND BE SURE ARTICLES WILL NEVER SLIP OFF THE TABLE SURFACE TO INTERFERE WITH THE ACT OF MACHINING.
- D). TOOLS AND ANY UNNECESSARY ITEMS ARE NOT ALLOWED TO BE PLACED ON THE MACHINE TABLE, MOVING PARTS, OR SIMILAR LOCATIONS.
- E). BEFORE OPERATING SWITCHES, ALWAYS CHECK IF THE SWITCHES ARE THE RIGHT ONES AND NEVER TOUCH A SWITCH ACCIDENTALLY OR IT MAY CAUSE MALFUNCTIONS OR DANGER.
- F). DO NOT OPERATE SWITCHES WITH GLOVES ON. THIS COULD CAUSE MALFUNCTIONS OR EVEN DANGER.
- G). DO NOT TOUCH SWITCHES WITH WET HANDS, AN ELECTRIC SHOCK COULD OCCUR.
- H). WARM UP THE MACHINE BEFORE USE, ESPECIALLY THE SPINDLE AND FEEDING AXES BY RUNNING THEM FOR 10 TO 20 MINUTES. IT IS VERY IMPORTANT FOR MAINTAINING MACHINE ACCURACY.
- I). IF JOB IS TO BE DONE BY TWO OR MORE OPERATORS, THE FUNCTION OF EACH MUST BE WELL KNOWN, WHAT ACTION WILL BE DONE AND WHAT DANGER MAY OCCUR, BEFORE THE NEXT STEP IS TAKEN.
- J). TOOLS SHOULD CONFORM TO THE MACHINE'S SPECIFICATIONS, SUCH AS DIMENSIONS, WEIGHT AND TYPES.
- K). GRIP WORKPIECES SECURELY TO MINIMISE MOVEMENT OR VIBRATION BETWEEN WORKPIECE AND CUTTING TOOL OR IT MAY INJURE PERSONNEL, OR DAMAGE THE MACHINE OR WORKPIECE.
- L). NEVER TOUCH TOOL NOSE AND CUTTING CHIPS WITH BARE HANDS.
- M). NEVER TRY TO TOUCH A TURNING WORKPIECE OR SPINDLE IN ANY WAY.

1-2 SAFETY RULES DURING AND/OR BEFORE OPERATION:

- N). STOP THE MACHINE BEFORE REPLACING A WORKPIECE AND PROVIDE PLENTY OF DISTANCE BETWEEN WORKPIECE AND TOOL TO AVOID IMPACT BETWEEN WORKPIECE AND TOOL DURING THE CHANGEOVER.
- O). IN THE EVENT OF POWER FAILURE, TURN OFF THE MAIN CIRCUIT BREAKER IMMEDIATELY.
- P). AFTER POWER FAILURE OR AN EMERGENCY STOP, IT IS NECESSARY TO RETURN TO REFERENCE POINT OF THE THREE AXES.
- Q). DO NOT CHANGE ELECTRICAL SETTINGS UNLESS NECESSARY. IF SUCH CHANGES ARE UNAVOIDABLE, RECORD THE ORIGINAL VALUES SO THAT THEY CAN BE RETURNED TO THEIR ORIGINAL SETTINGS IF NEEDED.
SETTINGS IF NEEDED.
- R). BEFORE REPLACING A FUSE OR ELECTRIC PART, TURN OFF THE MACHINE AND KEEP A RECORD OF THEM, FOR FUTURE REFERENCE.
- S). IF UNSPECIFIED LUBRICANT IS USED, IT MAY RESULT IN MALFUNCTIONS OR DAMAGE TO THE MACHINE.
- T). LIMIT SWITCHES, PROXIMITY SWITCHES, INTERLOCK MECHANISMS INCLUDING FUNCTIONAL PARTS AND OTHER SAFETY DEVICES SHOULD NOT BE REMOVED OR MODIFIED.
- U). DISPOSE OF FILTER MATERIAL AND POSSIBLE WORKING FLUID ACCORDING TO THE LOCAL REGULATION.
- V). PLEASE KEEP THE INSTRUCTION MANUAL NEAR THE MACHINE OR IN A POSITION EASY TO BE REACHED BY THE OPERATOR, AND KEEP THEM FOR AVAILABLE & IN GOOD CONDITION FOR USE.
- W). PLEASE ALWAYS QUOTE THE MACHINE MODEL AND SERIAL NUMBER IN ORDER FOR US TO DEAL WITH ANY REQUEST, AS QUICKLY AS POSSIBLE.
- X). THE MACHINING SURFACE IS SMEARED WITH ANTI-RUST PROTECTION WHEN DELIVERED. IT SHOULD BE CAREFULLY CLEANED & THEN SMEARED WITH PROTECTION OIL.

1-3 SAFETY DURING ELECTRICAL CONNECTION OR DISCONNECTION

A). ELECTRICAL CONNECTION:

1. A CABLE WITH THREE WIRES IS SUPPLIED TO CONNECT YOUR MACHINE INTO THE 3 PHASE POWER SUPPLY. THIS MACHINE IS EQUIPPED WITH A HAND OPERATED DISCONNECTION DEVICE, WHICH IS IN COMPLIANCE WITH PART LISTS, ON THE DOOR OF CONTROL BOX.
2. FOR THE PROTECTION OF CONTROL DEVICE, WE RECOMMEND THE OPERATOR TO SUPPLY A FUSE WITH APPROPRIATE CURRENT RATING, AND THE TOTAL LENGTH BETWEEN FUSE AND CONNECTION TERMINAL SHALL NOT EXCEED 1.5M.
3. THE POWER SUPPLY SYSTEM IS TN SYSTEM. THE EXACT POWER SOURCE VOLTAGE, FREQUENCY, AND NUMBER OF PHASE
4. SHALL BE CHECKED ACCORDING TO THE INSTALLATION DIAGRAM AND CIRCUIT DIAGRAM. THE CORRECT DIRECTION OF SPINDLE SHOULD BE CHECKED AFTER CONNECTING.

B). ELECTRICAL DISCONNECTION:

1. THE DISCONNECTION IS CARRIED OUT BY HAND-OPERATED DISCONNECTING DEVICE, WHICH IS ON THE DOOR OF CONTROL BOX AS AN OPTION OR CONNECTED BEFORE THE POWER SOURCE.
2. BE SURE TO DISCONNECT THIS MACHINE FROM POWER SOURCE, WHEN YOU WANT TO STOP THE JOB FOR MAINTENANCE OR ADJUSTMENT.

C). GROUNDING

THE GROUNDING OF THIS MODEL IS CARRIED OUT BY CONNECTING THE YELLOW/GREEN TERMINAL OF SUPPLY CABLE TO THE GROUNDING TERMINAL OF POWER SOURCE. BE SURE TO GROUND YOUR MACHINE BEFORE CONNECTING MACHINE TO POWER SOURCE IN ANY SITUATION.

WARNING!

DO NOT DISCONNECT GROUNDING TERMINAL BEFORE DISCONNECTING POWER SOURCE.

- D). WHERE A PORTION OF THE MACHINE AND ITS ASSOCIATED EQUIPMENT IS CHANGED OR MODIFIED, MUST BE APPROVED BY THE MANUFACTURER FIRST, AND FOLLOWING RETEST SHALL BE CARRIED OUT :

- CONTINUITY OF THE PROTECTIVE BONDING CIRCUIT.
- INSULATION RESISTANCE TESTS.
- VOLTAGE TESTS.

1-4 DESCRIPTION FOR THE SAFETY FUNCTION OF THIS MACHINE

THE FOLLOWING SAFETY FUNCTIONS ARE EQUIPPED WITH THIS MACHINE BE SURE TO CHECK AND ENSURE THE CORRECT FUNCTION BEFORE YOU START TO OPERATE YOUR MACHINE:

1. THE HAND-OPERATED POWER DISCONNECTION DEVICE:

IT IS CONSTRUCTED TO DISCONNECT MACHINE FROM POWER SOURCE WHEN THE OPERATOR INTEND TO STOP OPERATION FOR MAINTENANCE, REPAIR, AND/OR WHILE THE END OF WORK. THE CORRECTION IS THAT THE DOOR OF CONTROL CABINET COULD BE OPEN ONLY WHEN THIS SWITCH OF THIS DEVICE IS SWITCHED OFF, AND AFTER THIS DEVICE IS SWITCHED OFF, IT IS POSSIBLE TO BE LOCKED WITH SOME APPROPRIATE LOCKING. AS SOON AS THIS DEVICE IS SWITCHED OFF, NO ANY OPERATION IS POSSIBLE AND THERE WOULD BE NO ANY ELECTRICITY ON THE CONTROL CIRCUIT EXCEPT THE WIRING BEFORE THIS DEVICE.

2. THE EMERGENCY STOP DEVICE:

IT IS CONSTRUCTED TO STOP MACHINE AS FAST AS POSSIBLE WHILE IN EMERGENCY SITUATION. AS SOON AS THIS DEVICE IS ACTUATED, ANY MOVEMENT WILL BE STOPPED IN A SHORT TIME. AFTER THE ACTUATION OF EMERGENCY BUTTON, THE FURTHER OPERATION IS POSSIBLE ONLY WHEN THIS BUTTON IS DISENGAGED AND THE RESTART KEY IS ACTUATED. BE SURE TO CHECK THAT MACHINE ACTION WILL STOP IMMEDIATELY AFTER THIS BUTTON IS PUSHED AND WILL NOT CAUSE ANY ACTION WHEN THIS BOTTON IS DISENGAGED.

1-5 SAFETY INSPECTION

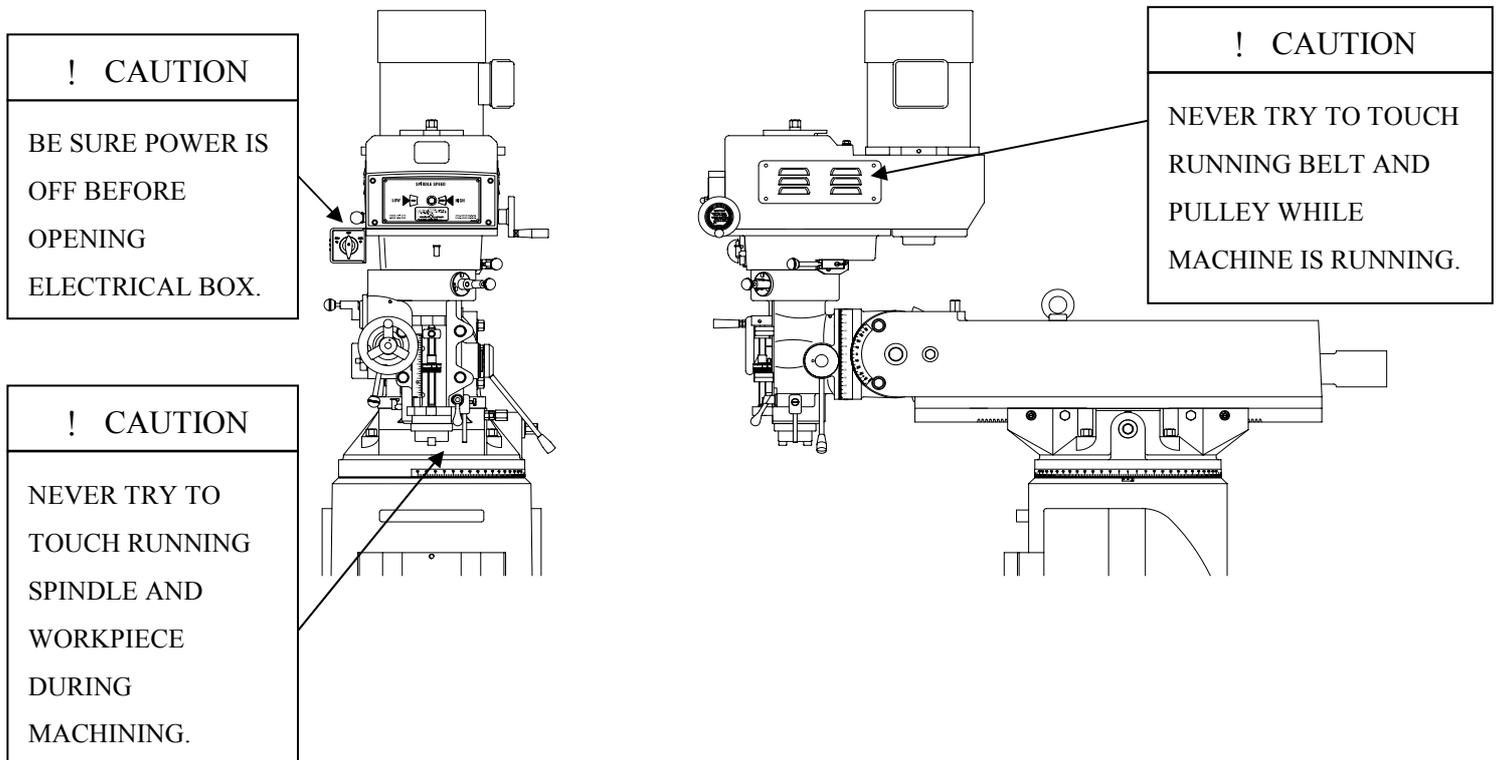
TO ENSURE SAFETY, IT IS NECESSARY TO DO THE FOLLOWING INSPECTIONS FOR THIS MACHINE AFTER INSTALLATION.

1. CHECK IF THE TRANSPORTATION PROCEDURE HAS INFLUENCED THE ACCURACY AND FUNCTIONS OF THE MACHINE.
2. CHECK IF THE FOUNDATION OF THE MACHINE IS APPROPRIATE.
3. CHECK IF THE FACTORY HAS THE CORRECT THUNDER - PREVENTING SYSTEM UNDER 25. THE MACHINE'S MAIN POWER SWITCH SHOULD ALSO HAVE EARTH WIRING CONNECTED.
4. USE THE MULTITESTER TO CHECK IF THE THREE-PHASE VOLTAGE IS STABLE AND PHASES ARE IN ORDER.
5. CHECK IF SPINDLE ROTATION IS NORMAL.
6. CHECK IF THE CONTROL PANEL FUNCTION AND PUSH BUTTON ARE FUNCTIONING (INCLUDING INDICATOR LAMP, LOAD AND RPM METER).
7. CHECK EMERGENCY STOP FUNCTION.
8. CHECK IF SAFETY PROTECTION ACCESSORIES ARE FUNCTIONING WELL
9. CHECK IF OTHER ACCESSORIES, INCLUDING HYDRAULIC AND PNEUMATIC ONES, ARE CONNECTED WELL (INCLUDING TRANSFORMER ETC.)
10. CHECK IF THE OIL AMOUNT INDICATOR AND AIR PRESSURE INDICATOR ARE NORMAL.
11. MAKE SURE NO OBSTACLE IS AROUND MACHINE AND CONTROL SYSTEM.
12. MAKE SURE NO PERSONNEL IS IN DANGEROUS AREA.

CHAPTER 2. INSTALLATION

2-1 SAFETY PRECAUTIONS

1. BE SURE THE INSTRUCTION MANUAL IS FULLY UNDERSTOOD.
MUST FOLLOW INSTRUCTION MANUAL TO OPERATE MACHINE CAREFULLY.
2. THE OPERATOR WITHOUT TRAINING OR BEING AUTHORISED IS PROHIBITED TO OPERATE THIS MACHINE.
3. SET ALL COVERS IN POSITION BEFORE OPERATION.
4. USE SAFETY PROTECTIVE EQUIPMENT SUCH AS SAFETY SHOES, GOGGLES, CLOTHES, ETC. AND DO NOT WEAR GLOVES OR ORNAMENTS.
5. MUST NOT TOUCH RUNNING CUTTERS.
6. NEVER TRY TO TOUCH WORKPIECES OR CLEAN CHIPS WHILE CUTTERS IS RUNNING.
7. KEEP HEAD & HANDS CLEAR FROM RUNNING MACHINE PARTS
8. TURN POWER OFF BEFORE MAINTENANCE.



2-2 INSTALLATION

METHOD 1

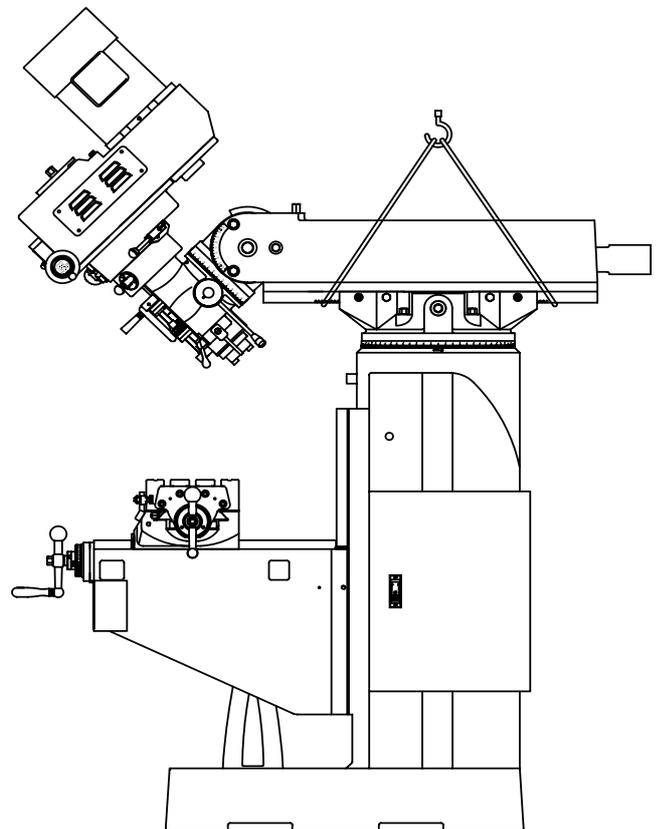
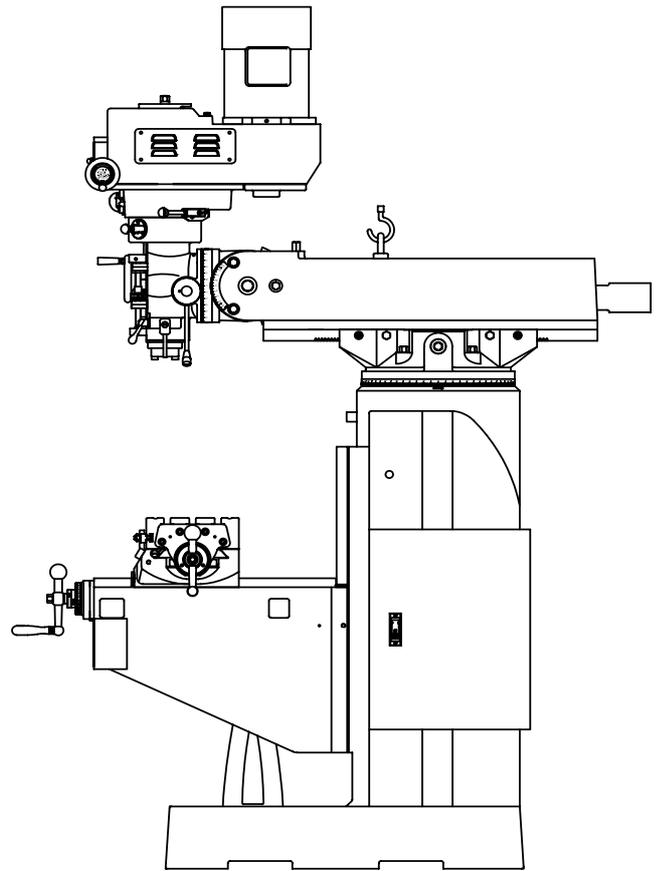
INSERT 3/4" (WHITWORTH) EYE BOLT INTO HOLE.
ENSURE BOLT IS FULLY SECURED BEFORE LIFTING.
IT IS ADVISABLE TO SWIVEL HEAD BEFORE LIFTING MACHINE.

METHOD 2

USE ROPE SLING AS ILLUSTRATED.
INSERT PADS OF SOFT CLOTH BETWEEN ROPE AND MACHINE.
IT IS ADVISABLE TO TILT THE HEAD BEFORE LIFTING THE MACHINE.

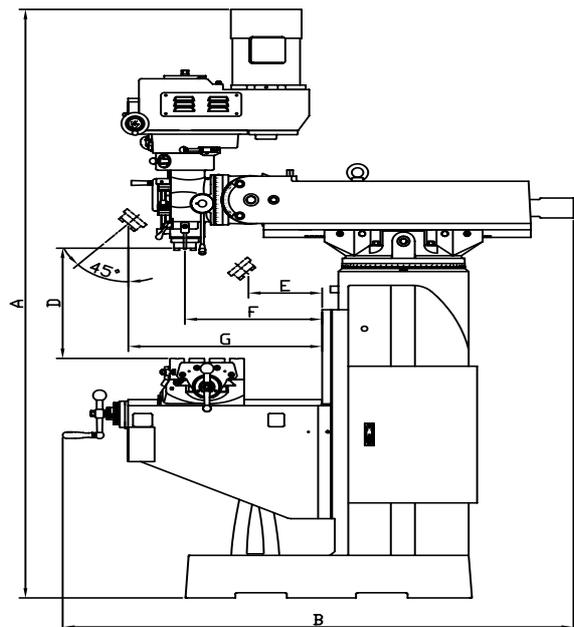
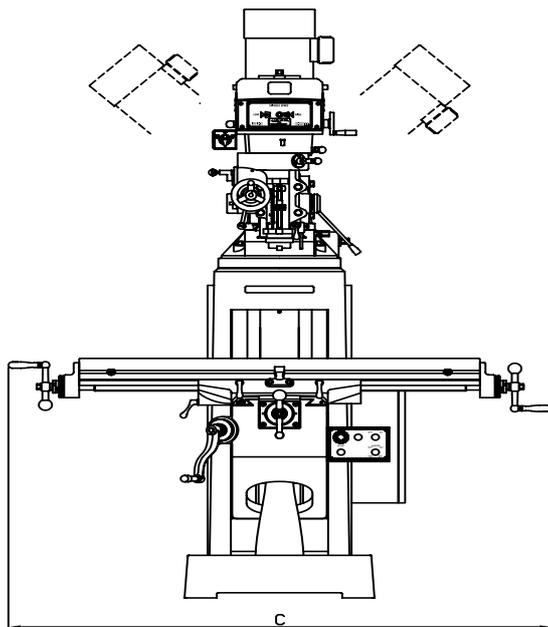
CLEANING

1. REMOVE RUST PREVENTATIVE BEFORE MOVING ANY SLIDEWAYS.
2. THE COATING IS BEST REMOVED BY USING PARAFFIN APPLIED WITH CLEAN RAGS.
3. WHEN THE COATING HAS BECOME SOFT, REMOVE WITH CLEAN RAGS.
4. OIL OR GREASE ALL LUBRICATION POINTS.

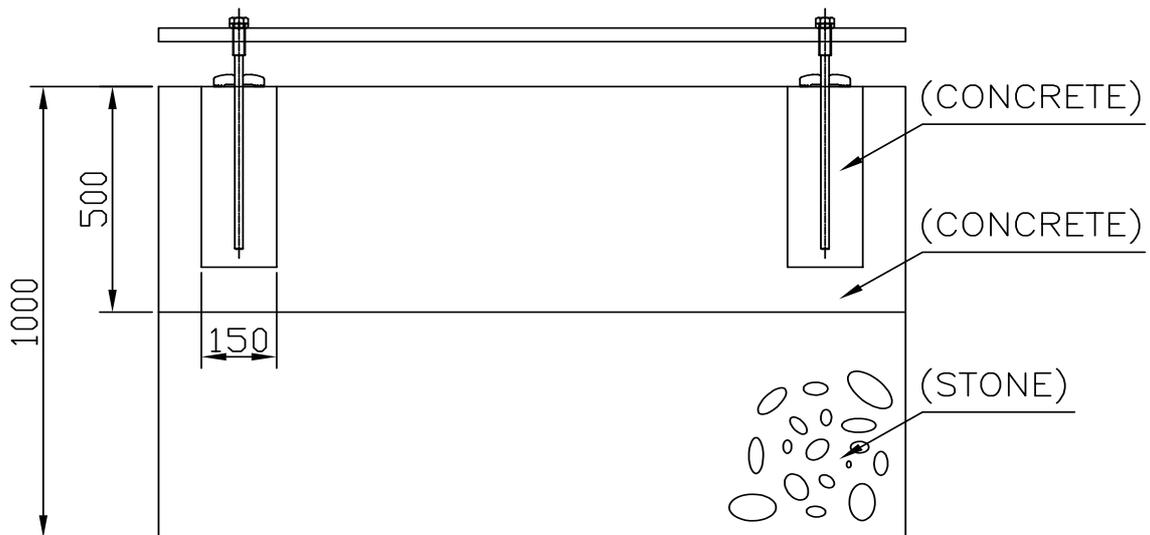
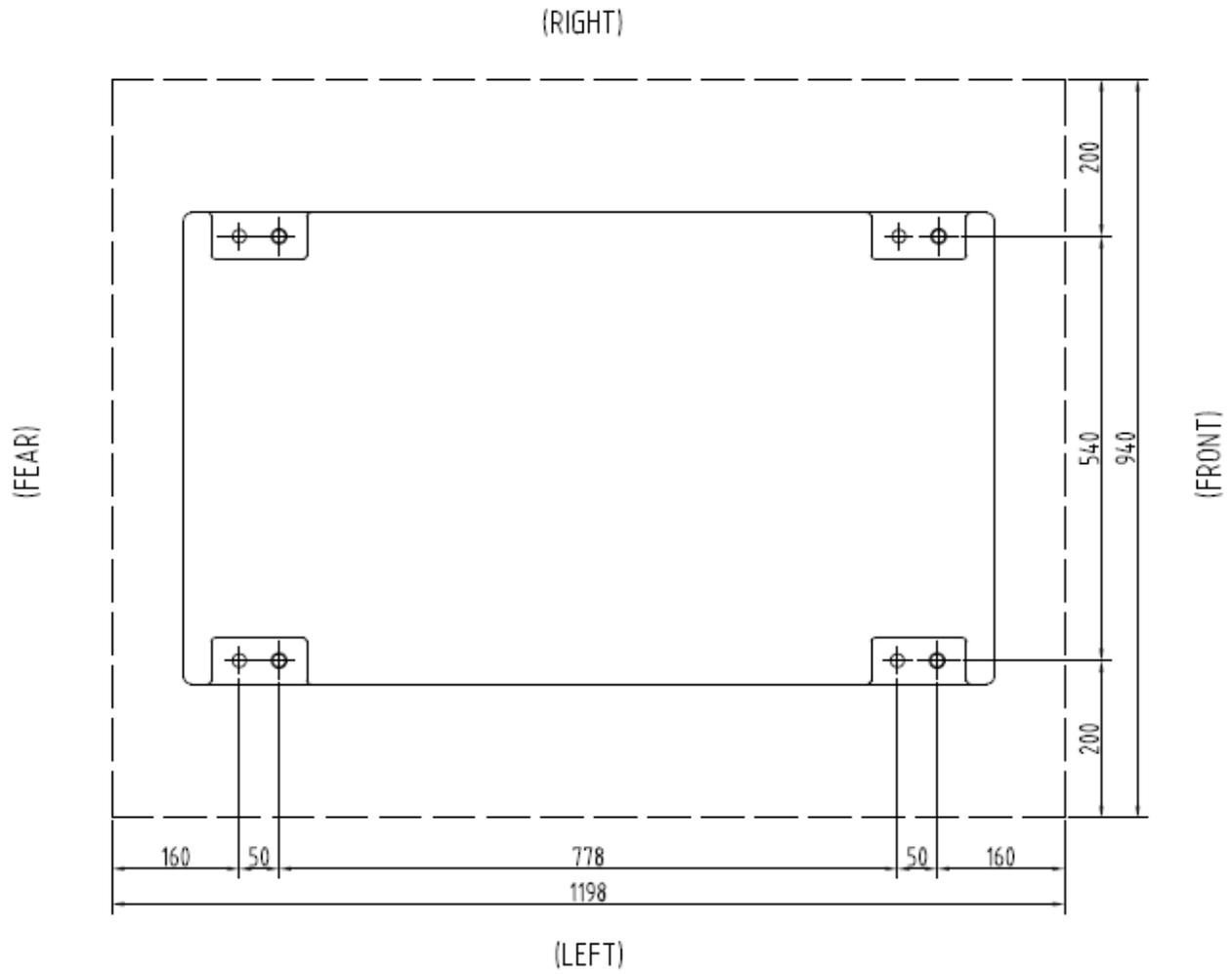


2-3 MACHINE DIMENSION

		2VS / 2EVS	3VS / 3EVS	4VSQ / 4EVSQ
A (mm)		1320	2230	2270
B (mm)		1430	1460	1600
C (mm)		1650	1675	1820
D.	MAX(mm)	435	490	470
	MIN(mm)	80	110	115
E.	MAX(mm)	500	480	480
	MIN(mm)	0	0	0
F.	MAX(mm)	585	650	740
	MIN(mm)	115	90	185
G.	MAX(mm)	645	740	745
	MIN(mm)	175	180	190
NET WEIGHT(kgs)		950	1350	1450



2-4 FOUNDATION PLAN FOR 4VSQ / 4EVSQ



2-5 POWER SUPPLY

A. MACHINE SUPPLIED WITH ELECTRICAL BOX

1. CHECK AND CONFIRM CORRECT VOLTAGE FROM FACTORY POWER SOURCE.
2. TURN MACHINE MAIN POWER SWITCH "OFF", CONNECT MACHINE MAIN POWER CABLE AND GROUND WIRE TO FACTORY POWER SOURCE.
3. POWER "ON" MACHINE AND CHECK MOTOR ROTATION DIRECTION, IF IT ROTATES REVERSE, SWITCH MAIN POWER 2 CABLES CONNECTION TO CORRECT IT.

