## SV-2414 OPERATOR’S MANUAL

**Machine Type:** SV-2414

**Machine Number:**

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<tr>
<td>陳嘉珮</td>
<td>林明宏</td>
<td>15, Aug. 2004</td>
<td>E00</td>
<td>SV-2414 OPERATOR’S MANUAL MANUAL</td>
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<tr>
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<td>邱文輝</td>
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Sharp Industries, Inc.
3501 Challenger Street Torrance, California 90503
Tel: (310) 370-5990 Fax: (310) 542-6162
http://www.sharp-industries.com
## CONTENTS

### 1 SAFETYY INTRODUCTION

1.1 FOREWORD ................................................................. 1
1.2 USING RESTRICTION .................................................. 2
  1.2.1 THE FORESEEN USE OF THE MACHINE .............. 2
  1.2.2 THE FORESEEN OTHER REASONABLE USE OF THE MACHINE. .......... 2
  1.2.3 THE FORESEEN UNREASONABLE USE OF THE MACHINE ....... 2
1.3 SAFETY INSTRUCTIONS .............................................. 3
  1.3.1 REACTION WITH EMERGENCY SITUATION: ............ 3
  1.3.2 SETTING UP THE MACHINE AND POWER. ............. 3
  1.3.3 WHEN OPERATING .............................................. 4
  1