B. MACHINE SUPPLIED WITHOUT CONTROL PANEL

1. CHECK THE MOTOR VOLTAGES AGAINST SUPPLY.
2. TURN POWER "OFF", CONNECT MAIN POWER AND GROUND WIRE, THEN MACHINE IS READY.
3. POWER "ON" MACHINE AND CHECK MOTOR ROTATION DIRECTION, IF IT ROTATES REVERSE, SWITCH MAIN POWER 2 CABLES CONNECTION TO CORRECT IT.

2-6 INITIAL SETTING

1. IF THE MACHINE WAS DELIVERED IN A CRATE, THE SLIDEWAY HANDLES HAVE BEEN TAKEN OFF. THESE SHOULD BE RE-FITTED .
2. THE MACHINE HEAD WAS TURNED DOWN FOR SHIPPING PURPOSE, MACHINE HEAD MUST BE TURNED UP BEFORE POSITIONING.

HOW TO TURN MACHINE HEAD UP.

- (1) LOOSEN ⑤ HEXAGON NUT A LITTLE BIT, AND TURN MACHINE HEAD.
- (2) ONE PERSON HOLD MACHINE HEAD, AND THE OTHER PERSON TURN ⑥ HEXAGON SCREW TO TURN MACHINE HEAD UP.

3. TO SET MILLING HEAD SQUARE TO THE TABLE (FOR HORIZONTAL PLANE)

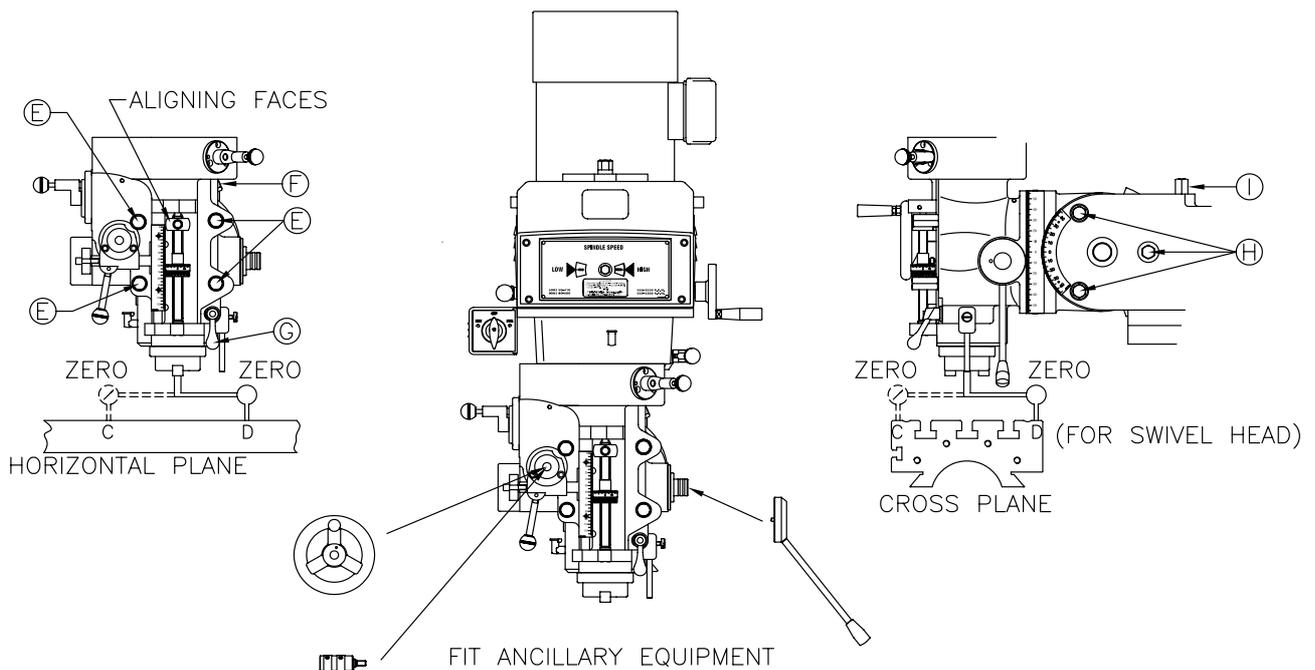
- (1) AN INDICATOR MOUNTED IN A SPINDLE NOSE TRAVELLING IN A 115mm(4.5") 90° RADIUS, THEN TIGHTEN ③ LOCK HANDLE.
- (2) LOOSEN ⑤ HEXAGON NUT(4 PCS.), TURN ⑥ HEXAGON SCREW, THEN ADJUST THE POINT C & D.

4. TO SET MILLING HEAD SQUARE TO THE TABLE (FOR CROSS PLANE)

- (1) AN INDICATOR MOUNTED IN A SPINDLE NOSE TRAVELLING IN A 115mm(4.5") 90° RADIUS, THEN TIGHTEN ③ LOCK HANDLE.
- (2) LOOSEN ⑧ ADAPTOR LOCKING BOLTS (3 PCS.) , TURN ① VERTICAL ADJUSTING WORM SHAFT, THEN ADJUST THE POINT A AND B.

NOTICE:

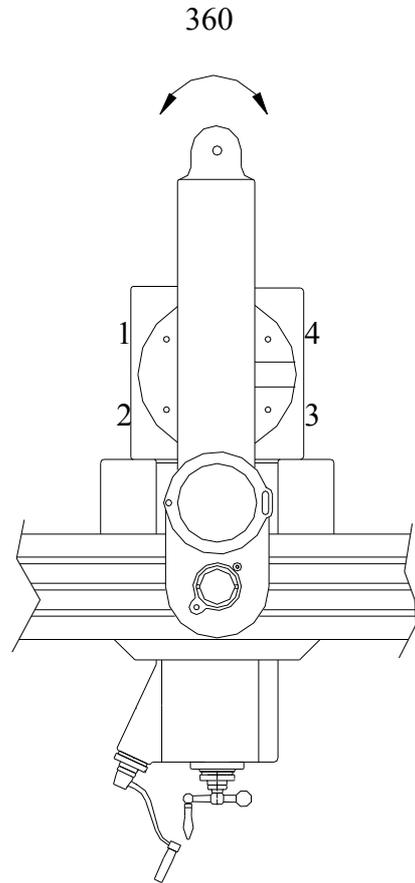
X/Y/Z AXIS ARE LOCKED SEPARATELY, PLEASE LOOSEN RESPECTIVE LOCKING LEVER.



CHAPTER 3. OPERATION

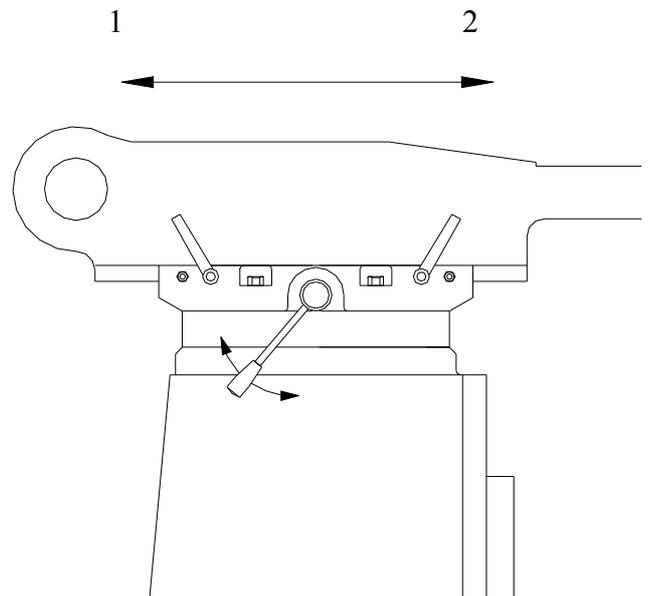
3-1 SWIVEL TURRET

1. USE SPANNER TO LOOSEN THE 4 BOLTS.
2. INDEX TO THE REQUIRED SETTING.
3. TIGHTEN THE 4 BOLTS



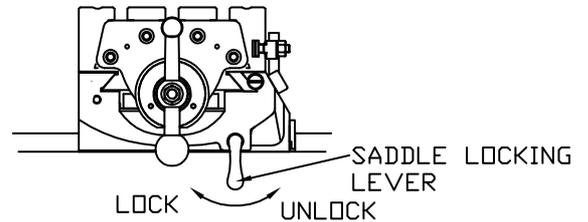
MOVE RAM SLIDE

1. USE SPANNER TO LOOSEN THE 2 BOLTS.
2. TURN THE HANDLE TO MOVE THE SLIDE TO THE DESIRED POSITION.
3. LOCK AND TIGHTEN THE 2 BOLTS.

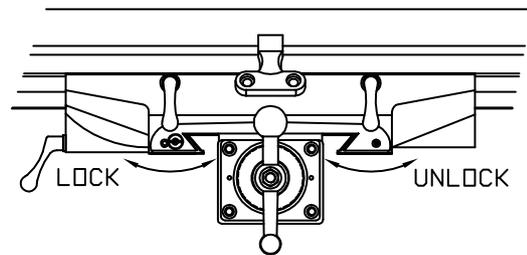


3-2 CLAMPING TABLE, SADDLE AND KNEE

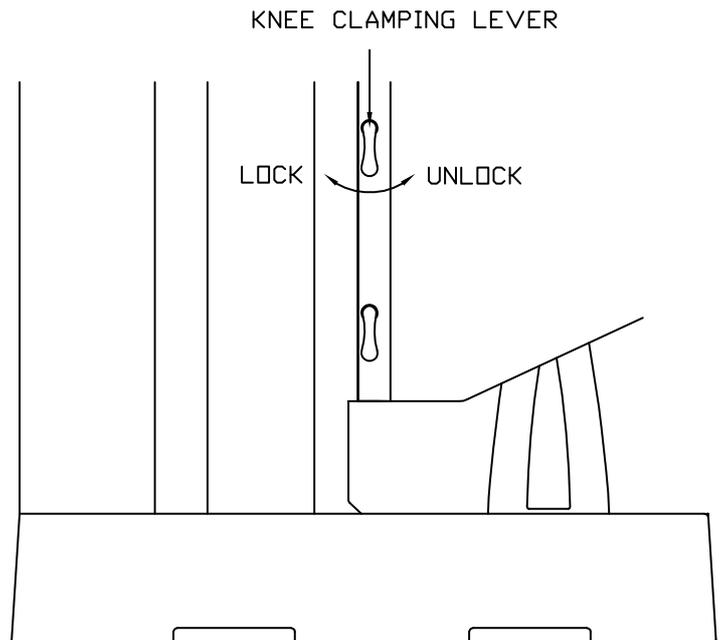
WHEN MILLING WITH LONGITUDINAL TABLE FEED ONLY, IT IS ADVISABLE TO CLAMP THE KNEE TO THE COLUMN AND THE SADDLE TO THE KNEE TO ADD RIGIDITY TO THESE MEMBERS AND PROVIDE FOR HEAVIER CUTS WITH A MINIMUM OF VIBRATION. THE SADDLE LOCKING LEVER IS LOCATED ON THE LEFT-HAND SIDE OF SADDLE.



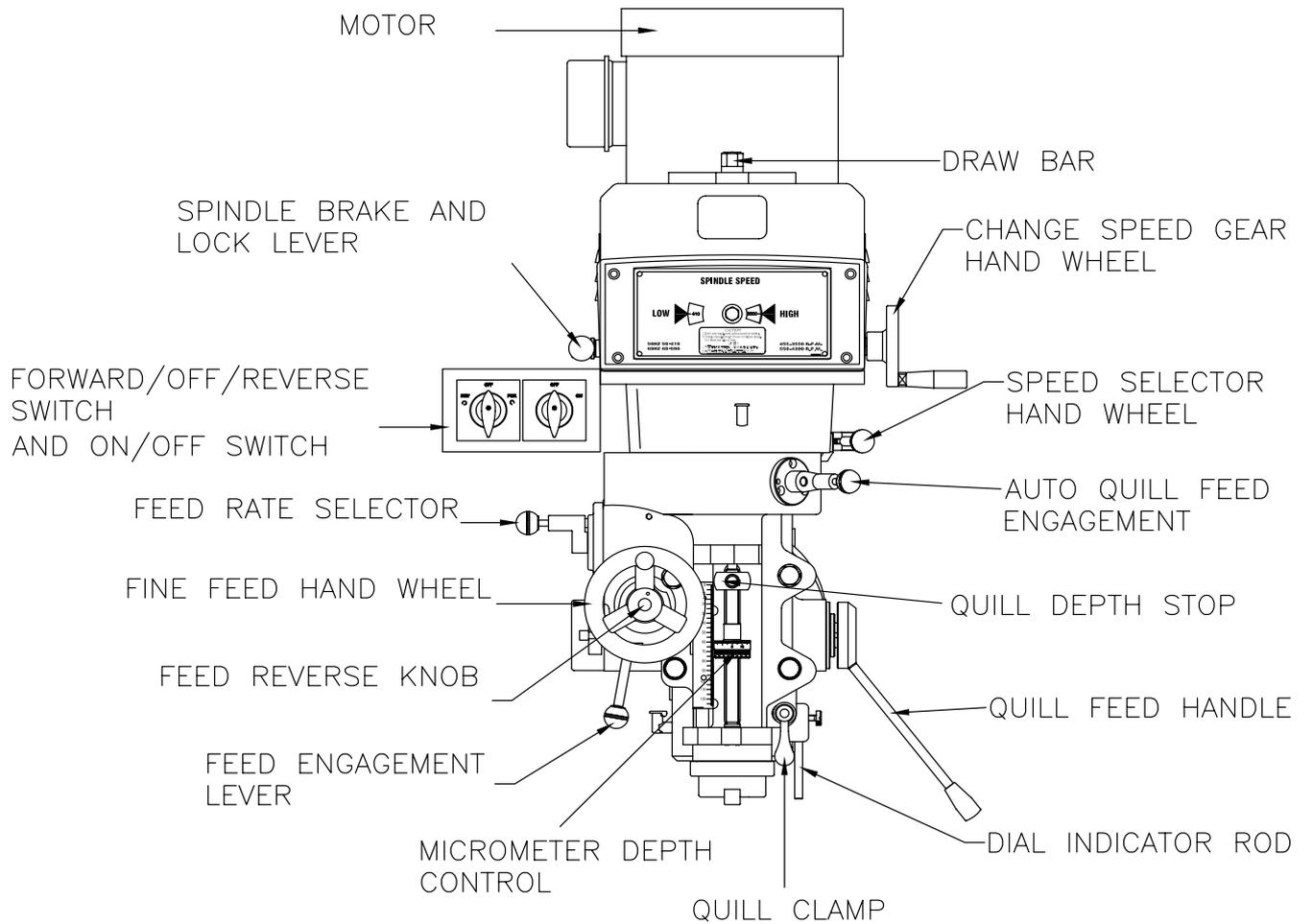
ALWAYS BE CLAMPED WHEN LONGITUDINAL MOVEMENT IS NOT REQUIRED.



THE KNEE CLAMPING LEVER IS AT THE LEFT SIDE OF THE KNEE AND SHOULD BE DRAWN UPWARD TO CLAMP THE KNEE. THIS IS ONLY A TENSION BRAKE AND WILL NOT LOCK THE KNEE COMPLETELY. LEAVE CLAMPED AT ALL TIMES UNLESS USING KNEE IN OPERATION.



3-3 MAIN PART OF MILLING HEAD (WITH VARIABLE SPEED MOTOR)



3-4 FINE HAND FEED

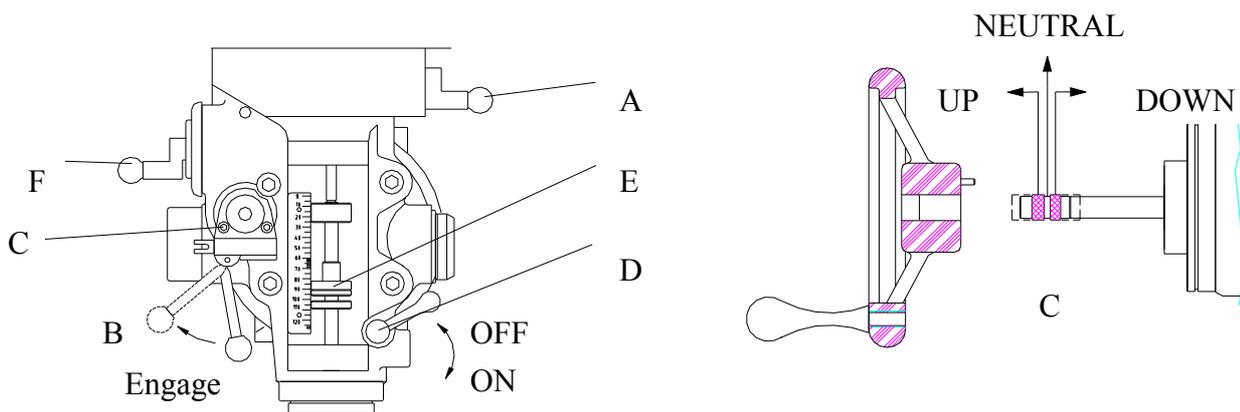
1. DISENGAGE AUTO QUILL FEED 'A'.
2. LOCATE 'C' IN MID (NEUTRAL) POSITION.
3. ENGAGE FEED TRIP LEVER 'B'.
4. THE QUILL IS NOW UNDER HANDWHEEL CONTROL.

AUTOMATIC FEED

MAXIMUM LOADING 9.5mm (3/8") DIAMETER DRILL IN STEEL.

1. ENSURE QUILL LOCK, 'D' IS OFF.
2. SET MICROMETER DIAL, 'E', TO REQUIRED DEPTH.
3. WHEN MOTOR HAS STOPPED, ENGAGE AUTO QUILL FEED 'A'.
4. SELECT FEED RATE 'F' & FEED DIRECTION 'C'.
5. ENGAGE FEED TRIP LEVER 'B'.
6. FEED WILL AUTOMATICALLY TRIP OUT WITHIN $\pm 0.25\text{mm}$ (0.005") OF REQUIRED DEPTH.
7. PRESS HAND FEED TO DEAD STOP FOR REPEATING ACCURACY OF $\pm 0.025\text{mm}$ (0.001").

****NOTE: DO NOT ENGAGE QUILL FEED 'A' OVER 3000 R.P.M.



3-5 SPINDLE SPEED (WITH VARIABLE SPEED MOTOR)

■ VARIABLE SPEED MOTOR

HZ	HIGH SPEED	LOW SPEED
50HZ	680~3800	75~450
60HZ	550~4300	60~500

■ INVERTER SPEED MOTOR

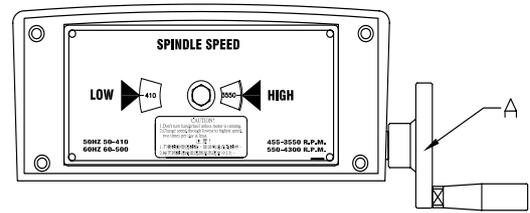
HZ	SPEED
60HZ	70~4300

***CHANGING SPEED WHILE MOTOR IS RUNNING.

3-6 SPINDLE SPEED SELECTION (WITH VARIABLE SPEED MOTOR)

■ CHANGE SPEED WHEEL

1. DO NOT TURN 'A' WHEN SPINDLE STOPPED.
2. TURN WHEEL 'A' TO CHOOSE SPEED



NO TURNING 'A' WHEN SPINDLE STOPPED

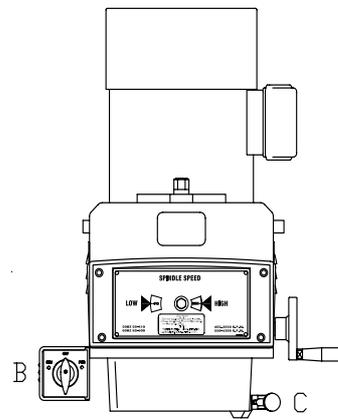
■ CHANGE HIGH / LOW SPEED HANDLE

CHANGE SPEED FROM HIGH SPEED TO LOW SPEED

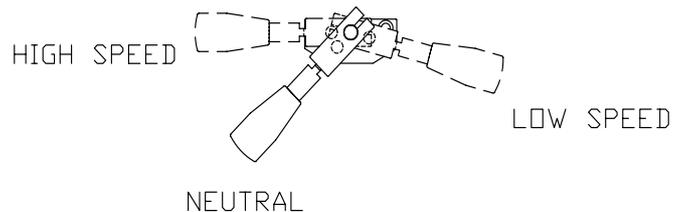
1. TURN OFF MOTOR.
2. MOVING HANDLE 'C' THROUGH NEUTRAL TO LOW SPEED.
3. TURN ON THE MOTOR.

CHANGE SPEED FROM LOW SPEED TO HIGH SPEED

1. TURN OFF MOTOR.
2. MOVING HANDLE 'C' THROUGH NEUTRAL TO HIGH SPEED.
3. TURNING SPINDLE TO MATCH CLUTCH
4. TURN ON THE MOTOR.

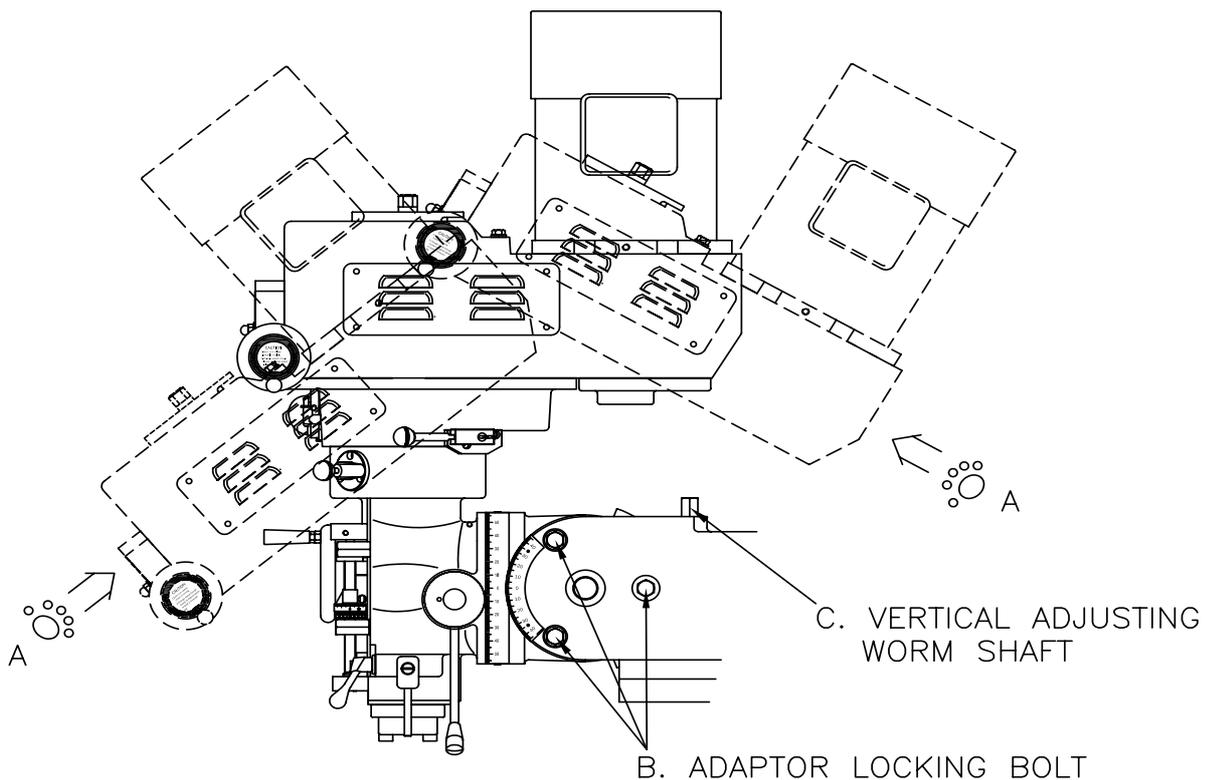


NO CHANGE 'C' WHEN SPINDLE MOVING



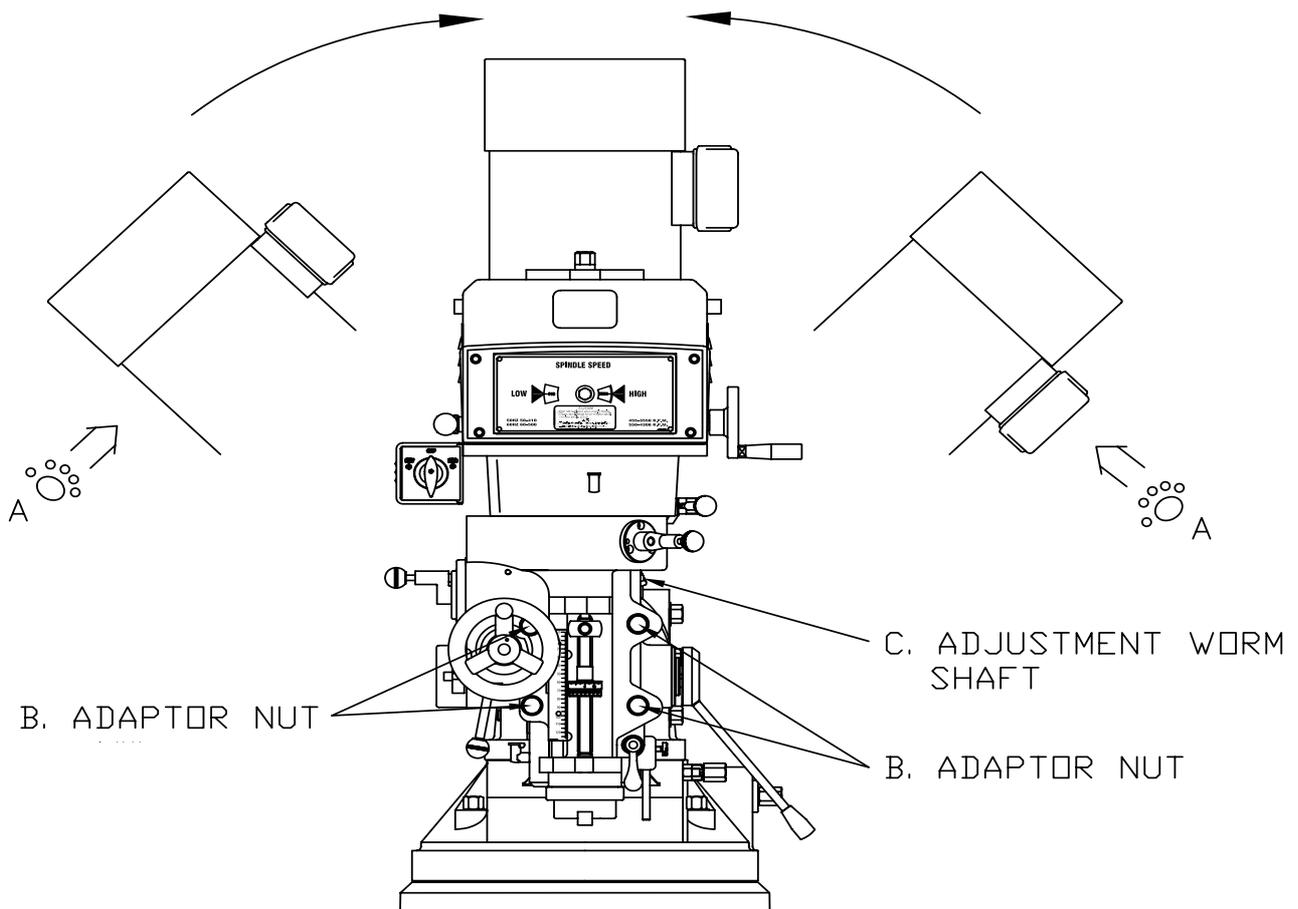
3-7 SWING MILLING HEAD FORWARD & BACKWARD

1. LOOSEN 'B' ADAPTOR LOCKING BOLT (3 PIECES.), BUT DO NOT LOOSEN THEM TOO MUCH OR REMOVE THEM AWAY FROM MACHINE.
2. TURN SLOWLY 'C' VERTICAL ADJUSTING WORM SHAFT TO SWING MILLING HEAD TO YOUR REQUIRED ANGLE. WHILE SWINGING MILLING HEAD, USE YOUR HAND(S) TO SUPPORT IT FROM FALLING. AFTER MILLING HEAD AT POSITION, LOCK 'B' ADAPTOR LOCKING BOLT (3 PIECES) TIGHTLY.
3. LOOSEN 'B' ADAPTOR LOCKING BOLT (3 PIECES.), THEN TURN 'C' VERTICAL ADJUSTING WORM SHAFT TO RETURN MILLING HEAD BACK TO ORIGINAL POSITION. WHILE TURNING MILLING HEAD, USE YOUR HAND(S) TO PUSH IT UPWARDS.



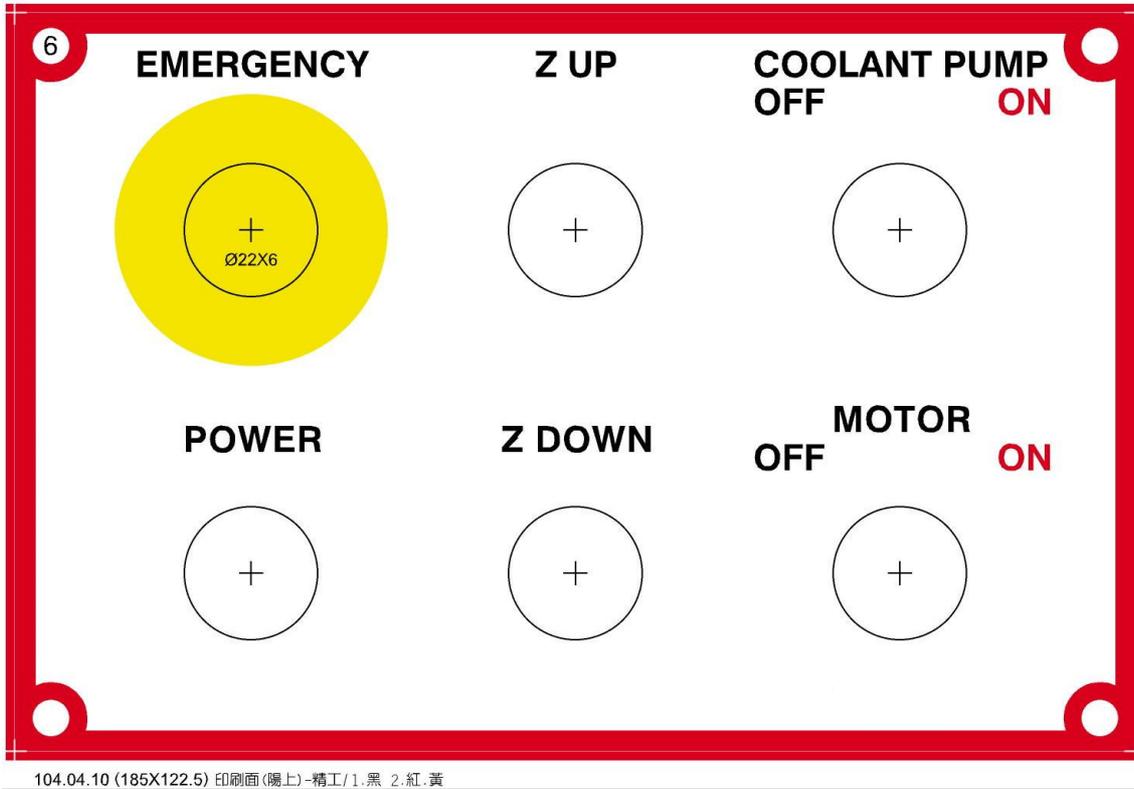
3-8 SWING MILLING HEAD LEFT-SIDE & RIGHT-SIDE

1. LOOSEN 'B' TEE BOLT (4 PIECES.), BUT DO NOT LOOSEN THEM TOO MUCH OR REMOVE THEM AWAY FROM MACHINE.
2. TURN SLOWLY 'C' ADJUSTMENT WORM SHAFT TO SWING MILLING HEAD TO YOUR REQUIRED ANGLE. WHILE SWINGING MILLING HEAD, USE YOUR HAND(S) TO SUPPORT IT FROM FALLING.
AFTER MILLING HEAD AT POSITION, LOCK 'B' TEE BOLT (4 PIECES) TIGHTLY.
3. LOOSEN 'B' TEE BOLT (4 PIECES.), THEN TURN 'C' ADJUSTMENT WORM SHAFT TO RETURN MILLING HEAD BACK TO ORIGINAL POSITION. WHILE TURNING MILLING HEAD, USE YOUR HAND(S) TO PUSH IT UPWARDS.



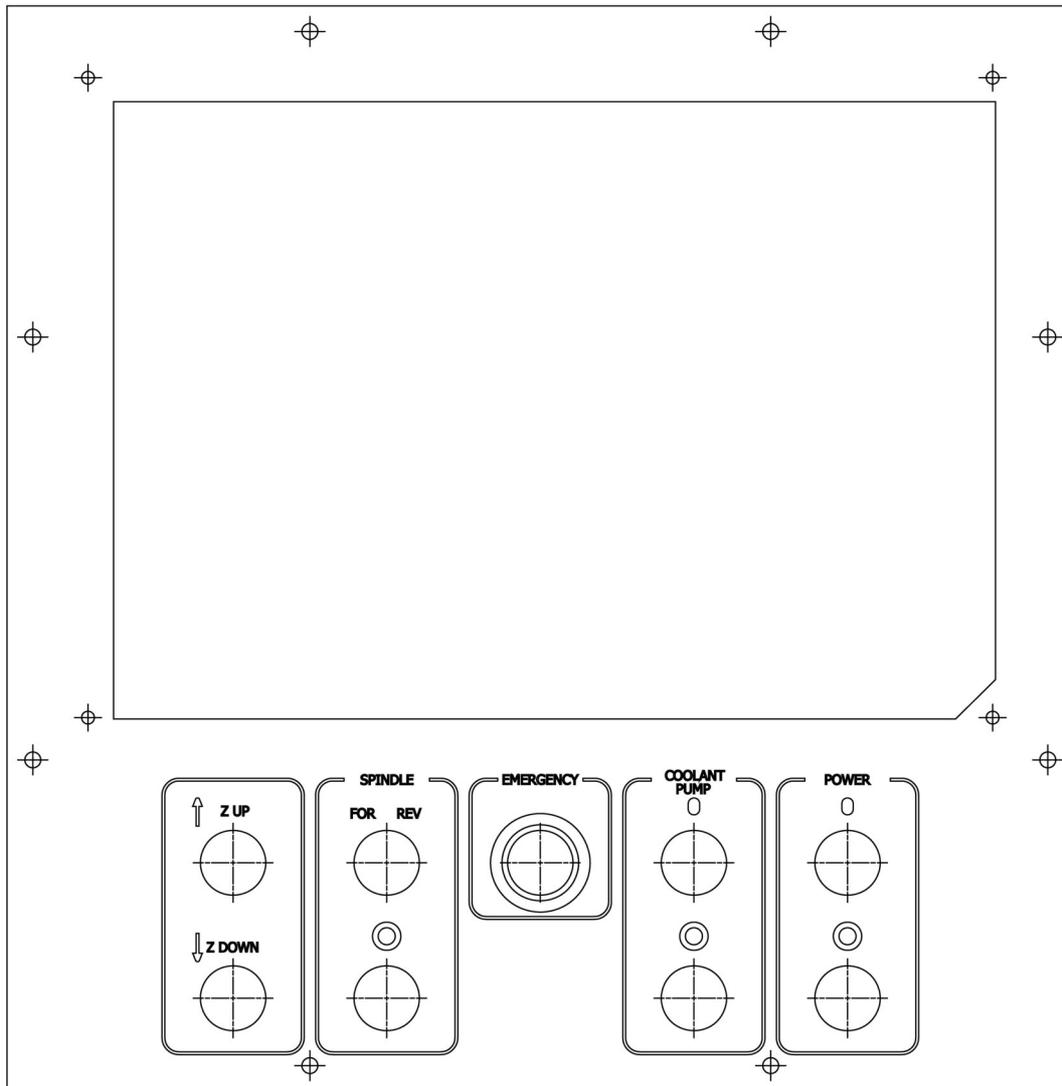
3-9 CONTROL PANEL

A. FULL ELECTRICS FOR 2VS/3VS/4VSQ (CLAUSING) :



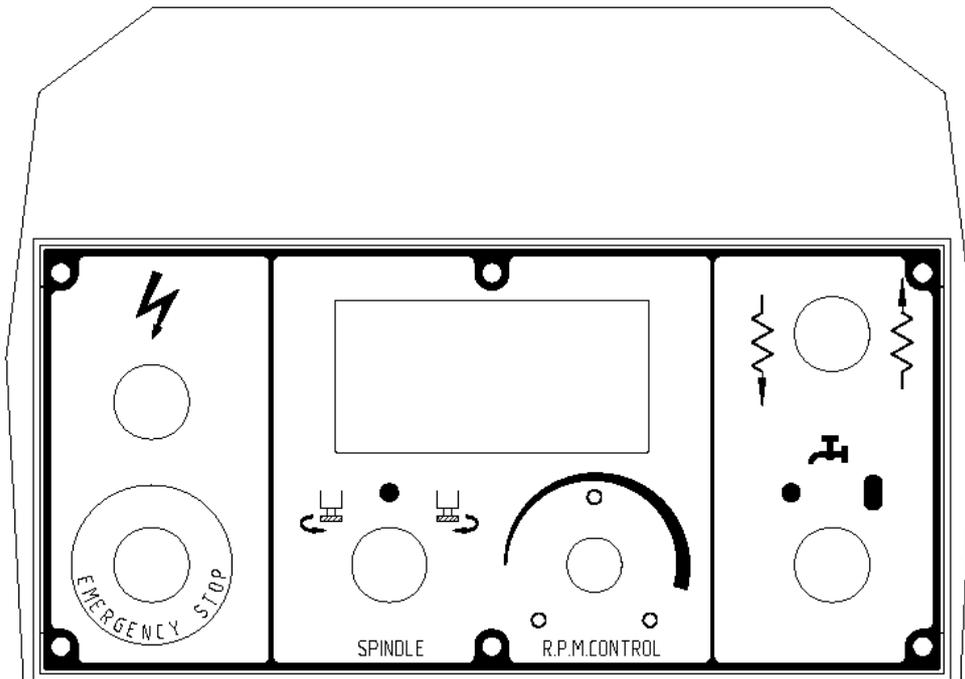
1. EMERGENCY: TO CUT OF MACHINE POWER SUPPLY
2. POWER: TO START MAIN POWER
3. Z UP: TO MOVE Z AXIS UPWARD DIRECTION (2/3VS OPTION)
4. Z DOWN: TO MOVE Z AXIS DOWNWARD DIRECTION (2/3VS OPTION)
5. COOLANT PUMP OFF: TO STOP COOLANT PUMP MOTOR
6. COOLANT PUMP ON: TO START COOLANT PUMP MOTOR
7. MOTOR OFF: TO STOP SPINDLE MOTOR

B. FULL ELECTRICS FOR 2VS/3VS/4VSQ (600 UK SPECIAL REQUIRE)

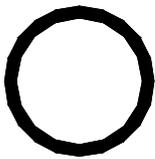


1. Z UP: TO MOVE Z AXIS UPWARD DIRECTION (2/3VS OPTION)
2. Z DOWN: TO MOVE Z AXIS DOWNWARD DIRECTION (2/3VS OPTION)
3. SPINDLE FOR/REV : SPINDLE ROTATE FORWARD / REVERSE DIRECTION
4. SPINDLE OFF : TO STOP SPINDLE MOTOR
5. EMERGENCY : TO CUT OF MACHINE POWER SUPPLY
6. COOLANT PUMP ON : TO START COOLANT PUMP MOTOR
7. COOLANT PUMP OFF : TO STOP COOLANT PUMP MOTOR
8. POWER ON : TO START MAIN POWER
9. POWER OFF : TO STOP MAIN POWER

C. FULL ELECTRICS FOR 2EVS/3EVS/4EVSQ (CLAUSING) :

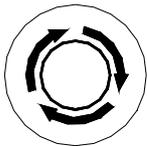


1. POWER BUTTON



WHEN IT'S ON, THE INTERNAL LIGHT GOES ON AT THE SAME TIME. IT CAN BE USED AS FREQUENCY CHANGER (FC) FOR ALM AND RESET. **CAUTION:** MAKE SURE THE SPINDLE SWITCH IS IN CENTER POSITION BEFORE PUSH THE POWER SWITCH.

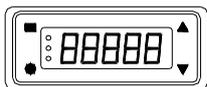
2. EMERGENCY BUTTON



EMERGENCY

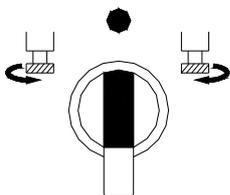
PUSH THE EMERGENCY BUTTON IF ANYTHING GOES AWAY DURING MACHINE OPERATION WORKING TO FORCE MACHINE SHUT DOWN IMMEDIATELY.

3. R.P.M. DISPLAY



DISPLAYS THE ACTUAL RPM WHEN MACHINE IS RUNNING. MAXIMAL RPM REACHES 4300 RPM.

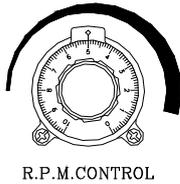
4. SPINDLE SWITCH



SPINDLE

WHEN THE SWITCH SET AS IN CENTER MEANS "OFF", SPINDLE "CW" , SPINDLE "CCW" .

5. R.P.M. ADJUST SWITCH



ADJUST THE RPM OF SPINDLE TO THE SPEED THAT YOU WANT.

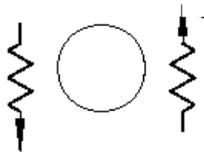
- (1) DON'T SHUT OFF THE POWER DURING ALTERING OF THE SPINDLE SPEED. IT CAN BE ADJUSTED ONLY WHEN THE SPINDLE IS OPERATING.
- (2) TO INCREASE THE SPINDLE SPEED, TURN THE SPEED KNOB CLOCKWISE. OTHERWISE, TURN KNOB COUNTERCLOCKWISE TO GRADUALLY SLOW THE SPINDLE SPEED. THE REQUIRED SPEED MAY BE FOLLOWED WITH THE R.P.M. DISPLAY.
- (3) CHANGING THE SPINDLE SPEED SHOULD BE OPERATED GRADUALLY TO AVOID ANY HARM OF MACHINE.

6. COOLANT PUMP SWITCH



TURN "RIGHT" TO TURN THE COOLANT PUMP "ON"
TURN "LEFT" TO TURN IT OFF.

7. Z UP/DOWN SWITCH



TURN "RIGHT" TO MOVE Z AXIS UPWARD
TURN "LEFT" TO MOVE Z AXIS DOWNWARD
(2VS/3VS OPTION)

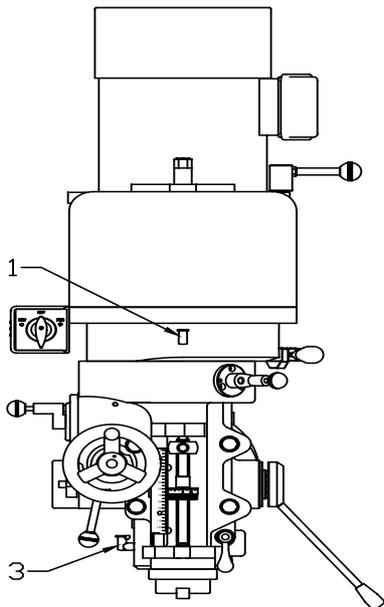
CHAPTER 4. MAINTENANCE

4-1 MILLING HEAD LUBRICATION SYSTEM

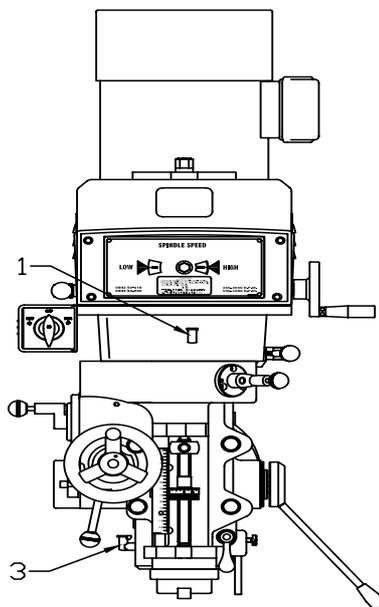
FREQUENCY	LUBRICATE	LUBRICANT	QUANTITY	LUB. AT
TWICE WEEKLY	CAP RING	VACTRA HEAVY MEDIUM	5 DROPS	1
TWICE DAILY	SPINDLE GEAR	GREASE	TOP-UP	2
TWICE DAILY	QUILL	VACTRA HEAVY MEDIUM	5 DROPS	3

※NOTE: FAILURE TO LUBRICATE "QUILL" AT 3 CAN RESULT IN TIGHT QUILLS.

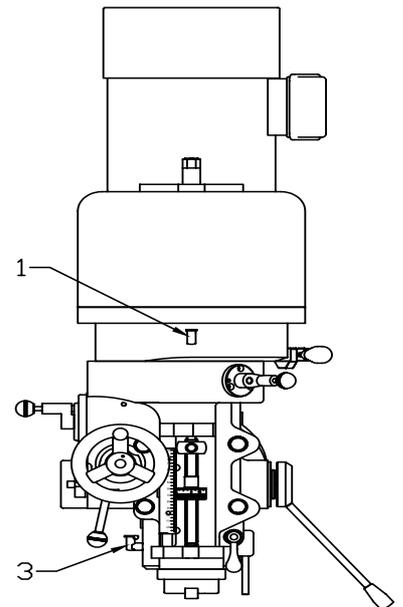
STEP PULLEY
CONTROLLED HEAD



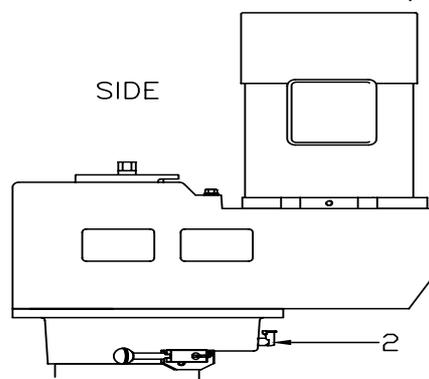
VARIABLE SPEED HEAD



VARIABLE SPEED
MOTOR HEAD



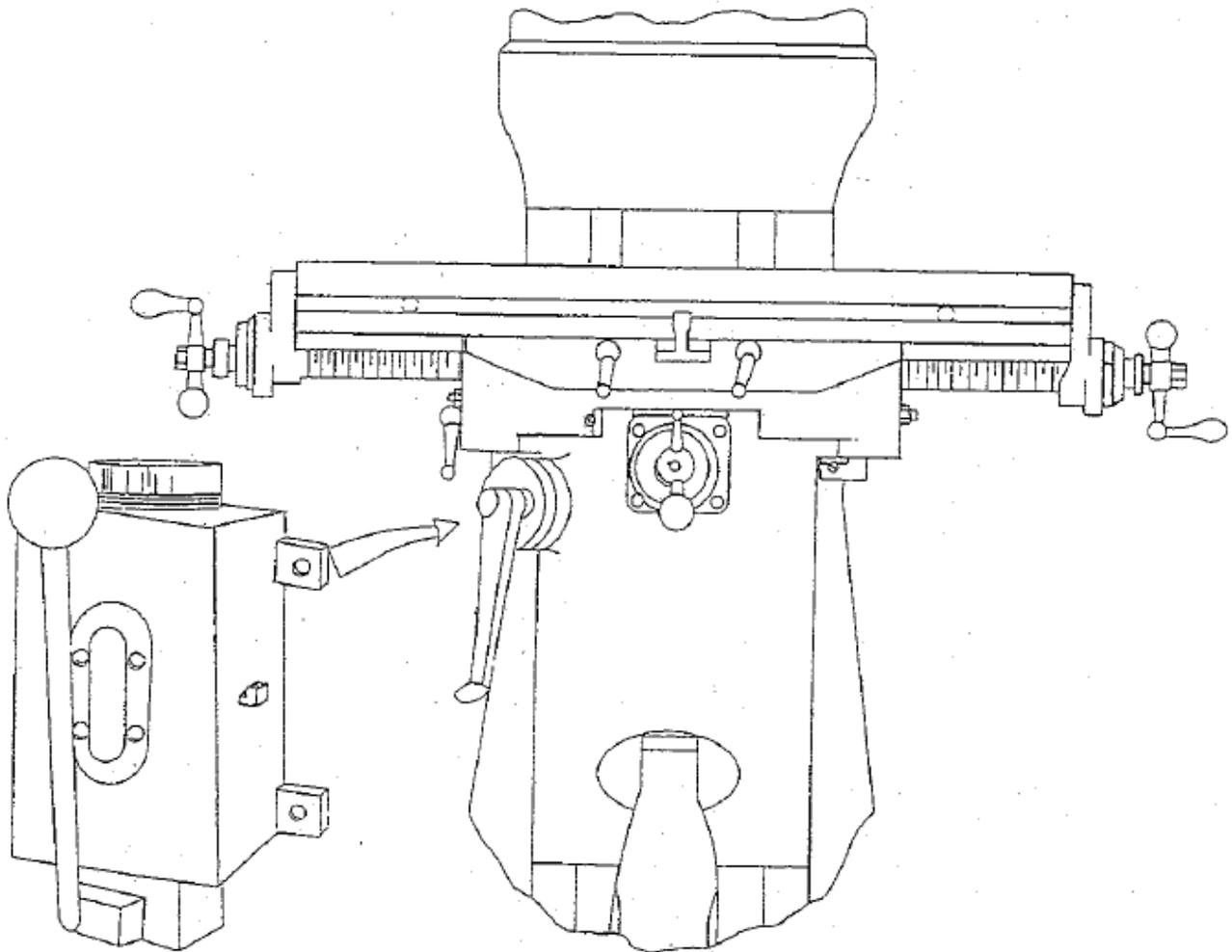
SIDE



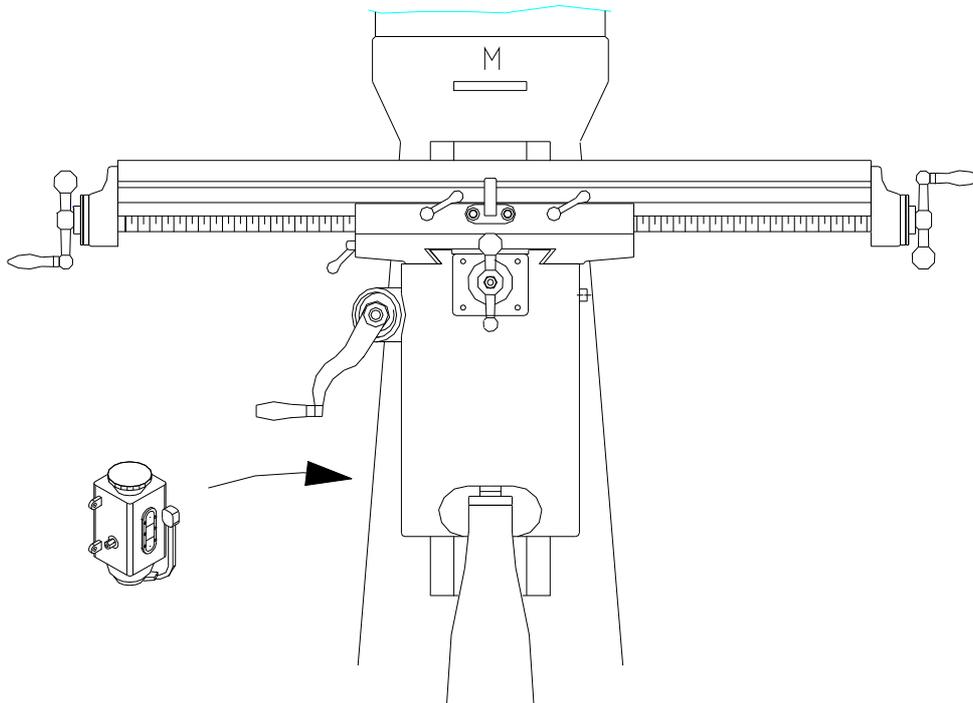
4-2 AXIAL LUBRICATION SYSTEM

■ REGULAR LUBRICATION

- ① PLEASE USE LUBRICATING SLIDE WAY OIL NO. 68
(FOR EXAMPLE: OIL MOBIL NO. 2).
- ② PLEASE PUSH LUBE SYSTEM AT LEAST ONE TIME EVERY DAY.



4-3 LUBRICATION SYSTEM



FREQUENCY	LUBRICATE	LUBRICANT	QUANTITY
Centraliced Lub.	Lead Screw	Shell Cornea Oil 41 MOBILx2 Socony Gargoyle Vactra No.2	One Pump
Pump Daily	Saddle-Table Ways	“Sunoco” Waylube #80 MOBILx2	One Pump
Check Level Weekly	Saddle-Knee Ways	“Sunoco” Waylube #80 MOBILx2	One Pump
	Knee Colum Ways	“Sunoco” Waylube #80 MOBILx2	One Pump
Twice Weekly	Elevating Screw	Shell Cornea Oil 41 MOBILx2 Socony Gargoyle Vactra No.2	5 Shots(Oil Gun)

4-4 AUTO LUBRICATION SYSTEM (OPERATION INSTRUCTIONS)

1. INSTRUCTION FOR MANUAL OIL FEEDING

1-1 IF CONTINUED LUBRICATING IS REQUIRED, PLEASE PRESS "F" KEY, AT THE TIME, THE INDICATOR OF ACT IS LIGHT AND PUMPING OIL OUT.

NOTE:

- ※ 1. PRESS "F" KEY, IT DOES NOT INFLUENCE THE TIME OF INTERVAL.
- ※ 2. MAX PUMPING OIL TIME : 4 MIN.
- ※ 3. PRIOR TO THE FIRST OPERATION, PRESS "F" KEY BY HAND IN ORDER TO FILL UP THE PIPE WITH OIL.

2. SETTING TIME OF AUTO OIL FEEDING

2-1 SET THE "ON" AND "OFF" AT THE RESPECTIVE POSITION FOR THE SELECTED DISCHARGE AMOUNT.

NOTE:

- ※ 1. SET THE POSITION OF TIME NOT OVER 0-60 OR 0-180.
- ※ 2. "OFF" TIME SHALL BE OVER THAN THE TRIPLE OF "ON" TIME.
- ※ 3. TIME VALUE IN $\pm 3\%$.
- ※ 4. CESD: ADJUSTER INSIDE BOX, SO THAT, WHEN YOU WANT TO SET THE TIME, THE COVER SHALL BE OPENED FIRST.

2-2 *ACT-INDICATOR*: LIGHT WILL BE ON DURING THE ACTUATING-PHASE.
INT-INDICATOR: LIGHT WILL BE ON DURING THE INTERMITTENT-PHASE.

2-3 WHEN OIL LOWER THAN THE MIN. LEVEL: THE LAMPS OF *ACT* AND *INT* WILL GLITTER; THE MOTOR IS STOPPED; *ALM* IS RING, AT THIS TIME, REFILL CLEAN OIL NEED.

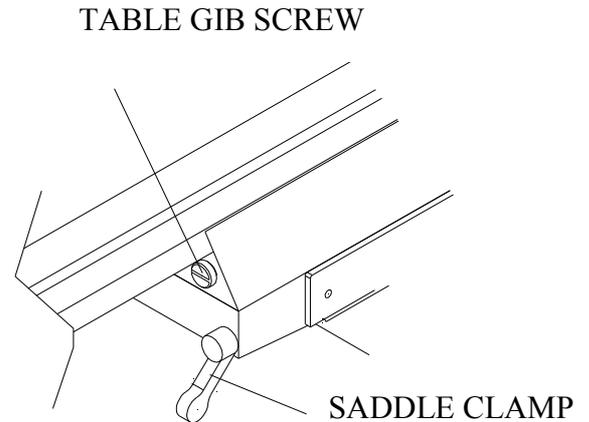
NOTE:

THE TIME OF DETECTION OIL DEFICIENT IS IN NEED OF 30 SECONDS.

4-5 GIB ADJUSTMENT

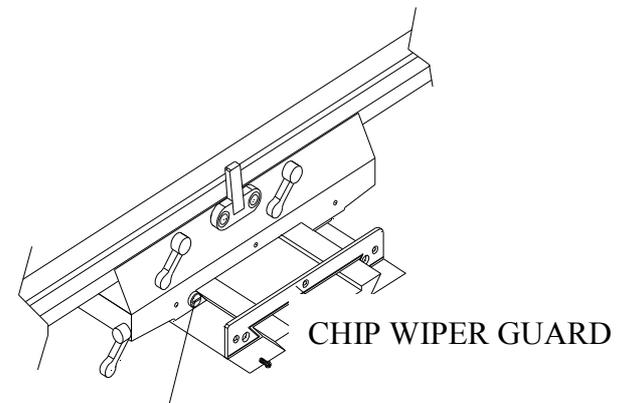
A. TABLE SADDLE WAYS

1. REMOVE ALL SWarf FROM AREA.
2. LOOSEN RIGHT TABLE GIB SCREW AND TURN LEFT TABLE GIB SCREW CLOCKWISE UNTIL SLIGHT DRAG IS FELT.



B. SADDLE KNEE WAYS

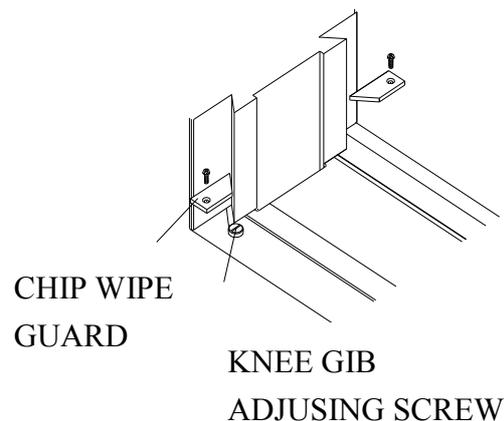
1. REMOVE ALL SWarf FROM AREA.
2. REMOVE COVER.
3. LOOSEN BACK SADDLE GIB SCREW AND TURN FRONT SADDLE GIB SCREW CLOCKWISE UNTIL SLIGHT DRAG IS FELT.
4. REPLACE THE WIPER.



SADDLE GIB ADJUSTING SCREW

C. KNEE COLUMN WAYS

1. REMOVE ALL SWarf FROM AREA.
2. REMOVE COVER.
3. LOOSEN BACK SADDLE GIB SCREW AND TURN FRONT SADDLE GIB SCREW CLOCKWISE UNTIL SLIGHT DRAG IS FELT.
4. REPLACE THE WIPER.



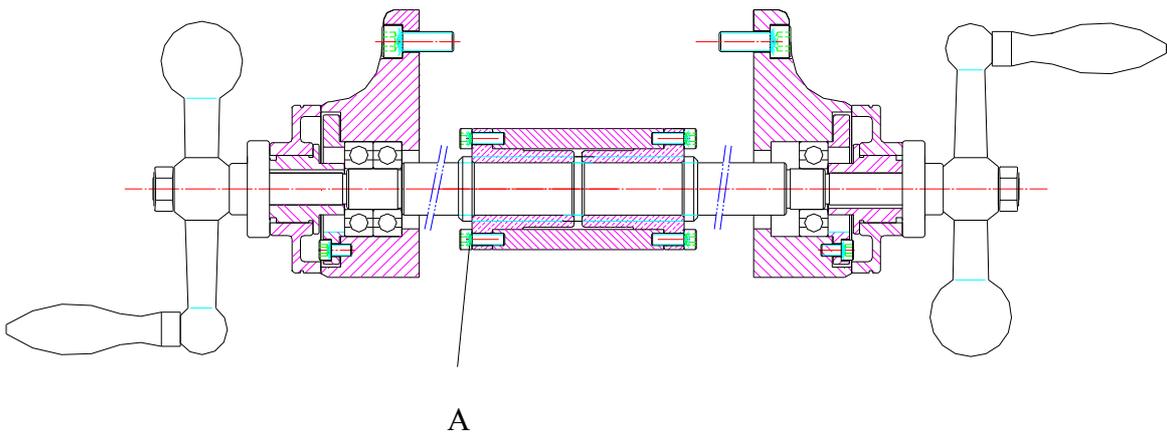
KNEE GIB
ADJUSTING SCREW

4-6 BACKLASH ADJUSTMENT (X AXIS)

■ TABLE SCREW ASSEMBLY

1. MOVE THE TABLE TO THE LEFT.
2. LOOSEN SCREW "A" 1/2 A TURN.
3. TIGHTEN SCREW "A" WHILST SLOWLY TURNING NUT "B" UNTIL
0.06MM~0.1MM ("0.002"~"0.004") IN OBTAINED.
4. FINALLY LOCK SCREW "A" ON TO "B"

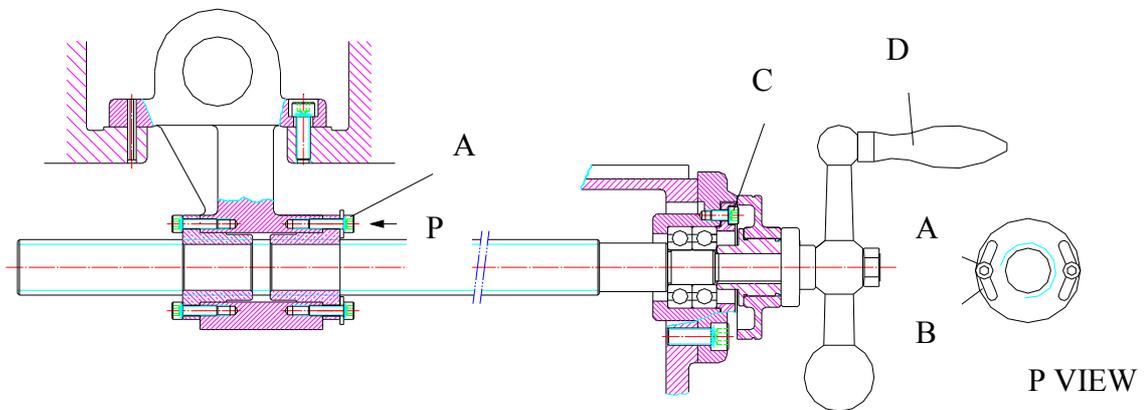
※NOTE: THIS BACKLASH ADJUSTMENT DOES NOT APPLY,
IF MACHINE IS EQUIPPED WITH X AXIS BALL SCREW



4-7 BACKLASH ADJUSTMENT (Y AXIS)

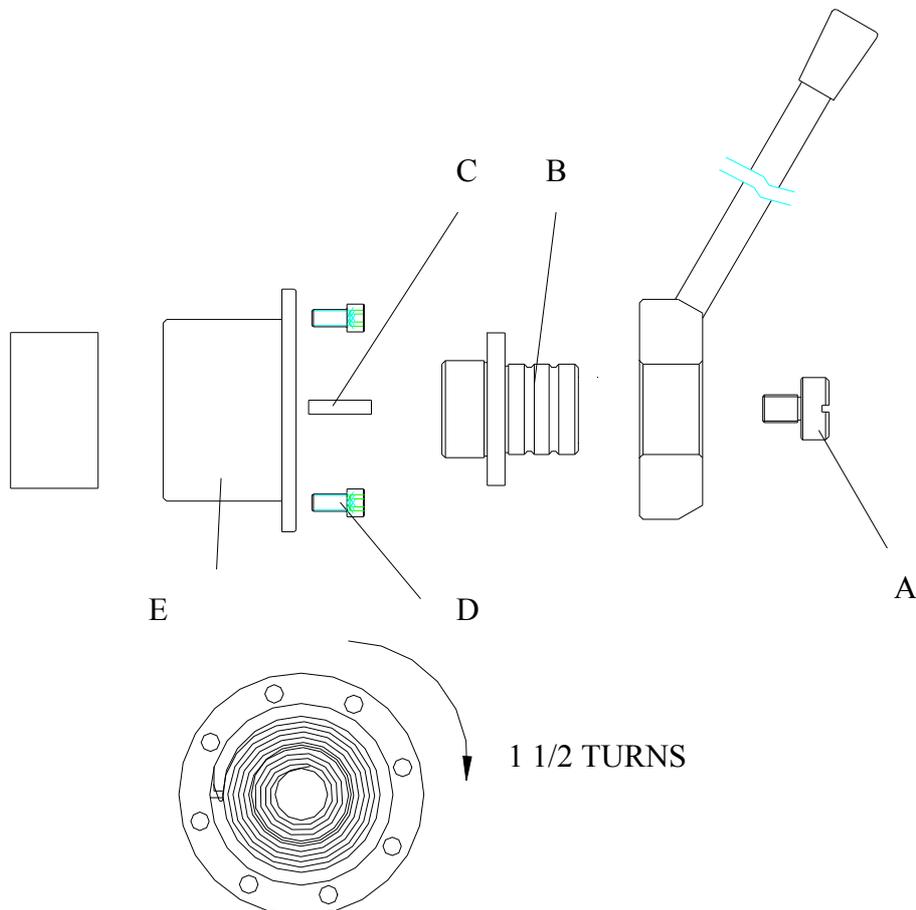
■ CROSS SCREW ASSEMBLY

1. MOVE THE SADDLE TO THE MIDDLE POSITION.
2. LOOSEN 4 PCS LOCK SCREW "C".
3. PULL THE SADDLE FORWARD TO EXPOSE SCREWS "A".
4. TIGHTEN SCREW "A" WHILST SLOWLY TURNING NUT "B" UNTIL 0.06MM~0.1MM ("0.002"~"0.004") IN OBTAINED.
5. LOCK SCREW "A" ONTO "B"
6. FINALLY CRANK THE SADDLE TO THE FRONT OF THE FRONT OF THE KNEE AND RELOCK 4 SCREWS "C"



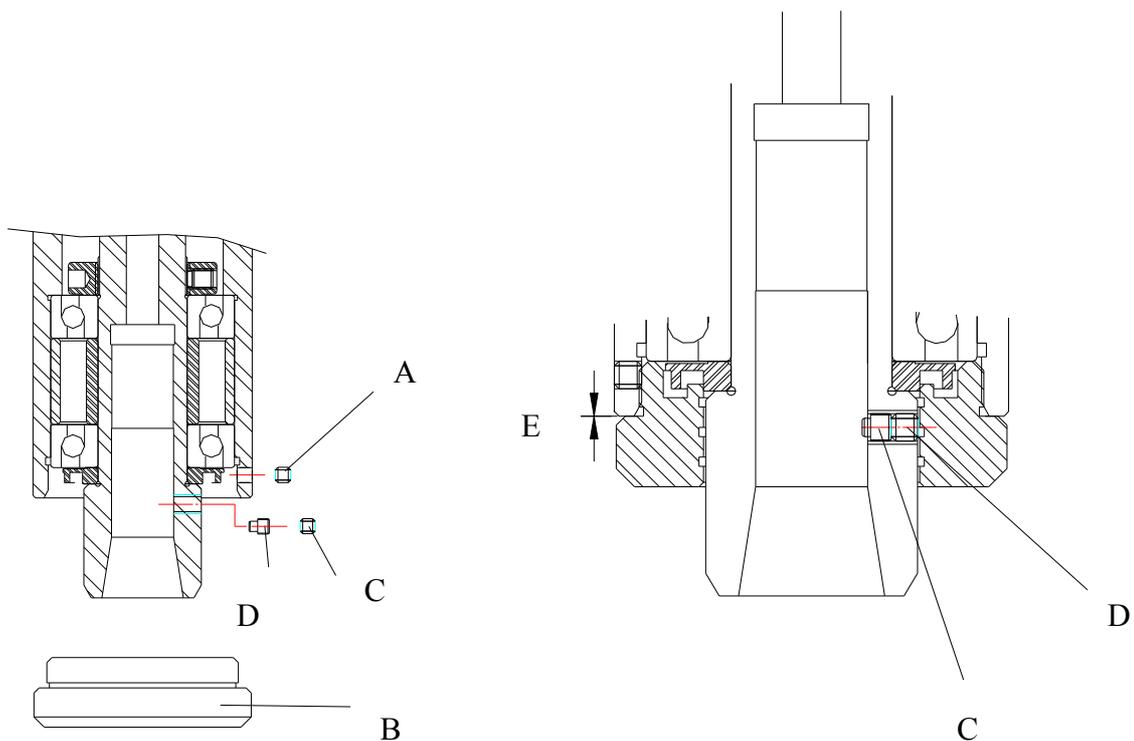
4-8 CLOCK SPRING REPLACEMENT

1. WITH QUILL AT TOP OF MOVEMENT, APPLY QUILL LOCK.
2. REMOVE SCREW 'A', HUB 'B' .
3. REMOVE TWO SCREWS 'D', ROTATE SPRING COVER 'E' UNTIL SLOWLY RELEASING SPRING TENSION IN COUNTER-CLOCKWISE SLOWLY AND GENTLY
4. REMOVE END OF CLOCK SPRING FROM THE PEG ON THE SPRING PIN.
5. REMOVE CLOCK SPRING (***BEWARE OF THE SPRING TENSION, YOU MIGHT GET HURT***) AND REPLACE A NEW/GOOD ONE.
6. REFIT SPRING IN REVERSE ORDER , THEN TEST THE TENSION OF REVERSE OF CLOCK SPRING, ADJUST THE TENSION AS REQUIRED AS FOLLOWS:
REMOVE THE FIRST SCREW 'D', INSERT A PIN, REMOVE THE SECOND SCREW 'D' , ADJUST ANGLE OF 'E' AS REQUIRED, TIGHTEN THE TENSION IN CLOCKWISE, REALEASE THE TENSION IN COUNTER-CLOCKWISE.



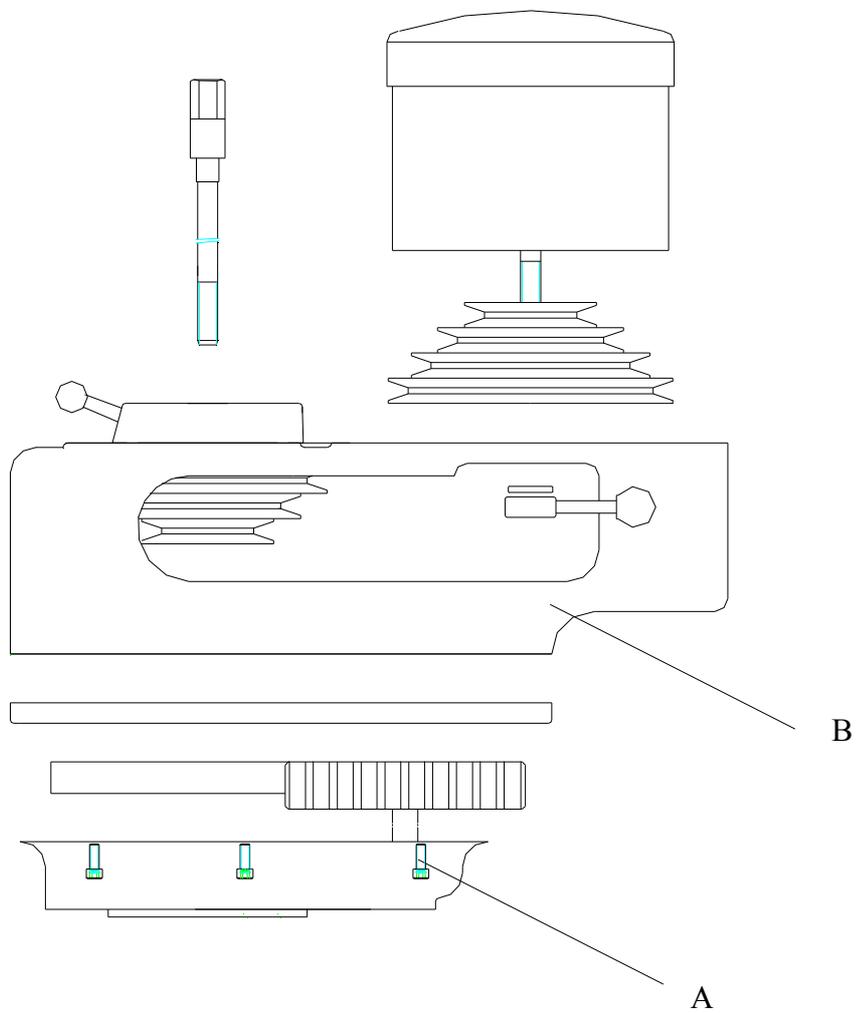
4-9 ADJUSTING SPINDLE BEARINGS PRELOAD VALUE & REPLACE SPINDLE BEARINGS (NT40# ϕ 105mm)

- 1 USE FELT PEN MARK REFERENCE LINE ON AND NOSE CAP 'B'.
- 2 REMOVE SET SCREW 'A'.
- 3 UNSCREW NOSE CAP 'B'.
- 4 REMOVE LOCK SCREW 'C' AND COLLET ALIGNING SCREW 'D'.
- 5 REPLACE 'D' INSERT R8 COLLET AND CHECK THAT THE DOG ON THE END OF THE SCREW DOES NOT FOUL ON THE BOTTOM OF THE GUIDE SLOT.
- 6 REPLACE LOCK SCREW 'C'.
- 7 REPLACE NOSE CAP 'B', CHECK FELT PEN MARKINGS FOR CORRECT ALIGNMENT.
- 8 REPLACE SET SCREW 'A'. CAUTION: DO NOT OVERTIGHTEN AS THIS WILL CAUSE DISTORTION.
- 9 CHECK GAP 'E'. (0.003=0.08MM)



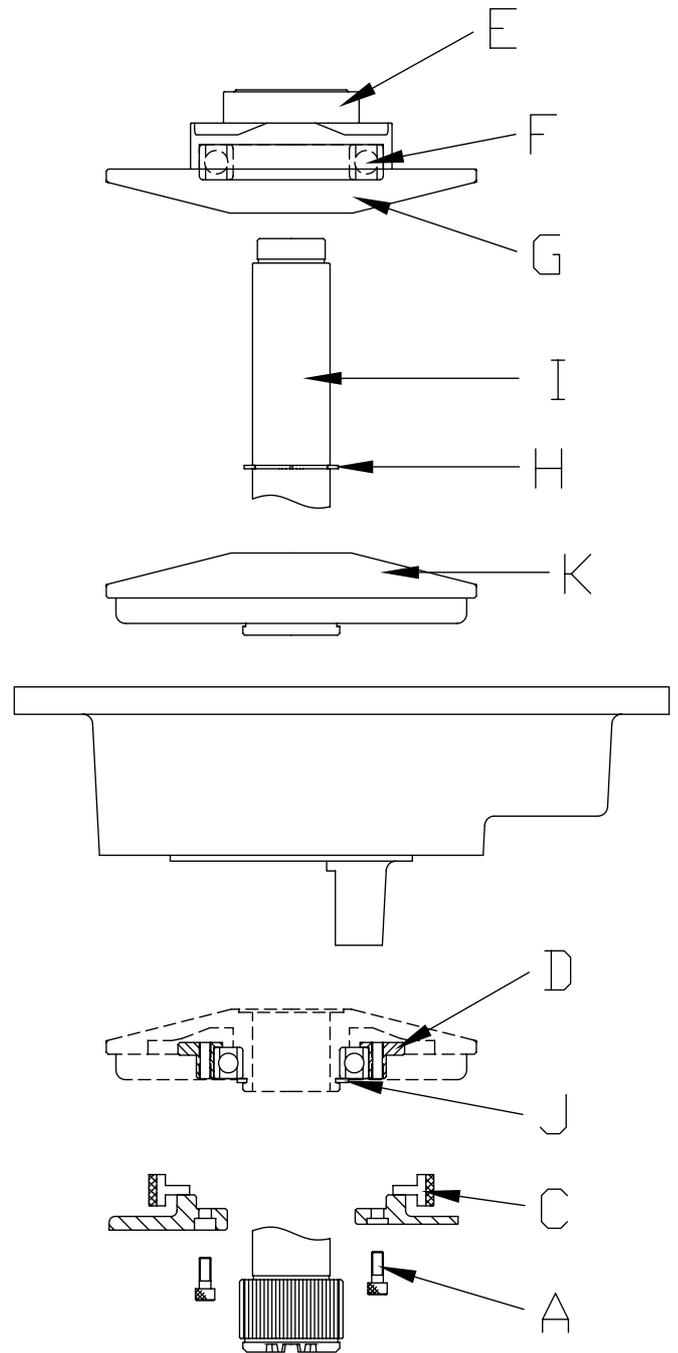
4-10 BELT REPLACEMENT (WITH VARIABLE SPEED MOTOR)

- 1 ISOLATE MACHINE.
- 2 REMOVE DRAWBAR.
- 3 REMOVE MOTOR.
- 4 LOWER QUILL TO FULL EXTENSION.
- 5 REMOVE 6 SCREW 'A'.
- 6 REMOVE BELT HOUSING 'B' TAP TO WITHDRAW FROM DOWELS.
- 7 THE BELT MAY NOW BE CHANGED.



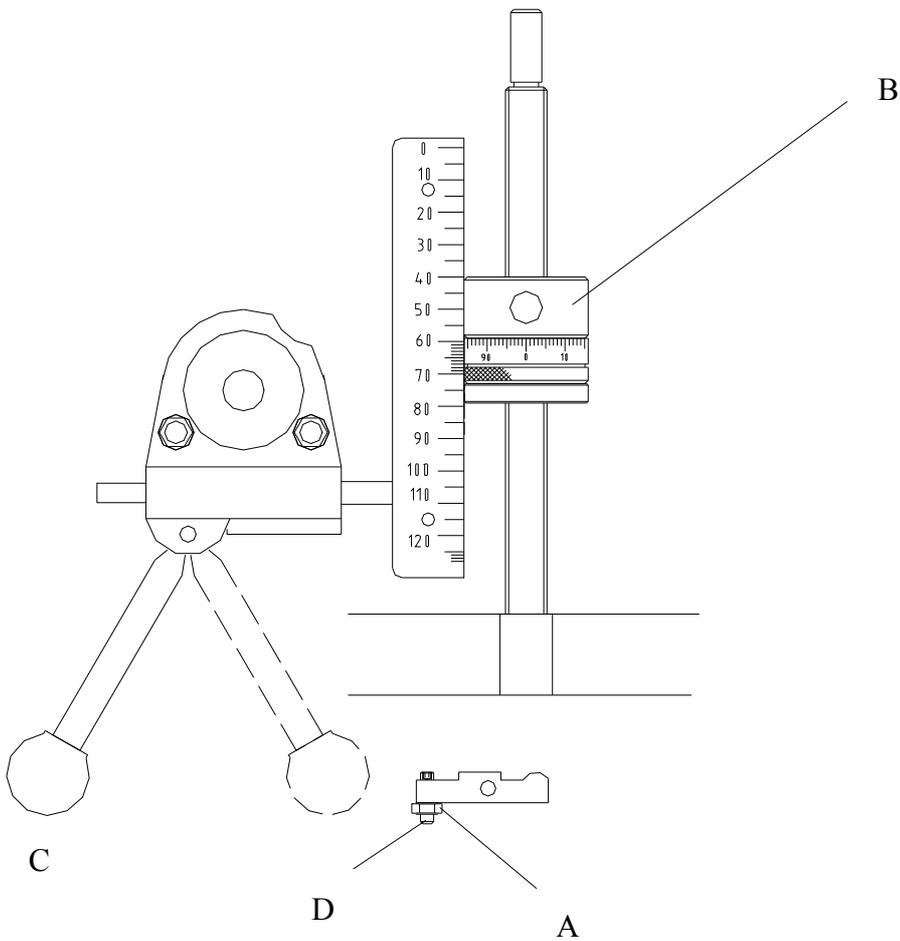
4-11 BRAKE DRUM REPLACEMENT (WITH VARIABLE SPEED MOTOR)

1. REMOVE THE MOTOR.
2. SAME AS TIMING BELT REPLACEMENT ITEM 1 TO 7.
3. REMOVE 'E', 'F', 'G' (AIM AT THE SLOT AND RE-MARK FIRST).
4. REMOVE 'H' CIRCUIT.
5. REMOVE CLUTCH GEAR SHAFT 'I' FROM LOWER SIDE.
6. REMOVE 'J' CIRCLIP.
7. REMOVE 'K' VARIABLE SPEED PULLEY FROM UPPER SIDE.
8. REMOVE 'A' ALLEN HEAD SCREW.
9. REMOVE 'D' BRAKE BEARING BASE.
10. REFIT A NEW, GOOD BRAKE SHOE.



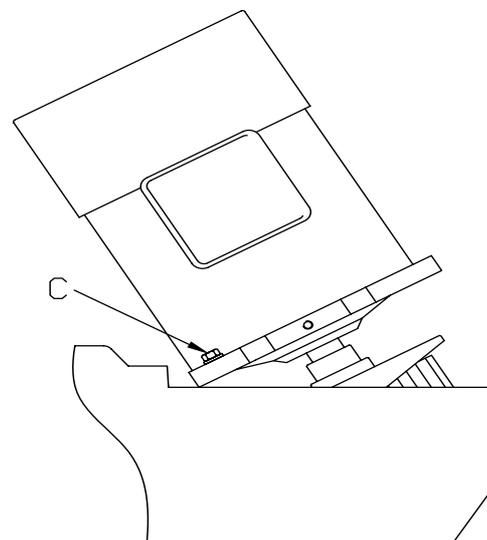
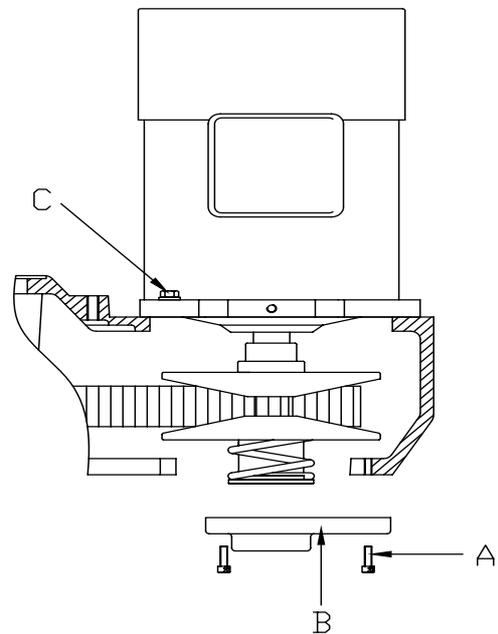
4-12 FEED TRIP ADJUSTMENT

- 1 RELEASE LOCKNUT 'A'.
- 2 ENGAGE TRIP HANDLE 'C'.
- 3 ADJUST MICRO NUTS AGAINST QUILL STOP 'B'.
- 4 SLOWLY TURN ADJUSTING SCREW 'D' UNTIL LEVER 'C' TRIPS.
- 5 AT THIS POINT SECURE LOCKNUT 'A'.
- 6 CHECK THAT SMART TRIP ACTION IS OBTAINED.



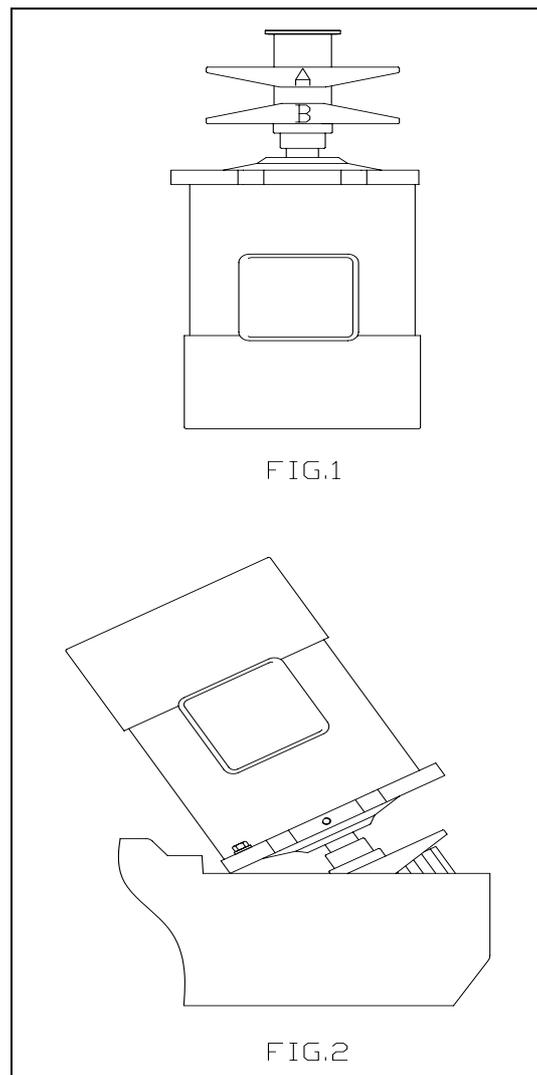
4-13 REMOVE SPINDLE MOTOR

1. ADJUST SPINDLE SPEED TO HIGHEST SPEED.
2. TURN OFF MAIN POWER.
3. REMOVE 3 SCREWS 'A' & COVER 'B'.
4. SEPARATE THE CONNECTING WIRE BETWEEN FORWARD/REVERSE SWITCH AND MOTOR.
5. REMOVE THE 4 LOCKING NUTS 'D'.
6. REMOVE THE MOTOR.



4-14 REPLACING SPINDLE MOTOR

1. USE "PULLEY PULLER" TO PULL PARTS 'A' UPWARD (SEE FIG. 1) AND PUT A 20MM THICKNESS WOODBLOCK FOR STEELBLOCK BETWEEN PARTS 'A' AND PARTS B'. KEEP THE WOODBLOCK / STEEL BLOCK AS NEAR AS POSSIBLE TO THE CENTER OF SHAFT, THEN REMOVE THE PULLEY PULLER.
2. TILT THE NEW MOTOR IN ORIGINAL ONE'S POSITION (SEE FIG. 2), PUT THE BELT BETWEEN PARTS 'A' AND PARTS 'B', THEN KEEP THE MOTOR IN UPRIGHT (VERTICAL) POSITION, AND FOCUS THE SCREW HOLES LOCATION.
3. TAKE OFF THE WOODBLOCK / STEELBLOCK, AND LOCK THE SCREWS (4 PCS. LOCKING NUT ON MOTOR AND 3 PCS. SCREW ON COVER).



CHAPTER 5. PARTS LIST

**WHEN ORDERING REPLACEMENT PARTS
PLEASE QUOTE:**

■ THE MACHINE MODEL NUMBER

■ THE MACHINE SERIAL NUMBER

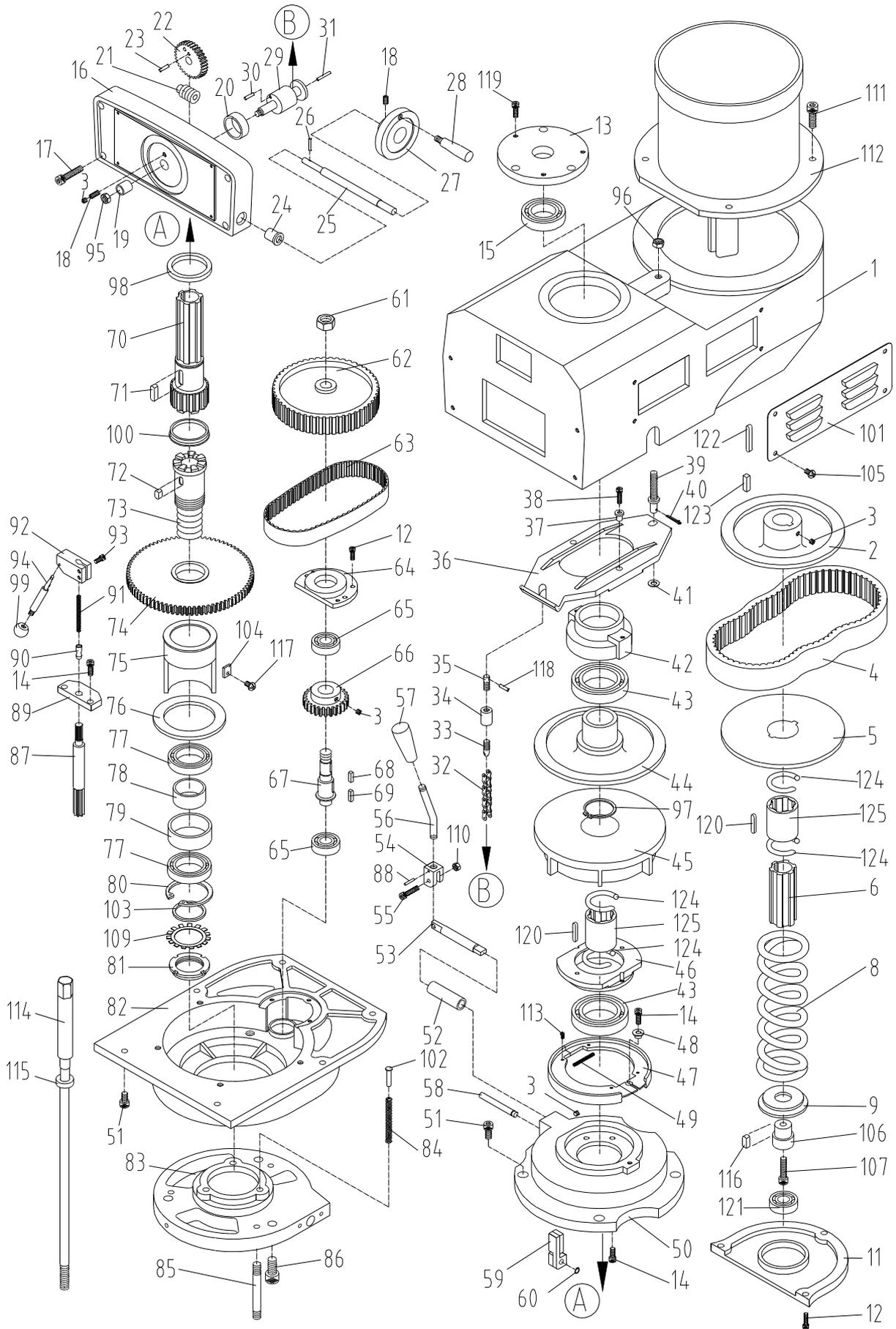
■ PARTS NUMBER

■ DESCRIPTION

■ QUANTITY

*****PARTS OBTAINABLE IN INCH OR METRIC**

VARIABLE SPEED HEAD TOP HOUSING (R8, NT30# SPINDLE TAPER)



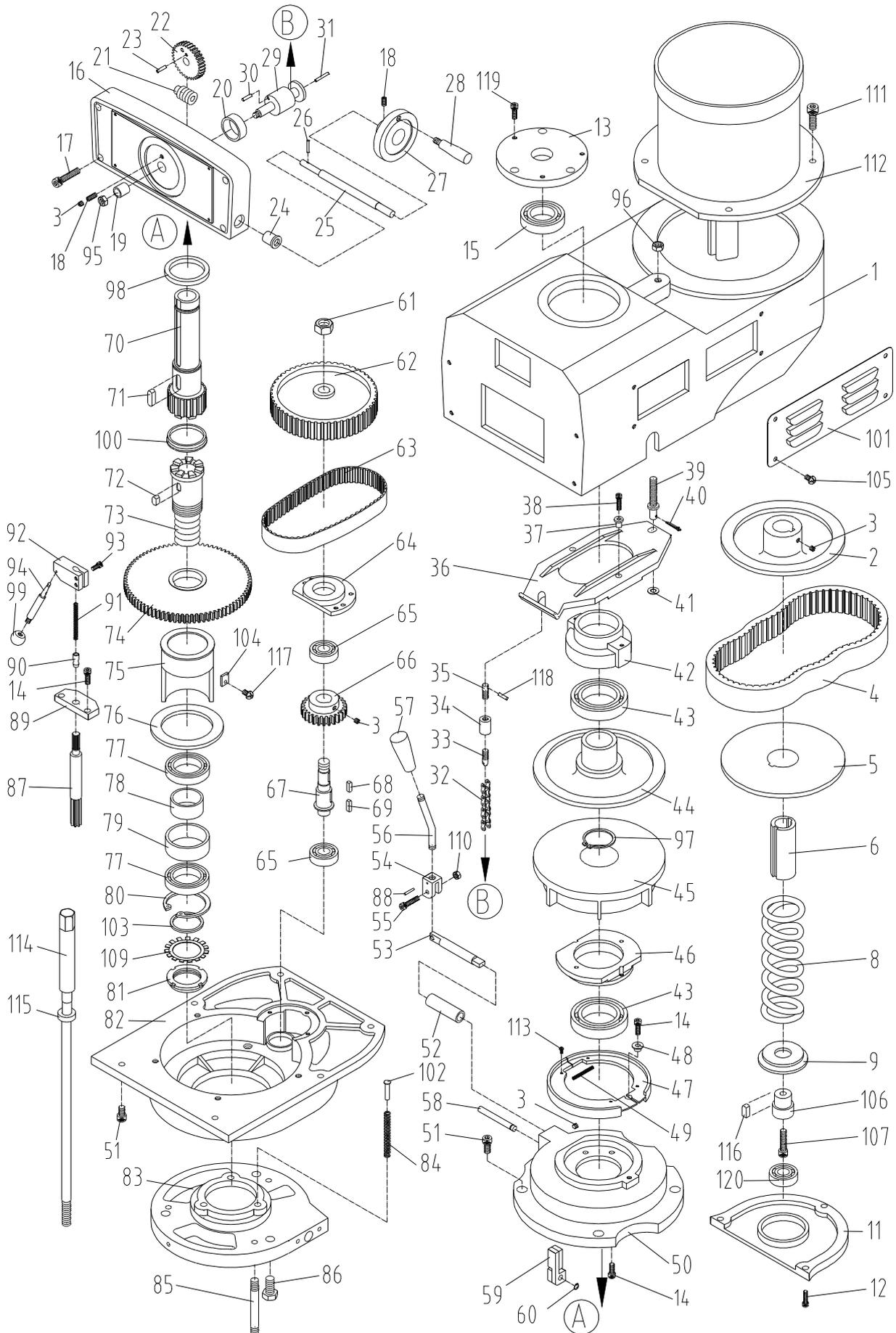
VARIABLE SPEED HEAD TOP HOUSING (R8, NT30# SPINDLE TAPER)

NO.	PART	DESCRIPTION	NO.	PART	DESCRIPTION
1	VS001A	HOUSING UPPER SIDE	41	WAS0818	WASHER
2	VS002A	MOTOR PULLEY	42	VS042	TILTER SUPPORT
3	SETM0606	SET SCREW (M6*6)	43	BE6010VV	BALL BEARING(6010VV)
4	VS004B	BELT (900VC3830)	44	VS044A	DRIVEN MOVING PULLEY
5	VS005A	MOTOR MOVING PULLEY	45	VS045	DRIVEN STEADY PULLEY
6	VS006AL	MOTOR PULLEY SHAFT	46	VS046	BEARING COVER
8	VS008	COMPRESSING SPRING	47	VS047	BRAKE LINING
9	VS009	SPRING STOP WASHER	48	VS048	LOCK SCREW
11	VS011A	MOTOR PULLEY COVER	49	VS049	BRAKE SPRING
12	CAPM0514	SOCKET SET SCREW	50	VS050	LOWER HOUSING COVER
13	VS013	FIXING COVER	51	CAPM0825	SOCKET CAP SCREW
14	CAPM0620	SOCKET SET SCREW	52	VS052	SLEEVE
15	BE6007ZZ	BALL BEARING(6007ZZ)	53	VS053	BRAKE LOCK SHAFT
16	VS016	DIAL COVER	54	VS054	BRAKE LOCK SHAFT
17	CAPM0635	SOCKET CAP SCREW	55	CAPM0625	SOCKET CAP SCREW
18	MCSSETM0608	SET SCREW M6x8L	56	VS056	BRAKE LOCK HANDLE
19	VS019	BUSHING	57	LB017	BLACK PLASTIC BALL
20	VS020	BUSHING	58	VS058	BRAKE FINGER PLVOT STUD
21	VS021	WORM			
22	VS022	WORM GEAR	59	VS059	BRAKE OPERATING FINGER
23	PIN0510	SPRING PIN(5*10)	60	RINS08	SNAP RING (S-8)
24	VS024	BUSHING	61	NUTW58FT	NUT(W5/8")
25	VS025	DIAL CONTROL SHAFT	62	VS062	TIMING BELT PULLEY
26	PIN0320	SPRING PIN(3*20)	63	A023	TIMING
27	VS027	DIAL WHEEL			
28	VS028	WHEEL HANDLE			
29	VS029	SPEED SHIFTING SHAFT			
30	PIN0416	SPRING PIN(4*16)			
31	PIN0325	SPRING PIN(3*25)			
32	VS032	SPEED CHANGE			
	CHAIN#35				
33	VS033	ADJUST STUD	64	VS064	BEARING RETAINER
34	VS034	SLEEVE NUT	65	BE6203ZZ	BALL BEARING(6203ZZ)
35	VS035	ADJUST STUD	66	VS066	PULLEY GEAR12P*26T
36	VS036	TILTER	67	VS067	PULLEY GEAR PINION COUNTER SHAFT
37	VS037	BUSHING	68	KEY5515	KEY(5*5*15)
38	CAPM0520	SOCKET CAP SCREW	69	KEY5518	KEY(5*5*18)
39	VS039	ROCKER RIGULATING SCREW	70	VS070A-S	SPINDLE PULLEY HUB (SPLINE SHAFT)
40	PINC33234	SPRING PIN ASSEMBLY		VS070C	SPINDLE PULLEY HUT (SINGLE SHAFT)
			71	KEY8724	KEY(8*7*24)
			72	KEY8712	KEY(8*7*12)
			73	VS073	SPINDLE GEAR HUB FOR R8/NT30#
			74	VS074	SPINDLE BULL GEAR ASSEMBLY(12P*81T)

VARIABLE SPEED HEAD TOP HOUSING (R8, NT30# SPINDLE TAPER)

NO. PART	DESCRIPTION	NO. PART	DESCRIPTION
75 VS075	RACK CUP	113 BUTW1814	OVAL HEAD SCREW
76 VS076	WASHER	114 VS00030	DARW BAR FOR NT30# (W1/2-13UNC)
77 BE6908ZZ	BALL BEARING(6908ZZ)	114 VS00030A	DARW BAR FOR T30# (M12*1.75P)
78 VS078	BEARING SEPARATING WASHER(SMALL)	114 VS00030B	DARW BAR FOR NT30# (WQ1/2-12UNC)
79 VS079	BEARING SEPARATING WASHER(LARGE)	114 VS000R8	DARW BAR FOR R8 (W7/16-20UNF)
80 RINR62	SNAP RING(R-62)	115 A002A	DARW BAR WASHER FOR NT30#
81 VS081	NUT FOR R8/NT30#	115 A002B	DARW BAR WASHER FOR R8
82 VS082	LOWER HOUSING	116 KEY0612	KEY (6*12)
83 VS083	FIXED CLUTCH BRACKET FOR R8/30#	117 BUTW31612	OVAL HEAD SCREW
84 VS084	COMPRESSING SPRING	118 PIN0424	SPRING PIN
85 VS085	ASSEMBLING STUD	119 CAPM0612	SOCKET CAP SCREW
86 HEXM1225	HEX SCREW (M12*25)	120 VS-120	KEY
87 VS087	GEAR SHIFT PINION	121 BB-6206ZZ	BALL BEARING
88 PIN0318	SPRING PIN(3*18)	122 KEY6645	KEY
89 VS089	HI-LOW DETENT PLATE	123 VS-040	SPRING PIN
90 VS090	HI-LOW DETENT PLUNGER	124 VS-007	SNAP RING
91 VS091	COMPRESSING SPRING ($\phi 1 * \phi 5.8 * 18.5L$)	125 VS-005A	PLASTIC SLEEVE
92 VS092	HI-LOW PINION BLOCK		
93 CAPM0514	SOCKET CAP SCREW		
94 VS094	HI-LOW PINION CRANK		
95 NUTM08	NUT(M8)		
96 NUTW38	NUT(W3/8)		
97 RINS40	SNAP PING (S-40)		
98 VS098	WAVE WASHER		
99 A082	BLACK PLASTIC BALL		
100 VS100	BELT SNAP RING		
101 VS101B	SAFETY CIVER		
102 VS102	SPRING SHAFT		
103 VS105	WASHER		
104 VS104	WASHER		
105 BUTW1438	OVAL HEAD SCREW		
106 VS106	LENGTHENING SHAFT		
107 CAPM0830	SOCKET CAP SCREW		
109 MCSWAS40	LOCKWASHER		
110 NUTM06	NUT (M6)		
111 CAPW381	SOCKET CAP SCREW		
112 MOTV	VARIABLE SPEED MOTOR		

VARIABLE SPEED HEAD TOP HOUSING (NT40# SPINDLE TAPER)



VARIABLE SPEED HEAD TOP HOUSING (NT40# SPINDLE TAPER)

NO.	PART	DESCRIPTION	NO.	PART	DESCRIPTION
1	VS001A	HOUSING UPPER SIDE	42	VS042	TILTER SUPPORT
2	VS002A	MOTOR PULLEY	43	BE6010VV	BALL BEARING(6010VV)
3	SETM0606	SET SCREW (M6*6)	44	VS044A	DRIVEN MOVING PULLEY
4	VS004B	BELT (900VC3830)	45	VS045	DRIVEN STEADY PULLEY
5	VS005A	MOTOR MOVING PULLEY	46	VS046	BEARING COVER
6	VS006AL	MOTOR PULLEY SHAFT	47	VS047	BRAKE LINING
8	VS008	COMPRESSING SPRING	48	VS048	LOCK SCREW
9	VS009	SPRING STOP WASHER	49	VS049	BRAKE SPRING
11	VS011A	MOTOR PULLEY COVER	50	VS050	LOWER HOUSING COVER
12	CAPM0514	SOCKET SET SCREW	51	CAPM0825	SOCKET CAP SCREW
13	VS013	FIXING COVER	52	VS052	SLEEVE
14	CAPM0620	SOCKET SET SCREW	53	VS053	BRAKE LOCK SHAFT
15	BE6007ZZ	BALL BEARING(6007ZZ)	54	VS054	BRAKE LOCK SHAFT
16	VS016	DIAL COVER	55	CAPM0625	SOCKET CAP SCREW
17	CAPM0635	SOCKET CAP SCREW	56	VS056	BRAKE LOCK HANDLE
18	MCSSETM0608	SET SCREW M6x8L	57	LB017	BLACK PLASTIC BALL
19	VS019	BUSHING	58	VS058	BRAKE FINGER PLVOT STUD
20	VS020	BUSHING			
21	VS021	WORM	59	VS059	BRAKE OPERATING FINGER
22	VS022	WORM GEAR			
23	PIN0510	SPRING PIN(5*10)	60	RINS08	SNAP RING (S-8)
24	VS024	BUSHING	61	NUTW58FT	NUT(W5/8")
25	VS025	DIAL CONTROL SHAFT	62	VS062	TIMING BELT PULLEY
26	PIN0320	SPRING PIN(3*20)	63	A023	TIMING BELT(225L-100)
27	VS027	DIAL WHEEL	64	VS064	BEARING RETAINER
28	VS028	WHEEL HANDLE	65	BE6203ZZ	BALL BEARING(6203ZZ)
29	VS029	SPEED SHIFTING SHAFT	66	VS066	PULLEY GEAR12P*26T
30	PIN0416	SPRING PIN(4*16)	67	VS067	PULLEY GEAR PINION COUNTER SHAFT
31	PIN0325	SPRING PIN(3*25)			
32	VS032	SPEED CHANGE CHAIN#35	68	KEY5515	KEY(5*5*15)
33	VS033	ADJUST STUD	69	KEY5518	KEY(5*5*18)
34	VS034	SLEEVE NUT	70	VS070C	SPINDLE PULLEY HUB (SINGLE SHAFT)
35	VS035	ADJUST STUD			
36	VS036	TILTER	71	KEY8724	KEY(8*7*24)
37	VS037	BUSHING	72	KEY8712	KEY(8*7*12)
38	CAPM0520	SOCKET CAP SCREW	73	VS073	SPINDLE GEAR HUB FOR R8/NT30#
39	VS039	ROCKER RIGULATING SCREW	74	VS074	SPINDLE BULL GEAR ASSEMBLY(12P*81T)
40	PINC33234	SPRING PIN			
41	WAS0818	WASHER	75	VS075	RACK CUP
			76	VS076	WASHER
			77	BE6908ZZ	BALL BEARING(6908ZZ)

VARIABLE SPEED HEAD TOP HOUSING (NT40# SPINDLE TAPER)

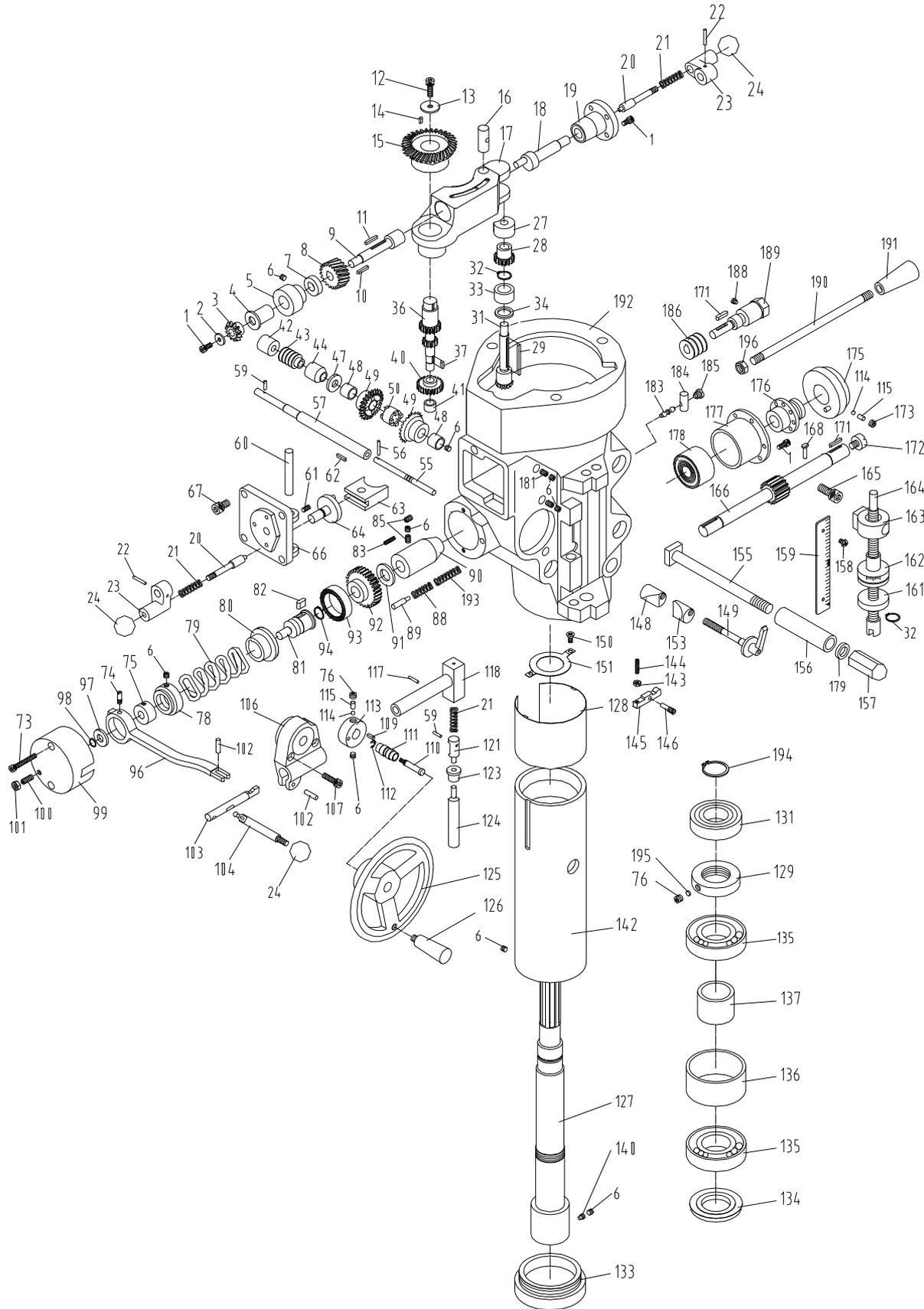
NO.	PART	DESCRIPTION	NO.	PART	DESCRIPTION
78	VS078	BEARING SEPARATING WASHER(SMALL)	114	VS00030	DARW BAR FOR NT30# (W1/2-13UNC)
79	VS079	BEARING SEPARATING WASHER(LARGE)	114	VS00030A	DARW BAR FOR T30# (M12*1.75P)
80	RINR62	SNAP RING(R-62)	114	VS00030B	DARW BAR FOR NT30# (WQ1/2-12UNC)
81	VS081	NUT FOR R8/NT30#	114	VS000R8	DARW BAR FOR R8 (W7/16-20UNF)
82	VS082	LOWER HOUSING	115	A002A	DARW BAR WASHER FOR NT30#
83	VS083	FIXED CLUTCH BRACKET FOR R8/30#	115	A002B	DARW BAR WASHER FOR R8
84	VS084	COMPRESSING SPRING	116	KEY0612	KEY (6*12)
85	VS085	ASSEMBLING STUD	117	BUTW31612	OVAL HEAD SCREW
86	HEXM1225	HEX SCREW (M12*25)	118	PIN0424	SPRING PIN
87	VS087	GEAR SHIFT PINION	119	CAPM0612	SOCKET CAP SCREW
88	PIN0318	SPRING PIN(3*18)	120	BB-6206ZZ	BALL BEARING
89	VS089	HI-LOW DETENT PLATE			
90	VS090	HI-LOW DETENT PLUNGER			
91	VS091	COMPRESSING SPRING ($\phi 1 * \phi 5.8 * 18.5L$)			
92	VS092	HI-LOW PINION BLOCK			
93	CAPM0514	SOCKET CAP SCREW			
94	VS094	HI-LOW PINION CRANK			
95	NUTM08	NUT(M8)			
96	NUTW38	NUT(W3/8)			
97	RINS40	SNAP PING (S-40)			
98	VS098	WAVE WASHER			
99	A082	BLACK PLASTIC BALL			
100	VS100	BELT SNAP RING			
101	VS101B	SAFETY CIVER			
102	VS102	SPRING SHAFT			
103	VS105	WASHER			
104	VS104	WASHER			
105	BUTW1438	OVAL HEAD SCREW			
106	VS106	LENGTHENING SHAFT			
107	CAPM0830	SOCKET CAP SCREW			
109	MCSWAS40	LOCKWASHER			
110	NUTM06	NUT (M6)			
111	CAPW381	SOCKET CAP SCREW			
112	MOTV	VARIABLE SPEED MOTOR			
113	BUTW1814	OVAL HEAD SCREW			

INVERTER HEAD TOP HOUSING (2/3/4EVSQ) (R8, NT30#, NT40#SPINDLE TAPER)

NO.	PART	DESCRIPTION	NO.	PART	DESCRIPTION
1	IV001	HOUSING UPPER SIDE	86	SPAM1225	HEXAGON HEAD SCREW (M12*25)
3	SETM0606	SET SCREW (M66)	87	VS087	GEAR SHIFT PINION
12	CAPM0514	SOCKET CAP SCREW(M514)	88	PIN0318	SPRING PIN (&3*18)
13	VS013	FIXING COVER	89	VS089	HI-LOW DETENT PLATE
14	CPRM0620	SOCKET CAP SCREW (M620)	90	VS090	HI-LOW DETENT PLUNGER
15	BE6007ZZ	BALL BEARING(6007ZZ)	91	VS091	COMPRESSING SPRING
16	LK008K	OPERATION BOX	92	VS092	HI-LOW PINION BLOCK
17	CAPM0630	SOCKET CAP SCREW (M630)	93	WAS40	WASHER (&40)
43	BE6010W	BALL BEARING (6010W+6010ZZ)	94	VS094	HI-LOW PINION CRANK
45	VS045	DRIVEN STEDAY PULLEY	97	RINS40	SNAP RING (S-40)
46	VS046	BEARING COVER	98	VS098	WASHER
50	VS050	LOWER HOUSING COVER	100	VS100	BELT SNAP RING
51	CAPM0820	SOCKET CAP SCREW (M820)	101	VS101B	SAFTY COVER
57	A082	BLACK PLASTIC BALL (W1/4")	102	VS102	SPRING SHAFT
61	NUTW58FT	NUT (W5/8)	104	VS104	WASHER
62	VS062C	TIMING BELT PULLEY(TOOTH)	105	BUTW1438	OVAL HEAD SCREW (W1/4*3/8)
63	MCSBELT5768M25D	TIMING BELT (576-8M-25)(TOOTH)	106	BUTW31612	OVAL HEAD SCREW (W3/16*1/2)
64	VS064	BEARING RETAINER	113	MOTV	INVERTING MOTOR
65	BE6203ZZ	BALL BEARING(6203ZZ)	114	HEXW1235	HEXAGON HEAD SCREW (W12*35)
66	VS066	BULL GEAR	115	KEY10860	KEY (10*8*60)
67	VS067	BULL GEAR PINION COUNTER SHAFT	116	HEXW51612	HEXAGON HEAD SCREW (5/16*1/2)
68	KEY5515	KEY (5*5*15)	117	IV021A	MOTOR PULLEY
69	KEY5518	KEY (5*5*18)	118	IV022	FIXED COVER
70	VS070C	SPINDLE PULLEY HUB(TOOTH)	119	IV025	LOWER HOUSING
71	KEY8720	KEY(8*7*20)	120	IV120	FAN (AC220V)
72	KEY8712	KEY(8*7*12)	121	CAPM0545	SOCKET CAP SCREW (M5*45)
73	VS073	SPINDLE GEAR HUB R8/NT30#	122	MCSHTD8808M30	BELT HTD8808M30
	VS073A	SPINDLE GEAR HUB NT40#	123	RINS40	SNAP RINE S-40
74	VS074	SPINDLE BULL GEAR ASSEMBLY	124	IV006A	SPINDLE PULLEY
75	VS075	RACK CUP	125	KEY8755	KEY (8*7*55)
76	VS076	WASHER	126	A024	TIMING BELT PULLEY PLANGE
77	BE6908W	BALL BEARING (6908 VV)	127	FLTM0510	FLAT HEAD SCREW FLTM0510
78	VS078	BEARING SERARATING WASHER (SMALL)	128	VS000R8	DRAW BAR FOR R8(W7/16*20UNF)
79	VS079	BEARING SEPARATING WASHER (LARGE)		VS00030	DRAW BAR FOR NT30#(W1/2*13UNC)
80	RINR62	SNAP RING (R-62)		VS00030A	DRAW BAR FOR NT30# (M12*1.75P)
81	VS081	NUT		VS00030B	DRAW BAR FOR NT30#(W1/2*12UNC)
82	VS082	LOWER HOUSING		FA001C	DRAW BAR FOR NT40#(5/8*11UNC)
83	VS083	FIXED CLUTCH BRACKET R8/NT30#		FA001D	DRAW BAR FOR NT40#(M16*2.0P)
	VS083A	FIXED CLUTCH BRACKET NT40#	129	A002A	DRAW BAR FOR NT30#
84	VS084	CPMPRESSING SPRING		A002B	DRAW BAR FOR R8
85	VS085	ASSEMBLING STUD		FA002	DRAW BAR FOR NT40#(5/8)
				FA002A	DRAW BAR FOR NT40#(&17)
			130	IV026	WASHER
			131	CAPM0520	SOCKET CAP SCREW (M5*20)

HEAD

(R8, NT30#, NT40# SPINDLE TAPER)



HEAD

(R8, NT30#, NT40# SPINDLE TAPER)

NO.	PART	DESCRIPTION	NO.	PART	DESCRIPTION
1	CAPM0510	SOCKET CAP SCREW	36	B036	FEED DRIVING GEAR STUD
2	WASM051202	BEVEL PINION WASHER (ϕ 5* ϕ 12*2t)			FOR R8/NT30#/NT40#
3	B003	FEED GEAR	37	KEY3310	KEY (3*3*10)
4	FB004	FEED WORM GEAR SHAFT SLEVE	40	B040	FEED DRIVING GEAR FOR R8/NT30#/NT40#
5	FB005	WORM CRADLE BUSHING	41	BEBA66	NEEDLE BEARING
6	SETM0606	SOCKET SET SCREW	42	B042	BUSHING
7	FB007	WORM GEAR SPACER	43	B043	WORM
8	B008	FEED DRIVE WORM GEAR FOR R8/NT30#/NT40#	44	B044	FEED WORM SHAFT SUSHING FOR R8/NT30#
9	B009	FEED DRIVE WORM GEAR SHAFT FOR R8//NT30#		FB044	FEED WORM SHAFT SUSHING FOR NT40#
	FB009	FEED DRIVE WORM GEAR SHAFT FOR NT40#	47	B047	BEVEL GEAR THRUST SPACER
10	KEY3308	KEY (3*3*8)	48	B048	BUSHING
11	KEY3320	KEY (3*3*20)	49	B049	FEED REVERSE BEVEL GEAR
12	CAPM0616	SOCKET CAP SCREW	50	B050	FEED REVERSE CLUTCH
13	WASM082302	WASHER (ϕ 8* ϕ 23*2t)	55	B055	REVERSE CLUTCH ROD FOR R8/NT30#
14	KEY3385	KEY (3*3*8.5)		FB055	REVERSE CLUTCH ROD FOR NT40#
15	B015	FEED REVERSE BEVEL GEAR	56	PIN0320	SPRING PIN (ϕ 3x20)
16	B016	FEED ENGAGE PIN	57	B057	FEED WORM SHAFT FOR R8/NT30#
17	FB017A	WORM GEAR CRADLE FOR R8/NT30#		FB057	FEED WORM SHAFT FOR NT40#
	FB017	WORM GEAR CRADLE FOR NT40#	59	PIN0312	SPRING PIN (3*12)
18	B018	WORM GEAR CARDLE THROW-OUT	60	B060	FEED SHIFT ROD
19	B019	SHIFT SLEEVE	61	SETM0510	SOCKET SET SCREW (M5x10)
20	A083	GEARSHIFT PLUNGER	62	KEY3315	KEY (3*3*15)
21	A084	COMPRESSING SPRING (ϕ 1*8.7*25L)	63	B063	FEED GEAR SHIFT FORK
22	PIN0320	SPRING PIN	64	B064	CLUSTER GEAR SHIFT CRANK FOR R8/NT30#
23	A081	SHIFT CRANK HANDLE		FB064	CLUSTER GEAR SHIFT CRANK FOR NT40#
24	A082	BLACK PLASTIC BALL W1/4"	66	B066	CLUSTER GEAR COVER FOR R8/NT30#
27	B027	CLUSTER GEAR SHAFT UPPER BUSHING		FB066	CLUSTER GEAR COVER FOR NT40#
28	B028	CLUSTER GEAR ASSEMBLY	67	CAPM0810	SOCKET CAP SCREW (M8x10)
29	KEY3345	KEY (3*3*45)	73	CAPM0535	SOCKET CAP SCREW(M5x35)
31	B031	CLUSTER GEAR SHAFT	74	B074	CLUTCH RING PIN
32	RINS16	SNAP RING (S-16)	75	B075	CLUTCH RING
33	B033	BEVEL GEAR BUSHING	76	SETM0806	SOCKET SET SCREW (M8x6)
34	B034	BEVEL GEAR THRUST SPACER			

HEAD

(R8, NT30#, NT40# SPINDLE TAPER)

NO.	PART	DESCRIPTION	NO.	PART	DESCRIPTION
78	B078	OVERLOAD CLUCH LOCKNUT FOR R8/NT30#	106	B106	FEED TRIP BRACKET FOR R8/NT30#
	FB078	OVERLOAD CLUCH LOCKNUT FOR NT40#		FB106	FEED TRIP BRACKET FOR NT40#
79	B079	SAFETY CLUTCH SPRING FOR R8/NT30#	107	CAPM0620	SOCKET CAP SCREW (M6x20)
	FB079	SAFETY CLUTCH SPRING FOR NT40#	109	KEY3310	KET (3*3*10)
80	B080	OVERLOAD CLUTCH #40	110	B110	FEED REVERSE NKOBS STUD
	B080B	OVERLOAD CLUTCH R8/#30	111	B111	REVERSE KNOB
81	B081	OVERLOAD CLUTCH SLEEVE FOR R8/NT30#	112	B112	SNAP RING (E-5mm)
	FB081	OVERLOAD CLUTCH SLEEVE FOR NT40#	113	B113	HANDWHEEL CLUTCH
82	B082	KEY (5x8x13)	114	BALW316	STEEL BALL (3/16")
83	SETM0416	SOCKET SET SCREW (M4x16)	115	B174	SPRING PIN (ϕ 5*8)
85	SETM0610	SOCKET SET SCREW (M6x10)	117	PIN0316	SPRING PIN
88	B088B	COMPRESSING SPRING (1.4*10*20)	118	B118	CAM ROD SLEEVE ASSEMBLY FOR R8/NT30#
89	B089	OVERLOAD CLUTCH LEVER SPRING PLUNGER		FB118	CAM ROD SLEEVE ASSEMBLY FOR NT40#
90	B090	PINION SHAFT BUSHING	121	B121	TRIP PLUNGER
91	B091	PINION SHAFT WORM GEAR SPACER	123	B123A	TRIP PLUNGER BUSHING
92	B092	OVERLOAD CLUTCH WORM GEAR	124	B124	FEED TRIP PLUNGER
93	B093	OVERLOAD CLUTCH RING #40	125	B125	HANDWHEEL
	B093B	OVERLOAD CLUTCH RING R8/#30	126	B126	HANDWHEEL HANDLE
94	RINS15	SNAP RING (S-15)	127	B127A	SPINDLE FOR NT30#
96	B096	OVERLOAD CLUTCH TRIP LEVER FOR R8/NT30#		B127B	SPINDLE FOR R8
	FB096	OVERLOAD CLUTCH TRIP LEVER FOR NT40#		B127D	SPINDLE FOR THREAD NT30#
97	B097	OVERLOAD CLUTCH WASHER		FB127	SPINDLE FOR NT40#
98	RINS10	SNAP RING (S-10)	128	B128	QUILL SKIRT FOR R8/NT30#
99	B099	CLUTCH ARM COVER		FB128	QUILL SKIRT FOR NT40#
100	SETM0616	SOCKET SET SCREW (M6x16)	129	B129	LOCKNUT FOR R8/NT30#
101	NUTM06	NUT (M6)		FB129	LOCKNUT FOR NT40#
102	B102	DOWEL PIN	131	BE6206ZZ	BALL BEARING (6206ZZ)
103	B103	CAM ROD FOR R8/NT30#	133	B133A	NOSE PIECE FOR NT30#
	FB103	CAM ROD FOR NT40#		B133B	NOSE PIECE FOR R8
104	B104	TRIP HANDLE		FB133	NOSE PIECE FOR NT40#
			134	B134	SINDLE DIRT SHIELD FOR R8/NT30#
				FB134	SINDLE DIRT SHIELD FOR NT40#
			135	BE7207	BALL BEARING (7207) FOR R8/NT30#
				BE0710	BALL BEARING (7010) FOR NT40#

HEAD

(R8, NT30#, NT40# SPINDLE TAPER)

NO. PART	DESCRIPTION	NO. PART	DESCRIPTION
136 B136	BEARING SPACER-LARGE FOR R8/NT30#	159 B159A	MICROMETER SCALE (METERIC)
FB136	BEARING SPACER-LARGE FOR NT40#	159 B159B	MICROMETER SCALE (INCH)
137 B137	BEARING SPACER-SMALL FOR R8/NT30#	B161B	QUILL MICRO-STOP NUT (INCH)
FB137	BEARING SPACER-SMALL FOR NT40#	161 B161A	QUILL MICRO-STOP NUT (METERIC)
140 B140	SPECIAL SOCKET SET SCREW	162 B162A	MICROMETER NUT (METERIC)
142 B142	QUILL FOR R8/NT30#	B162B	MICROMETER NUT (INCH)
B142B	QUILL FOR THREAD NT30#	163 B163	QUILL STOP KNOB FOR R8/NT30#
FB142	QUILL FOR NT40#	FB163	QUILL STOP KNOB FOR NT40#
143 NUTM4	NUT (M4)	164 B164A	QUILL STOP MICRO SCREW (METERIC)
144 SETM0420	SOCKET SET SCREW (M4x20)	B164B	QUILL STOP MICRO SCREW (INCH)
145 B145	FEED TRIP LEVER	165 CAPW3834F	RD.HD. SCREW (3/8"-24UNFx3/4")
146 B146	TRIP LEVER PIN	166 B166	QUILL PINION SHAFT FOR R8/NT30#
148 B148	QUILL LOCK SLEEVE FOR R8/NT30#	FB166	QUILL PINION SHAFT FOR NT40#
FB148	QUILL LOCK SLEEVE FOR NT40#	168 B168	SPRING PIN
149 B149152	LOCK HANDLE FOR R8/NT30#	171 KEY4418	KEY (4*4*18)
FB149152	LOCK HANDLE FOR NT40#	172 B172	PINION SHAFT HUB
150 FLTM0510	FLT. HD. SCREW (M5x10)	173 SETW51614	SOCKET SET SCREW (W5/16x1/4")
151 B151	FELT WASHER	175 B175	RACK FEED HANDLE HUB
153 B153	QUILL LOCK SLEEVE TAPPED FOR R8/NT30#	176 B176	QUILL PINION SHAFT FOR R8/NT30#
FB153	QUILL LOCK SLEEVE TAPPED FOR NT40#	FB176	QUILL PINION SHAFT FOR NT40#
155 B155	T-BOLT ASSY (1/2"-12UNC) FOR R8/NT30#	177 B177	PRING COVER FOR R8/NT30#
FB155	T-BOLT ASSY (5/8"-11UNC) FOR NT40#	FB177	SPRING COVER FOR NT40#
156 B156	LOWER CLAMPING BOLT SPACER	178 B178	CLOCK SPRING FOR R8/NT30#
157 B157	LOCKNUT (1/2-12UNC)FOR R8/NT30#	FB178	CLOCK SPRING FOR NT40#
FB157	LOCKNUT (5/8)FOR NT40#		
158 FLTM0405	RD. HD. SCREW (M4x5)		

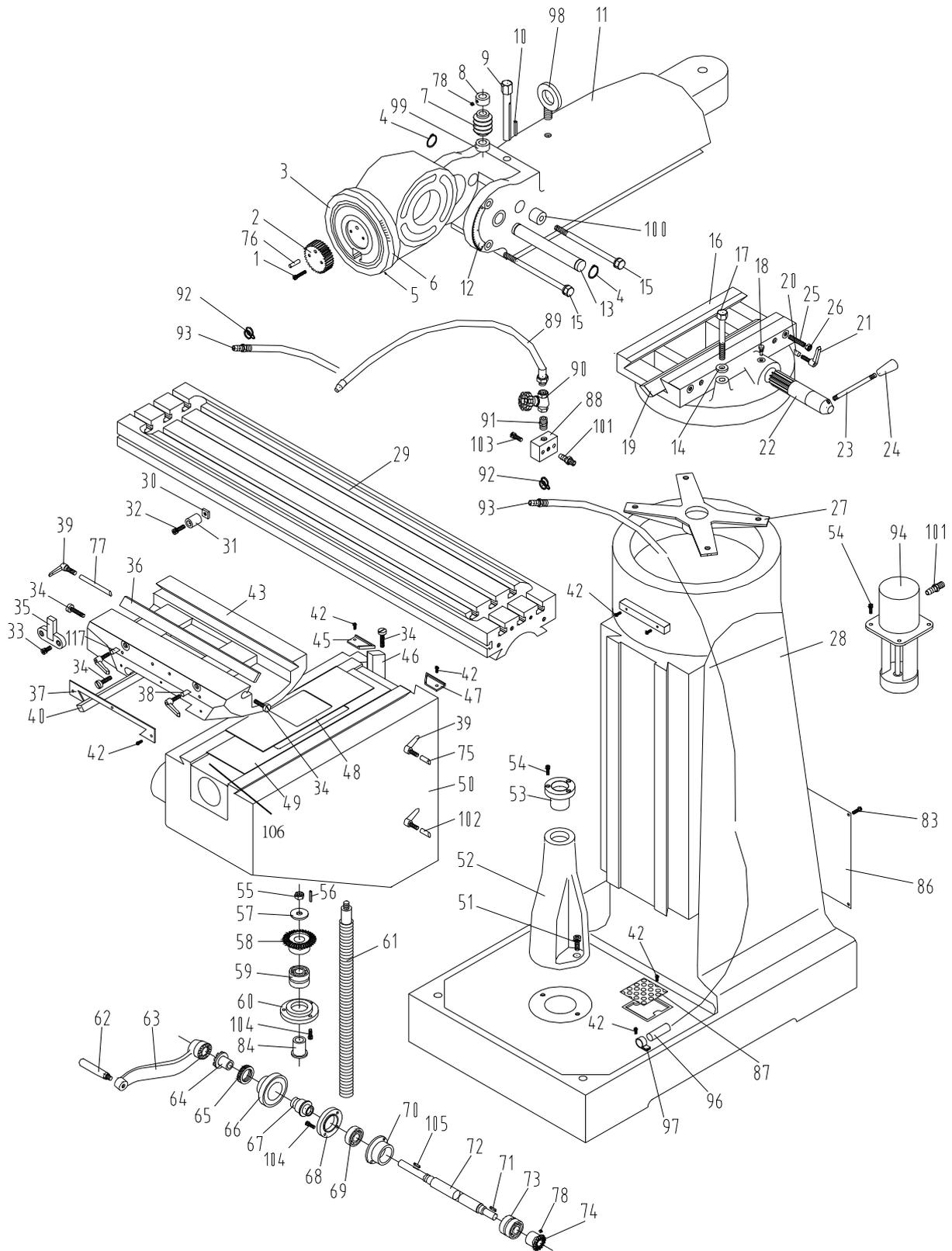
HEAD

(R8, NT30#, NT40# SPINDLE TAPER)

NO. PART	DESCRIPTION	NO. PART	DESCRIPTION
179 B179	WASHER SPWW58 FOR #40		
181 SETM0610	SOCKET SET SCREW (M6x10)		
183 B183	REVERSE TRIP BALL LEVER		
184 B184	FEED REVERSE TRIP PLUNGER FOR R8/NT30#		
185 B185	REVERSE TRIP BALL LEVER SCREW FOR R8/NT30#		
186 B186	WORM GEAR		
188 B188	SOCKET SET SCREW (6*9L)		
189 B189	ADJ WORM SHAFT FOR R8/NT30#		
FB189	ADJ WORM SHAFT FOR NT40#		
190 B190	PINION SHAFT HUB HANDLE		
191 LB017	BLACK PLASTIC BALL (3/8")		
192 B192	QUILL HOUSING FOR R8/NT30#		
FB192	QUILL HOUSING FOR NT40#		
193 B088A	COMPRESSING SPRING		
194 RINS30	SNAP RING (S-30)		
195 HB1291	LOCK WASHER		
196 NUTW38	SET SCREW (M8x8)		
197 NUTW38	NUT (3/8")		

MACHINE BASE

2VS



MACHINE BASE

2VS

NO.	PART	DESCRIPTION	NO.	PART	DESCRIPTION
1	CAPM0630	SOCKET CAP SCREW	37	LS013	FELT WIPERS
2	LB023A	QUILL HOUSING ADJ GEAR	38	LS005A	TABLE LOCK PLUNGER 13L
3	LB020	RAM ADAPTOR	38	LS005B	TABLE LOCK PLUNGER 16L
4	RINS28	SNAP RING (S-28)	39	LS006B	TABLE LOCK BOLT HANDLE
5	RIVM0205	RIVET	40	MS001	SADDLE/KNEE GIB
6	LB027	ADAPTOR SCALE	42	BUTW31612	HEAD SCREW
7	LB035	VERTICAL ADJUSTING WORM	43	MS000A	SADDLE 42"
8	LB036A	WORM THRUST WASHER	43	MS000B	SADDLE 49"
9	LB034	VERTICAL ADJUSTING WORM SHAFT	45	LS016A	KNEE WIPER FELT (LEFT)
10	KEY5540	KEY (5*5*40)	46	MK001	KNEE/COLUMN GIB
11	KB026	RAM	47	LS016B	KNEE WIPER FELT (RIGHT)
12	LB032	ANGLE PLATE	48	LK007	CHIP GUARDS (UP)
13	LB028	ADAPTOR PIVOT STUD	49	LK006	CHIP GUARDS (MIDDLE)
14	LB031	WASHER	50	KK000	KNEE
15	LB030	ADAPTOR LOCKING BOLT	51	CAPM1025	SOCKET CAP SCREW (M10x25)
16	MB009	TURRET	52	MK012	ELEVATING SCREW HOUSING
17	LB010	LOCK BOLT	53	XK014A	ELEVATING SCREW NUT
18	LB041	RAM PINION SCREW	53	XK014B	ELEVATING SCREW NUT
19	MB011	RAM/TURRET GIB	54	CAPM0616	SOCKET CAP SCREW (M6x16)
20	LK003A	RAM LOCK PLUNGER 29L	55	NUTW12F	NUT (W1/2-20UNF)
21	LB014A	RAM LOCK BOLT HANDLE 1/2*25L	56	KEY4430	KEY (4*4*30)
22	LB015	RAM PINION	57	LB031	WASHER
23	LB016	BAR	58	MK021	BEVEL GEAR
24	LB017	BLACK PLACTIC BALL	59	BE6306Z	BALL BEARING (6306Z)
25	SETW382	SOCKET SET SCREW(3/8"x2)	60	MK019	BEARING RETAINER RING
26	NUTW38	NUT (W3/8)	61	XK016C	ELEVATING SCREW ASSEMBLY(METERIC)
27	MB008	SPIDER	61	XK016D	ELEVATING SCREW ASSEMBLY(INCH)
28	KB001	COLUMN	62	LK037A	HANDLE GRIP W3/8"
29	MT000A	42"*9" TABLE	63	LK036	ELEVATING CRANK HANDLE
29	MT000B	49"*9" TABLE	64	LK035	GEARSHAFT CLUTCH INSERT
30	LT027	STOP PIECE NUT	65	LK034	DIAL LOCK NUT
31	LT028	TABLE STOP PIECE	66	LK033A	GRADUATION DIAL (METERIC)
32	CAPM0835	SOCKET CAP SCREW	66	LK033B	GRADUATION DIAL (INCH)
33	CAPM0816	SOCKET CAP SCREW	67	LK032	DIAL HOLDER
34	LK002	GIB ADJUSTING SCREW	68	LT005	BEARING RETAINER RING
35	LS003	TABLE STOP BRACKET	69	BE6204ZZ	BALL BEARING (6204ZZ)
36	MS008	SADDLE /TABLE GIB FOR 42"	70	LK029	BEARING CAP
			71	KEY4418	KEY (4*4*18)
			72	FLK028A	ELEVATING SHAFT
			73	BE6204Z	BALL BEARING (6204Z)

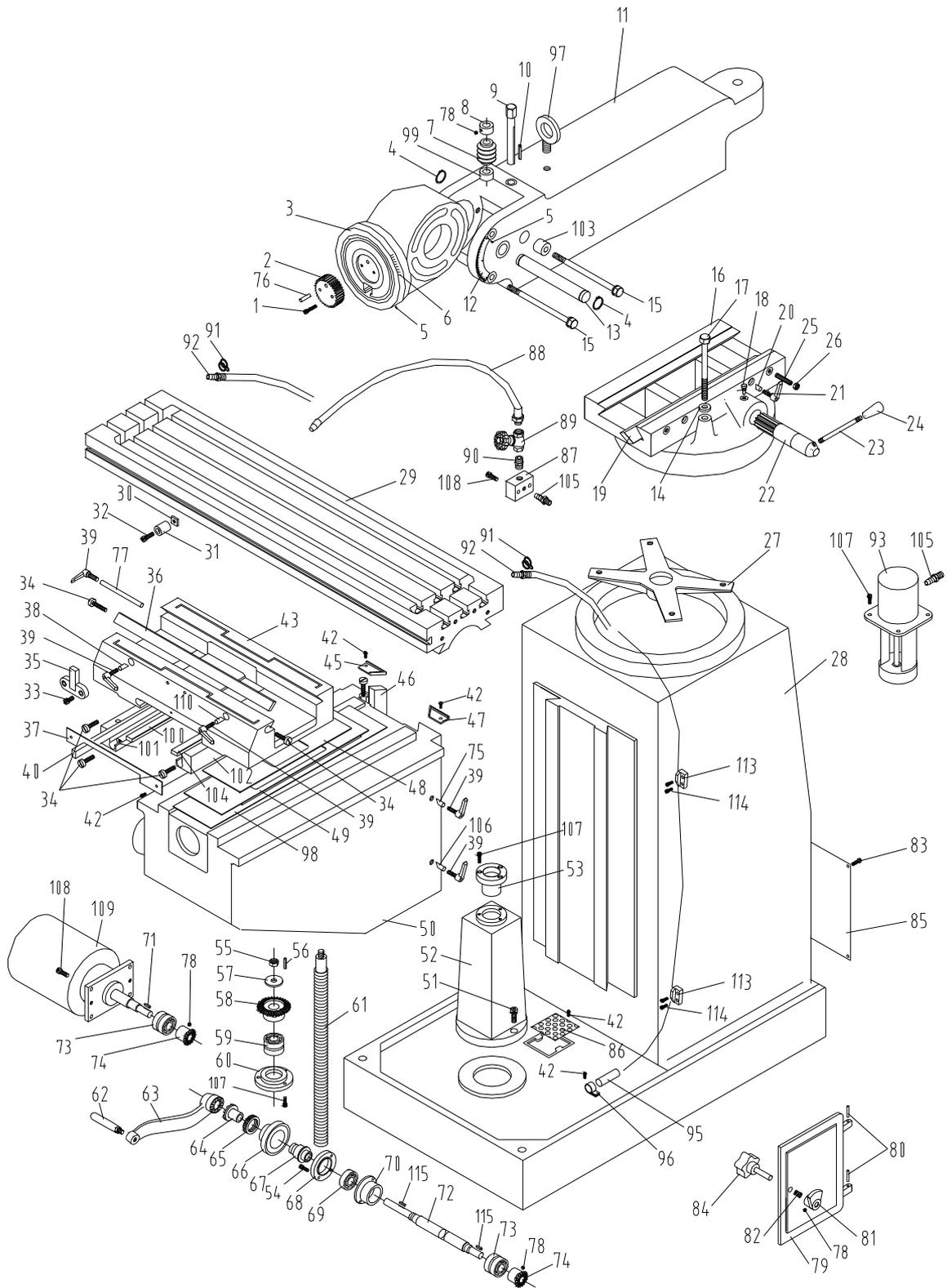
MACHINE BASE

2VS

NO. PART	DESCRIPTION	NO. PART	DESCRIPTION
74	MK024		BEVEL PINION
75	LK003B		ELEVATING LOCK PLUNGER 32L
76	PIN0830		SPRING PIN
77	LS010A		SADDLE LOCK PLUNGER 116L
77	LS010D		SADDLE LOCK PLUNGER 90L
83	BUTMH0512		OVAL HEAD SCREW
84	MK038		BUSHING
86	MB004		COVER
87	MB041A		STAINER
88	MB042		TAP BRACKET
89	MB095		COOLANT PIPE (PT3/8*26)
90	MB096		OIL VALVE M (PT3/8)
91	MB097		VALVE ADAPTOR (PT3/8*3/8)
92	MB098		HOSE CHIP (M20)
93	MB099		HOSE ADAPTOR (PT1/2*1/2)
94	EQPUMP		PUMP
96	MB102		PLASTIC HOSE (W1/2)
97	MB103		WASHER (W1/2)
98	RIBW34		HOISTING RING W3/4"
99	LB036C		WORM THRUST WASHER
100	LB033		THRUST WASHER
101	MB097		VALVE ADAPTOR (PT3/8*1/2)
102	LK003C		SPRING PIN (35L)
103	CAPM0825		SOCKET CAP SCREW
104	CAPM0616		SOCKET CAP SCREW
105	KEY3320		KEY (3*3*20)
106	LK005		CHIP GUARD (DOWN)

MACHINE BASE

3VS



MACHINE BASE

3VS

NO.	PART	DESCRIPTION	NO.	PART	DESCRIPTION
1	CAPM0630	SOCKET SET SCREW (M6x30)	38	LS005C	LOCK PLUNGER (18L)
2	LB023	QUILL HOUSING ADJ GEAR	39	LS006B	SADDLE LOCK SCREW HANDLE
3	LB020	RAM ADAPTOR	40	XS001B	SADDLE/KNEE GIB
4	RINS28	SNAP RING (S-30)(S-28)	41	XS014	SADDLE/KNEE WIPER PLATE
5	RIVM0205	RIVET	42	BUTW31612	HEAD SCREW (W3/16x1/2)
6	LB027	ADAPTOR SCALE	43	XS000A	SADDLE
7	LB035	VERTICAL ADJUSTING WORM		XS000B	SADDLE WITH TURCITE-B
8	LB036A	WORM THRUST WASHER	45	LS016A	KNEE WIPER FELT HOLDER(LEFT)
9	LB034	VERTICAL ADJUSTING WORM SHAFT	46	MK001	KNEE/COMUMN GIB
10	KEY5540	KEY (5*5*40)	47	LS016B	KNEE WIPER FELT HOLDER (RIGHT)
11	HB026	RAM	48	LK007	CHIP GUARDS (UP)
12	LB032	ANGLE PLATE	49	LK006	CHIP GUARDS (MIDDLE)
13	LB028	ADAPTOR PIVOT STUD	50	XK000	KNEE
14	LB031	WASHER	51	CAPM1030	SOCKET CAP SCREW (M10x30)
15	LB030D	ADAPTOR LOCKING BOLT	52	XK012	ELEVATING SCREW HOUSING
16	FLB009	TURRET	53	XK014A	ELEVATING SCREW NUT (METERIC)
17	LB010E	LOCK BOLT		XK014B	ELEVATING SCREW NUT (INCH)
18	LB041	RAM PINION SCREW	54	CAPM0620	SOCKET CAP SCREW (M6x20)
19	XB011	RAM/TURRET GIB	55	NUTW12	NUT (W1/2)
20	FLB012	RAM LOCK PLUNGER	56	KEY443	KEY (4*4*30)
21	LB014B	RAM LOCK BOLT HANDLE	57	LB031	WASHER (ϕ 28* ϕ 1/2*4.5)
22	LB015	RAM PINION	58	FLK021	BEVEL GEAR
23	LB016	BAR	59	BE6305Z	BALL BEARING (6305Z)
24	LB017	BLACK PLASTIC BALL(3/8")	60	XK019	BEARING RETAINER RING
25	SETW382	SOCKET SET SCREW (W3/8x2)	61	XK016A	ELEVATING SCREW ASSEMBLY (METERIC)
26	NUTW38	NUT (W3/8)		XK016B	ELEVATING SCREW ASSEMBLY (INCH)
27	MB008	SPIDER	62	LK037A	HANDLE GRIP (W3/8)
28	XB001	COLUMN	63	LK036	ELEVATING CRANK HANDLE
29	XT000B	54" TABLE	64	LK035	GEARSHAFT CLUTCH INSERT
30	LT027	STOP PIECE NUT	65	LK034	DIAL LOCK NUT
31	LT028	TABLE STOP PIECE	66	LK033A	GRADUATION DIAL (METERIC)
32	CAPM0830	SOCKET CAP SCREW (M8x30)		LK033B	GRADUATION DIAL (INCH)
33	CAPM0816	SOCKET CAP SCREW (M8x16)	67	LK032	DIAL HOLDER
34	LK002	GIB ADJUSTING SCREW	68	LT005	BEARING RETAINER RING
35	LS003	TABLE STOP BRACKET	69	BE6204ZZ	BALL BEARING (6204ZZ)
36	XS008	SADDLE/TABLE GIB			
37	XS013	FELT WIPERS			

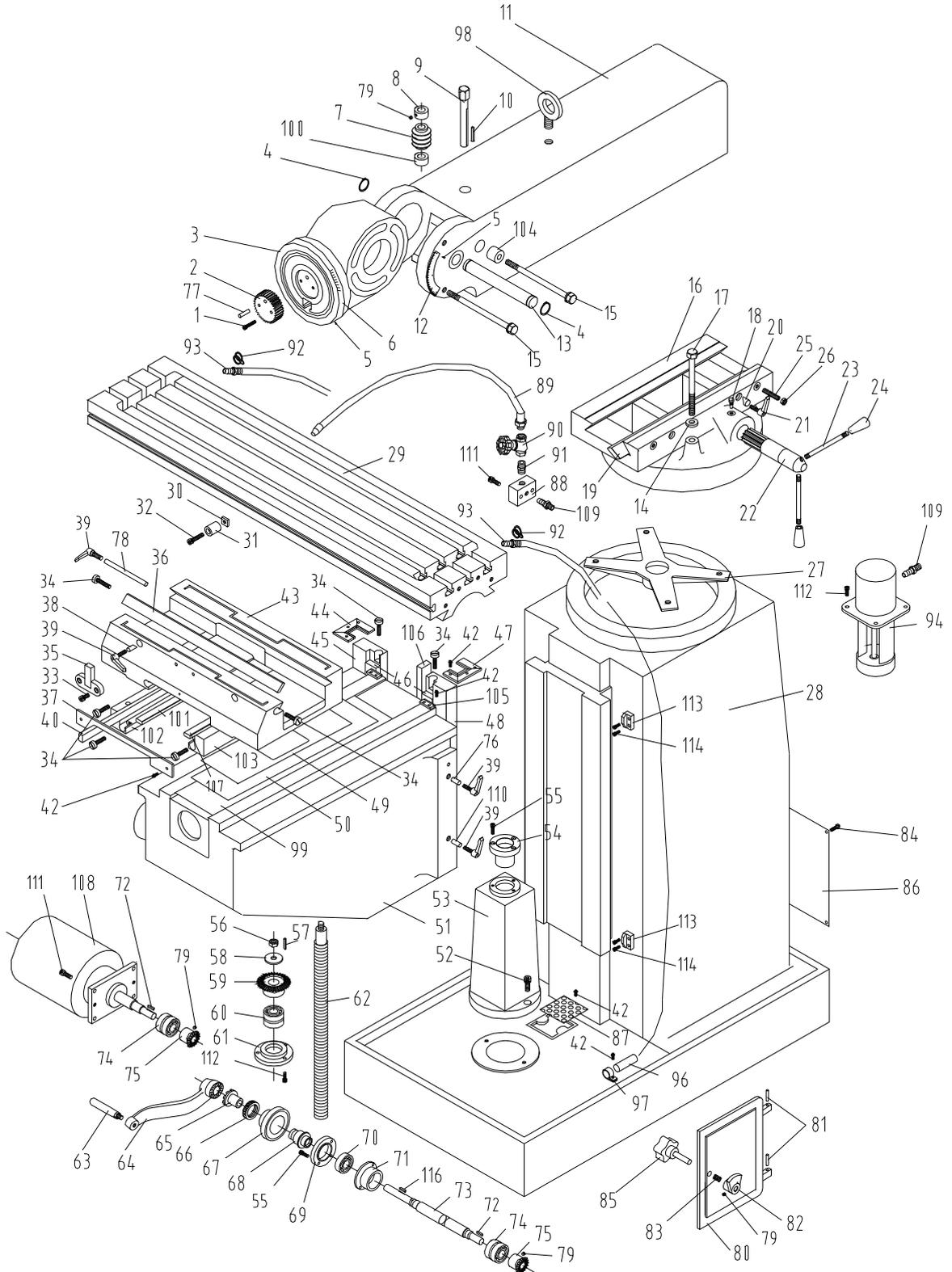
MACHINE BASE

3VS

NO.	PART	DESCRIPTION	NO.	PART	DESCRIPTION
70	LK029	BEARING CAP	113	FLK040	LIMITED SWITCH
71	KEY4418	KEY (4*4*18)	114	CAPM0512	SOCKET CAP SCREW (M5x12)
72	XK028	ELEVATING SHAFT	115	KEY3325	KEY (3*3*25)
73	BE6204ZZ	BALL BEARING (6204ZZ)			
74	FLK024	BEVEL PINION			
75	LK003B	LOCK PLUNGER (30L)			
76	PIN0830	SPRING PIN			
77	LS010C	SADDLE LOCK PLUNGER			
78	SETM0606	SOCKET SET SCREW(M6x6)			
79	MB040	DOOR			
80	PIN0530	SPRING PIN (ϕ 5x30)			
81	MB039	DOOR LOCKING CAM			
82	MB089	SPRING			
83	BUTWM0612	OVAL HEAD SCREW(6x12)			
84	MB043	DOOR KNOB			
85	MB004	COVER			
86	MB041A	STAINER			
87	MB042	TAP BRACKET			
88	MB095	COOLANT PIPE(PT3/8x30")			
89	MB096	OIL VALVE (PT3/8)			
90	MB097	VALVE ADAPTOR (PT3/8*3/8)			
91	MB098	HOSE CHIP (M20)			
92	MB099	HOSE ADAPTOR (PT1/2*1/2)			
93	EQPUMP	PUMP 1/8HP+150L			
94	MB101	COOLING PUMP MOTOR SEAT			
95	MB102	PLASTIC HOSE (W1/2)			
96	MB103	PLASTIC CHIP			
97	RIBW34	HOISTIC CHIP (W3/4)			
98	LK005	CHIP GUARDS (DOWN)			
99	LB036B	WORM THRUST WASHER			
100	XS001A	SADDLE/KNEE GIB			
101	XS002	SADDLE FIXED PLATE			
102	XS002	SADDLE FIXED PLATE			
103	LB033	TURUST WAHSER			
104	XS001A	SADDLE/KNEE GIB			
105	MB097A	VALVE ADAPTOR (PT3/8x1/2)			
106	LK003C	LOCK PLUNGER (35L)			
107	CAPM0620	SOCKET CAP SCREW (M6x20)			
108	CAPM0825	SOCKET CAP SCREW (M8x25)			
109	MOTE01	ELEVATING MOTOR			
110	LS005D	LOCK PLUNGER (20L)			

MACHINE BASE

4VSQ



MACHINE BASE

4VSQ

NO.	PART	DESCRIPTION	NO.	PART	DESCRIPTION
1	CAPM0630	SOCKET SET SCREW (M6x30)	38	LS005D	LOCK PLUNGER (20L)
2	LB023	QUILL HOUSING ADJ GEAR	39	LB014B	SADDLE LOCK SCREW HANDLE
3	FLB020	RAM ADAPTOR	40	XS001B	SADDLE/KNEE GIB
4	RINS28	SNAP RING (S-30)(S-28)	41	XS014	SADDLE/KNEE WIPER PLATE
5	RIVM0205	RIVET	42	BUTW31612	HEAD SCREW (W3/16x1/2)
6	LB027A	ADAPTOR SCALE	43	XS000A	SADDLE 50"
7	LB035	VERTICAL ADJUSTING WORM		XS000B	SADDLE WITH TURCITE-B
8	LB036A	WORM THRUST WASHER	44	FLS016A	KNEE WIPER FELT HOLDER(LEFT)
9	LB034	VERTICAL ADJUSTING WORM SHAFT	45	FLK039A	KNEE FIXED PLATE (LEFT)
10	KEY5540	KEY (5*5*40)	46	FLK001A	KNEE/COLUMN GIB
11	FLB026	RAM	47	FLS016B	KNEE WIPER FELT HOLDER (RIGHT)
12	LB032	ANGLE PLATE	48	FLK039B	KNEE FIXED PLATE (RIGHT)
13	FLB028	ADAPTOR PIVOT STUD	49	LK007	CHIP GUARDS (UP)
14	WAS1233	WASHER	50	LK006	CHIP GUARDS (DOWN)
15	LB030A	ADAPTOR LOCKING BOLT	51	FLK000	KNEE
16	FLB009	TURRET	52	CAPM1030	SOCKET CAP SCREW (M10x30)
17	LB010E	LOCK BOLT	53	GK012	ELEVATING SCREW HOUSING
18	LB041	RAM PINION SCREW	54	GK014A	ELEVATING SCREW NUT (METERIC)
19	XB011	RAM/TURRET GIB		GK014B	ELEVATING SCREW NUT (INCH)
20	FLB012	RAM LOCK PLUNGER	55	CAPM0620	SOCKET CAP SCREW (M6x20)
21	LB014A	RAM LOCK BOLT HANDLE	56	NUTW12F	NUT (W1/2)
22	FLB015	RAM PINION	57	KEY4430	KEY (4*4*30)
23	LB016	BAR	58	LB031	WASHER (ϕ 28* ϕ 1/2*4.5)
24	LB017	BLACK PLASTIC BALL(3/8")	59	FLK021	BEVEL GEAR
25	SETW3812	SOCKET SET SCREW (W3/8x2)	60	BE6305Z	BALL BEARING (6305Z)
26	NUTW38	NUT (W3/8)	61	XK019	BEARING RETAINER RING
27	MB008	SPIDER	62	GK016A	ELEVATING SCREW ASSEMBLY (METERIC)
28	FLB001	COLUMN		GK016B	ELEVATING SCREW ASSEMBLY (INCH)
29	XT000B	54" TABLE	63	LK037A	HANDLE GRIP (W3/8)
30	LT027	STOP PIECE NUT	64	LK036	ELEVATING CRANK HANDLE
31	LT028	TABLE STOP PIECE	65	LK035	GEARSHAFT CLUTCH INSERT
32	CAPM0835	SOCKET CAP SCREW (M8x35)	66	LK034	DIAL LOCK NUT
33	CAPM0816	SOCKET CAP SCREW (M8x16)	67	LK033A	GRADUATION DIAL (METERIC)
34	LK002	GIB ADJUSTING SCREW		LK033B	GRADUATION DIAL (INCH)
35	LS003	TABLE STOP BRACKET			
36	XS008	SADDLE/TABLE GIB			
37	XS013	FELT WIPERS			

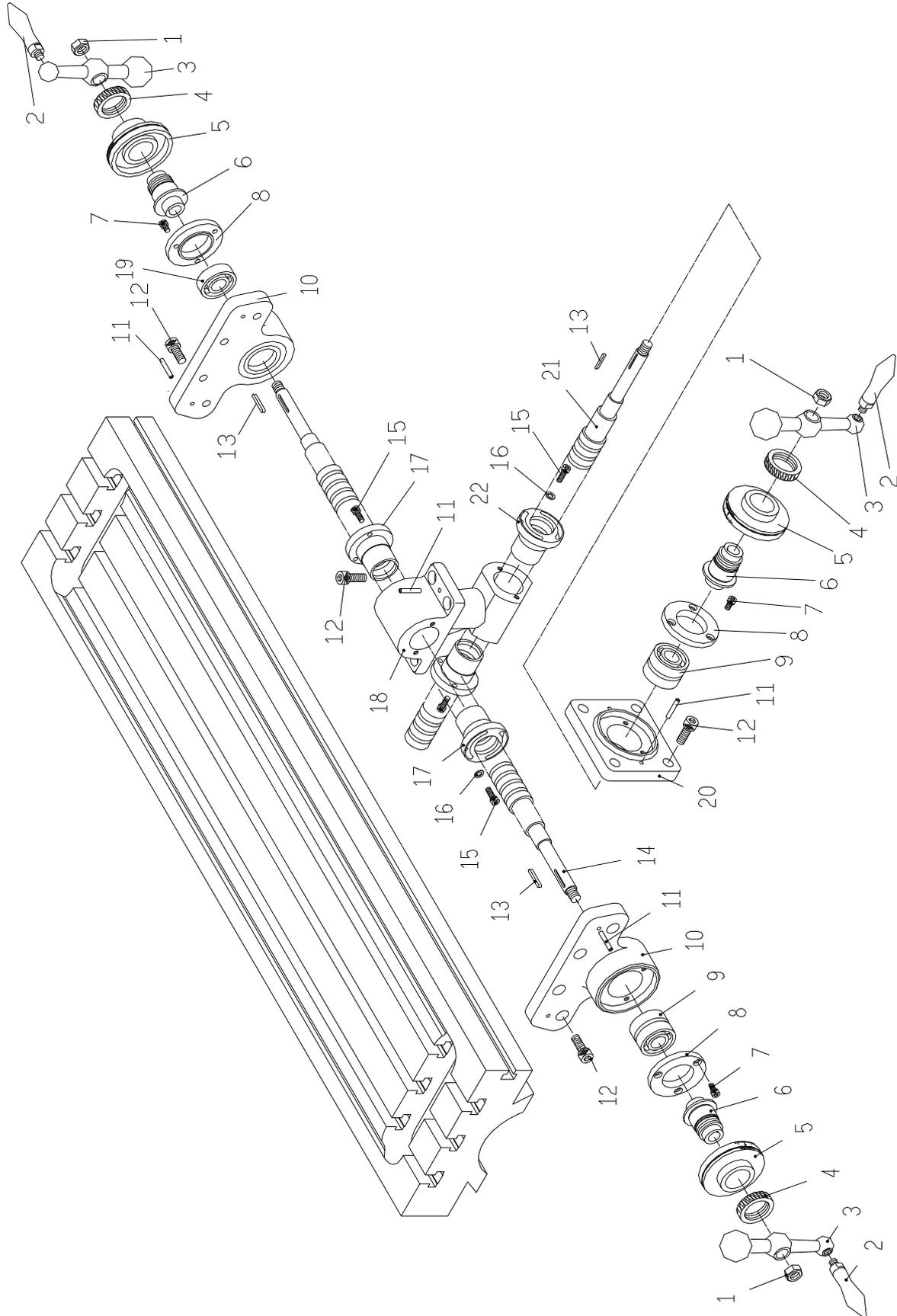
MACHINE BASE

4VSQ

NO.	PART	DESCRIPTION	NO.PART	DESCRIPTION
68	LK032	DIAL HOLDER	109	MCSPT38PE12 VALVE (PT1/2x1/2)
69	LT005	BEARING RETAINER RING	110	LK003E SPRING PIN (35L)
70	BE6204ZZ	BALL BEARING (6204ZZ)	111	CAPM0825 SOCKET CAP SCREW (M8x25)
71	LK029	BEARING CAP	112	CAPM0616 SOCKET CAP SCREW (M6x16)
72	KEY4418	KEY (4*4*18)	113	FLK040 LIMITED SWITCH
73	FLK028	ELEVATING SHAFT	114	CAPM0512 SOCKET CAP SCREW (M5x12)
74	BE6204Z	BALL BEARING (6204ZZ)	115	LK003E LOCK PLUNGER (25L)
75	FLK024	BEVEL PINION	116	KEY3325 KEY (3*3*25)
76	LS003D	LOCK PLUNGER (30L)		
77	PIN0830	SPRING PIN		
78	LS010C	SADDLE LOCK PLUNGER		
79	SETM0606	SOCKET SET SCREW(M6x6)		
80	MB040	DOOR		
81	PIN0530	SPRING PIN (ϕ 5x30)		
82	MB039	DOOR LOCKING CAM		
83	MB089	SPRING		
84	BUTW1438	OVAL HEAD SCREW(W1/4x3/8)		
85	MB043	DOOR KNOB		
86	MB004	COVER		
87	MB041A	STAINER		
88	MB042	TAP BRACKET		
89	MB095	COOLANT PIPE(PT3/8x30")		
90	MB096	OIL VALVE (PT3/8)		
91	MB097PT3838	VALVE ADAPTOR (PT3/8*3/8)		
92	MB098	HOSE CHIP (M20)		
93	MB099PT1212	HOSE ADAPTOR (PT1/2*1/2)		
94	EQPUMP	PUMP 1/8HP+150L		
95	MB101	COOLING PUMP MOTOR SEAT		
96	MB102	PLASTIC HOSE (W1/2)		
97	MB103	PLASTIC CHIP		
98	RIBW34	HOISTIC CHIP (W3/4)		
99	LK005	CHIP GUARDS (DOWN)		
100	LB036C	WORM THRUST WASHER		
101	XS001A	SADDLE/KNEE GIB		
102	XS002	SADDLE FIXED PLATE		
103	XS002	SADDLE FIXED PLATE		
104	LB033B	TURUST WAHSER		
105	FLS019	WIPER FELT		
106	FLK001B	KNEE/COLUMN GIB		
107	XS001A	SADDLE/KNEE GIB		
108	MOTE14110	ELEVATING MOTOR		

LEADSCREW ASSEMBLY

2VS / 3VS / 4VSQ



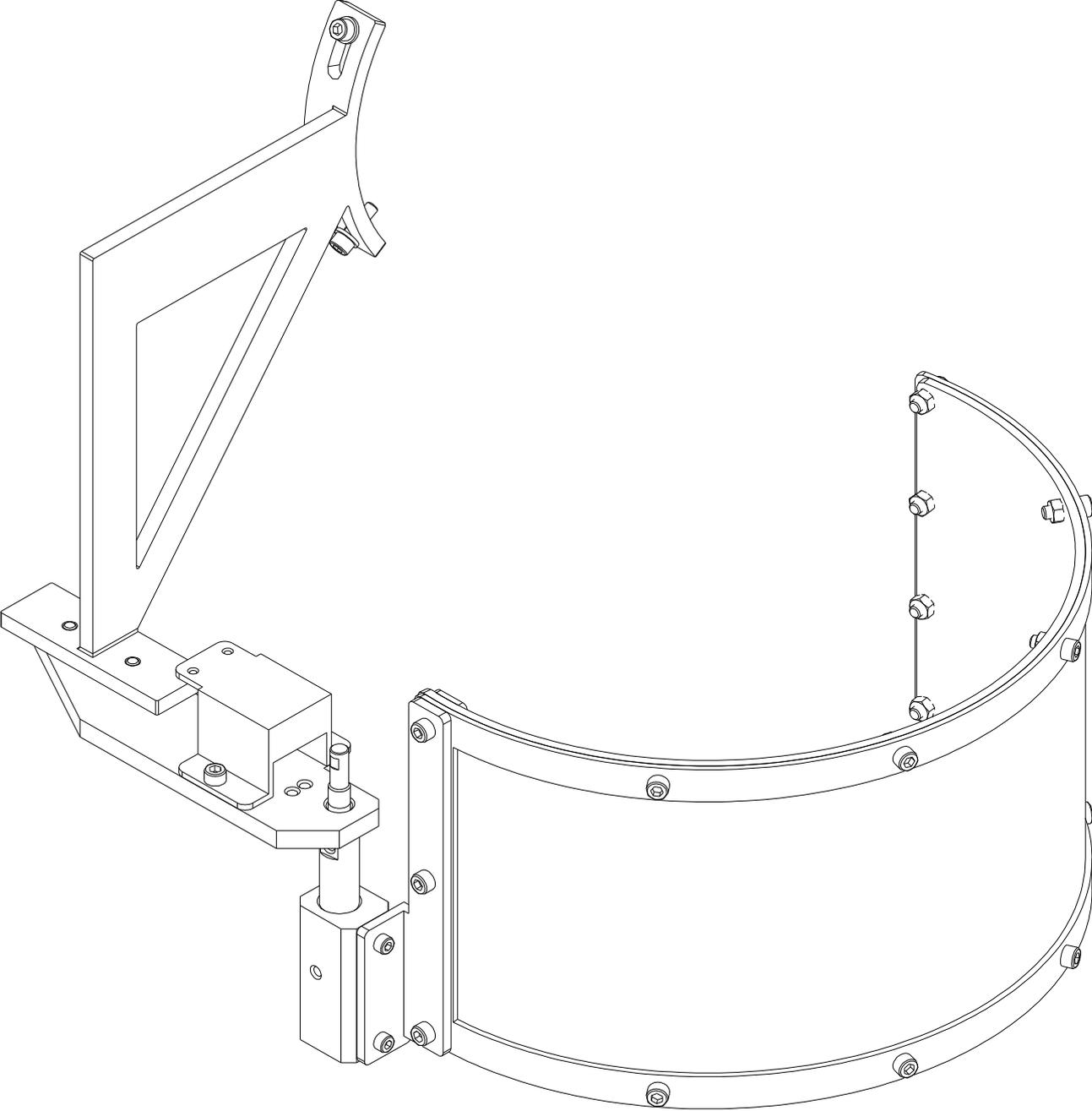
LEADSCREW ASSEMBLY

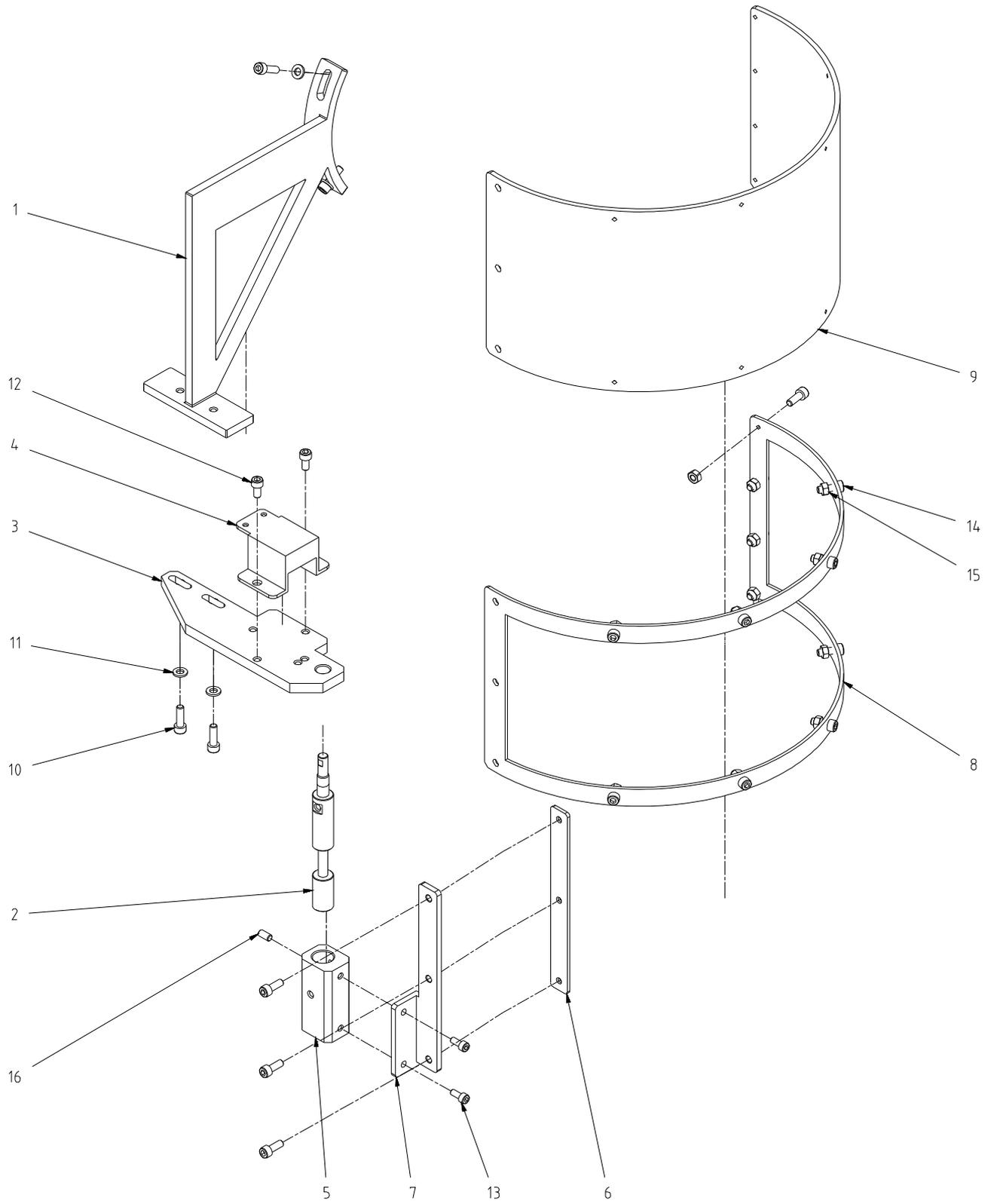
2VS / 3VS / 4VSQ

NO.	PART	DESCRIPTION	NO.	PART	DESCRIPTION
1	NUTW12F	JAM NUT (W1/2-20UNF)	22	XT022A	CROSS FEED NUT (METRIC)
2	LT010C	HANDLE GRIP	22	XT022B	CROSS FEED NUT (INCH)
3	LT010B	BALL CRANK HANDLE			
4	LT009	DIAL LOCK NUT			
5	LT008A	GRADUATION DIAL(METRIC)			
	LT008B	GRADUATION DIAL(INCH)			
6	LT007	DIAL HOLDER			
7	CAPM0610	CAP SCREW (M6x10)			
8	LT005	BEARING RETAINER RING			
9	BE6204ZZ	BALL BEARING (6204ZZ)			
10	LT002A	LONGITUDINAL BEARING BRACKET			
	LT002B	LONGITUDINAL BEARING BRACKET			
11	PIN0530	SPRING PIN (ϕ 5x30)			
12	CAPM1025	CAP SCREW (M10x25)			
13	KEY3325	KEY (3*3*25)			
14	MT015A	LONGITUDINAL FEED SCREW FOR 50" TABLE (METRIC)			
14	MT015B	LONGITUDINAL FEED SCREW FOR 50" TABLE (INCH)			
14	MT015C	LONGITUDINAL FEED SCREW FOR 54" TABLE (METRIC)			
14	MT015D	LONGITUDINAL FEED SCREW FOR 54" TABLE (INCH)			
15	CAPM0520	CAP SCREW (M6x16) COP (5x20)			
16	WASM05	WASHER (ϕ 7)			
17	XT019A	LONGITUDINAL FEED SCREW NUT (METRIC)			
17	XT019B	LONGITUDINAL FEED SCREW NUT (INCH)			
18	MT017	FEED NUT BRACKET			
19	BE6204ZZ	BALL BEARING (6204ZZ)			
20	MT025A	CROSS FEED BEARING BRACKET			
21	MT024A	CROSS FEED SCREW (METRIC)			
21	MT024B	CROSS FEED SCREW (INCH)			

CE SAFTY GUARD PARTS LIST

SAFTY GUARD ASSEMBLY





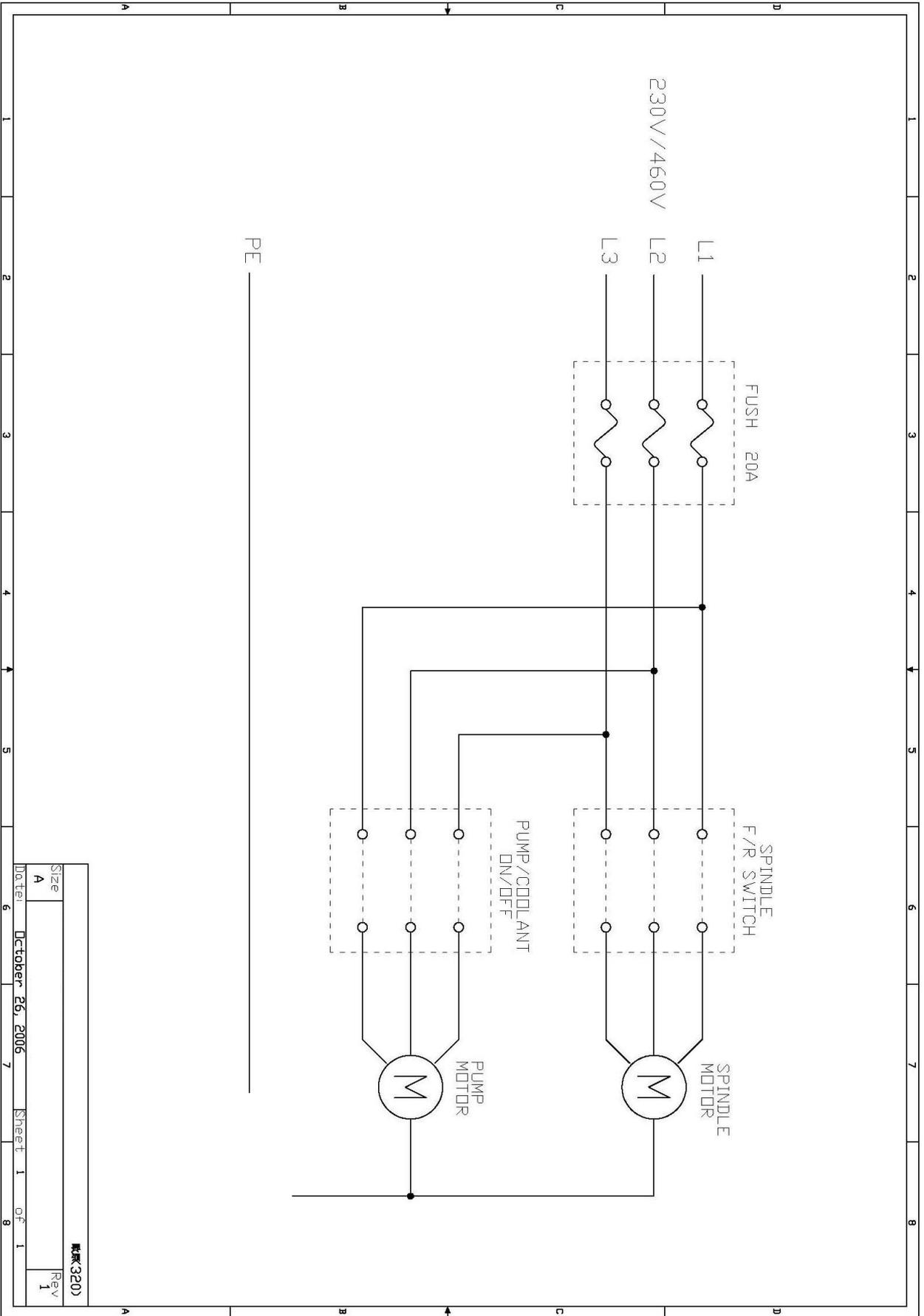
SAFTY GUARD PARTS LIST

NO.PART	DESCRIPTION	QT'Y	NO.PART	DESCRIPTION	QT'Y
1. S120	FIXED BRACKET	1			
2. VS109	AXIS	1			
3. VS110	FIXED BRACKET	1			
4. VS111	SWITCH FIXED BRACKET	1			
5. VS112	FIXED BLOCK	1			
6. VS113	COVER	1			
7. VS114	COVER	1			
8. VS115	COVER	1			
9. VS116	COVER	1			
10. MCSCAPM0620	SOCKET CAP SCREW	4			
11. MCSWASM06	WASHER	4			
12. MCSCAPM0612	SOCKET CAP SCREW	2			
13. MCSCAPM0512	SOCKET CAP SCREW	2			
14. MCSCAPM0616	SOCKET CAP SCREW	15			
15. MCSNUTM6	NUT	12			
16. MCSSETM0612	SET SCREW	1			

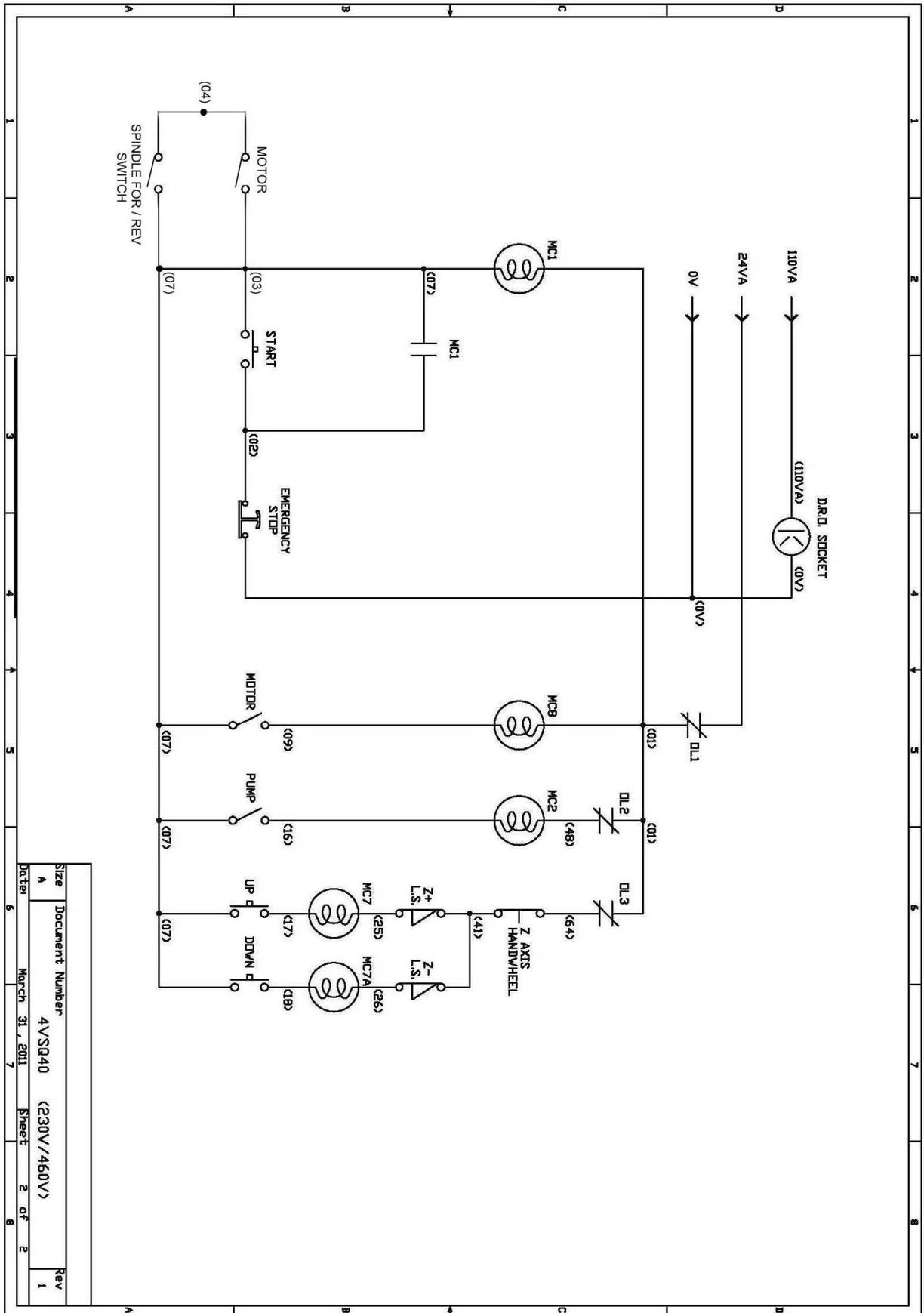
CHAPTER 6.

WIRING DIAGRAM : ESP01

6-1 2VS / 3VS STANDARD (CLAUSING)

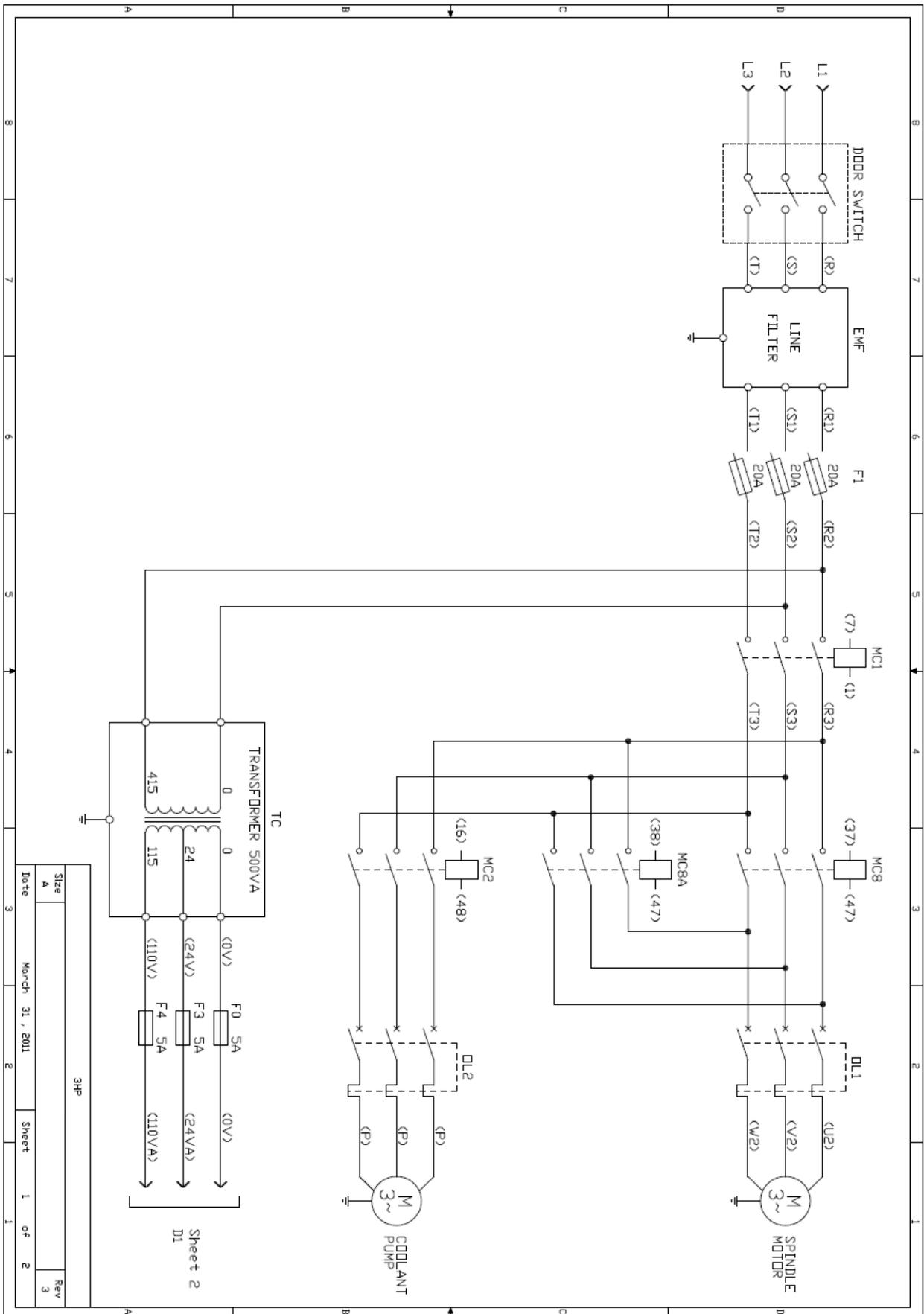


6-2 4VSQ STANDARD (CLAUSING)

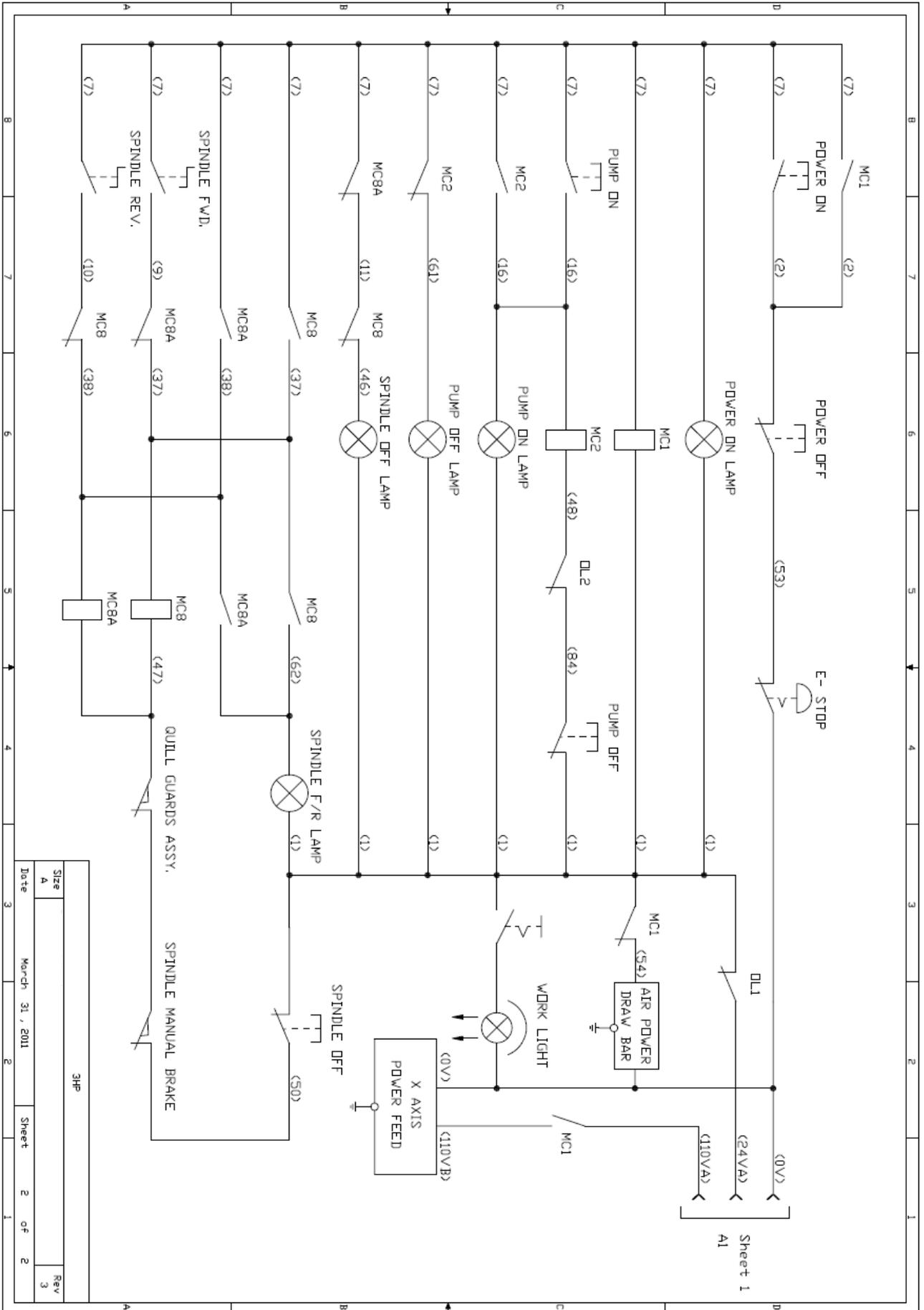


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Date	March 31, 2011	Sheet 2 of 2

6-3 2VS / 3VS CE WITH EMC FILTER – 1/2

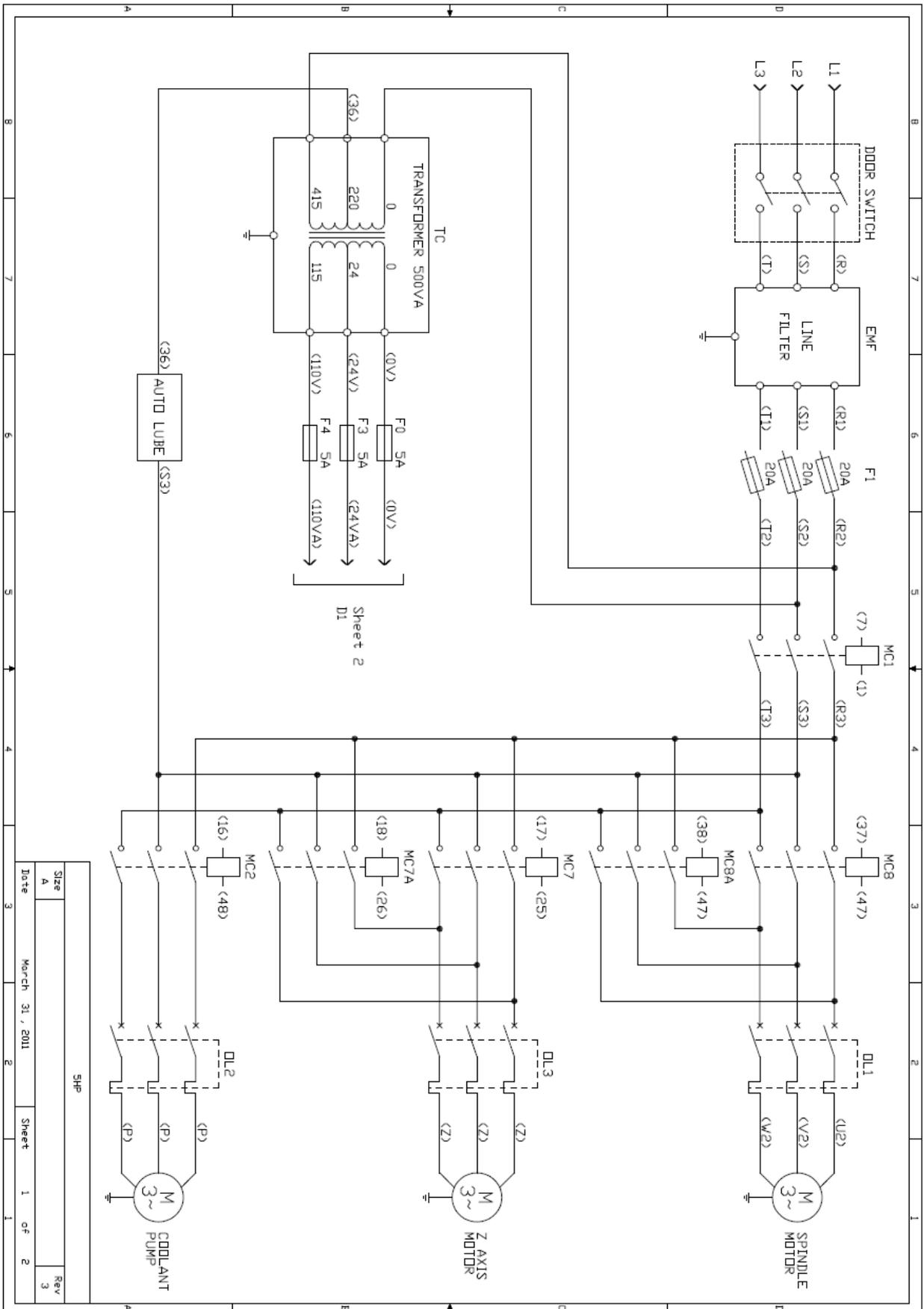


2VS / 3VS CE WITH EMC FILTER – 2/2



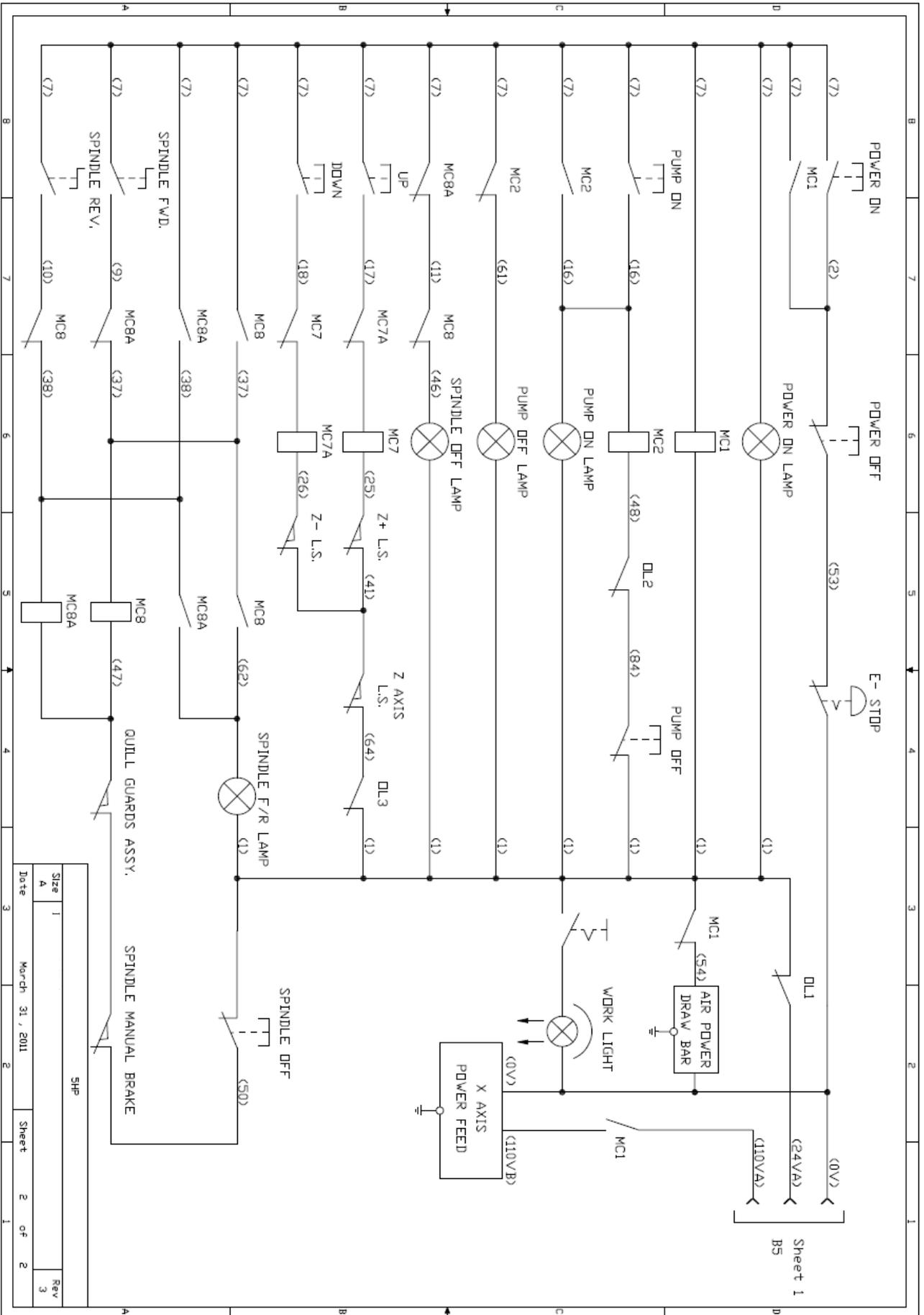
Size	A
Date	March 31, 2001
Sheet	2 of 2
Rev	3

6-4 4VSQ CE WITH EMC FILTER - 1/2

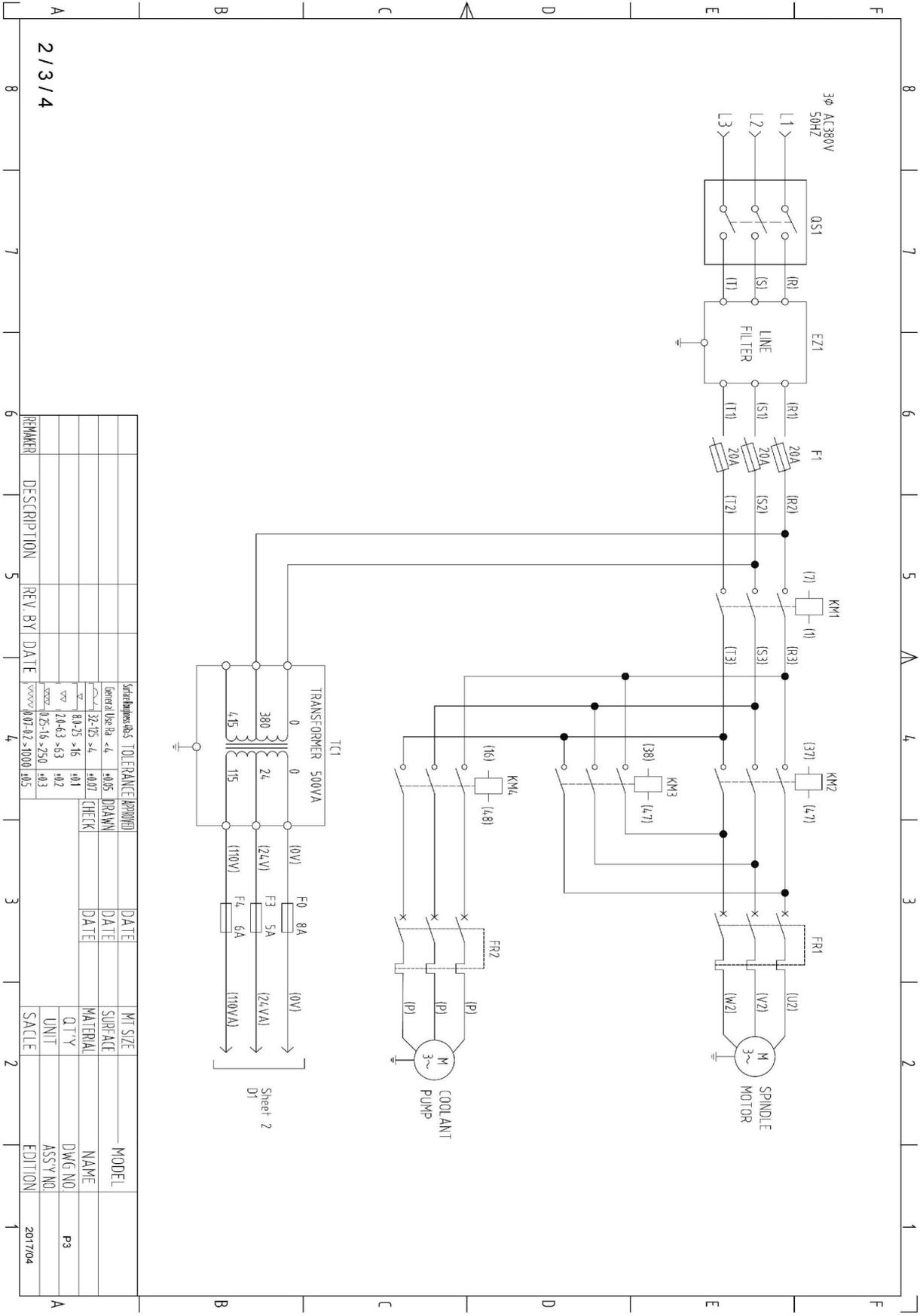


Size	A	Date	March 31, 2011	Sheet	1	of	2	Rev	3
SHP									

4VSQ CE WITH EMC FILTER – 2/2



2/3/4VSQ CE WITH EMC FILTER & SAFETY MODULE - 3/5



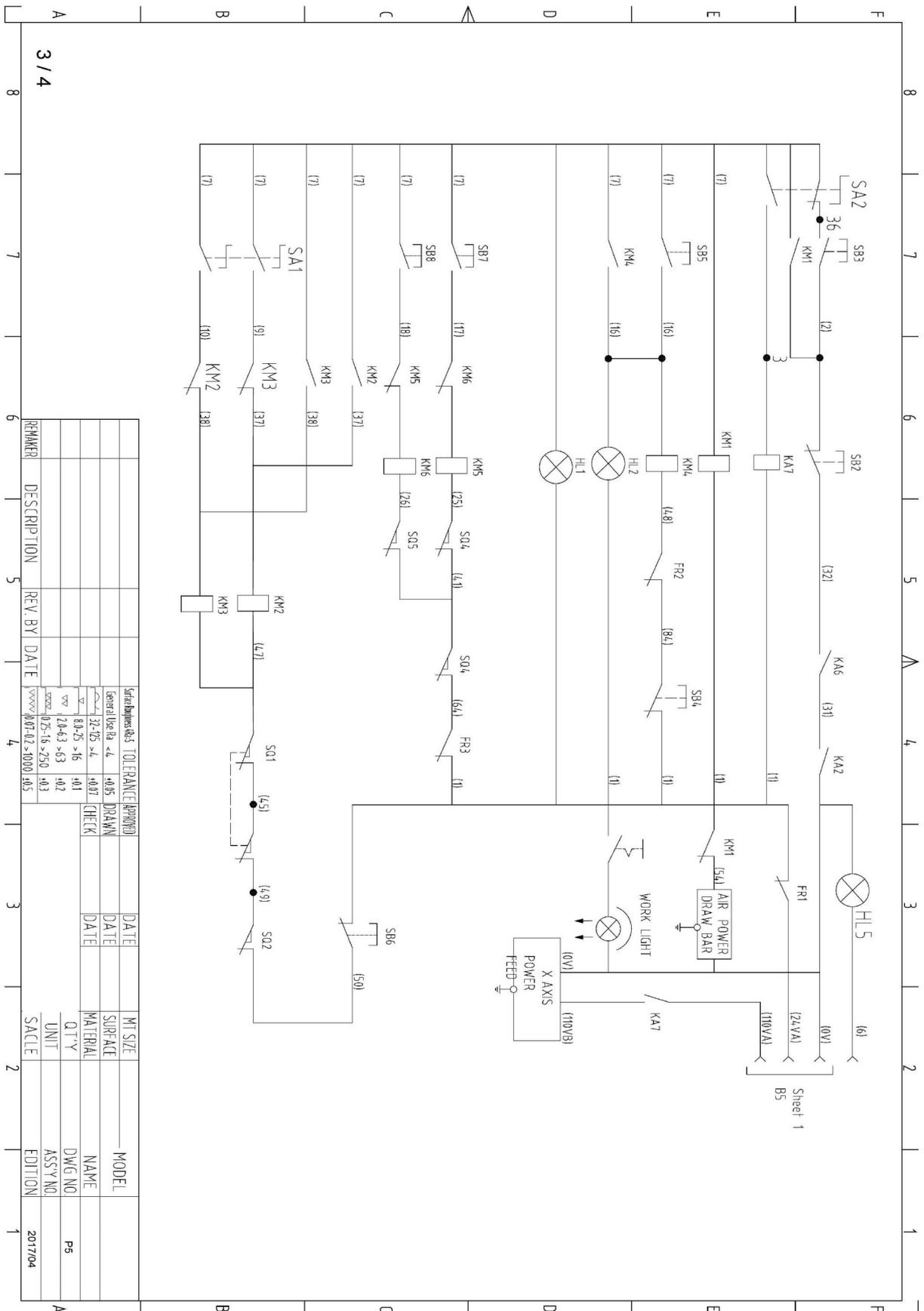
REVISION	DESCRIPTION	REV. BY	DATE	SYMBOLS	TOLERANCE	PERIOD	DATE	MT SIZE	MODEL
1				General Use Ba	±0.05	DRAWN		SURFACE	
2				24-75	±0.07	CHECK		MATERIAL	
3				84-75	±0.1		DATE	QTY	DWG NO
4				24-63	±0.2		DATE	UNIT	ASSY NO.
5				102-16	±0.3		DATE	SACLE	EDITION
6				107-02	±0.5		DATE		

2/3/4

Sheet 2
D1

2017/04

2/3/4VSQ CE WITH EMC FILTER & SAFETY MODULE - 5/5

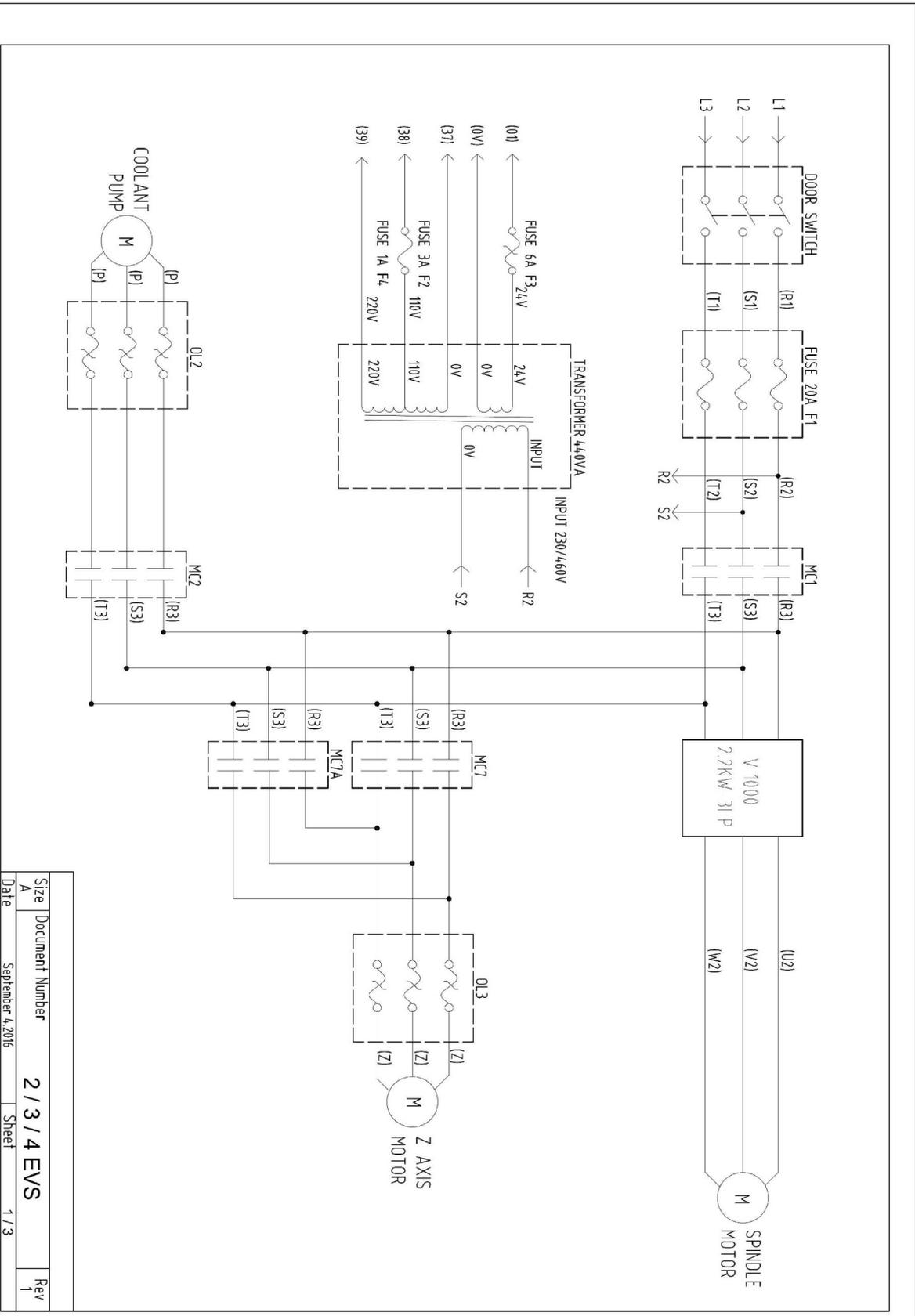


3 / 4

REMARKER	DESCRIPTION	REV. BY	DATE	TOLERANCE	APPROVED	DATE	MODEL
				General Use < 4	0.05	DRAWN	
				32-75 > 4	0.07	CHECK	
				80-75 > 16	0.1	DATE	
				20-63 > 63	0.2	MATERIAL	NAME
				0.75-16 > 250	0.3	QTY	DWG NO
						UNIT	ASSY NO
						SACLE	EDITION
							2017/04

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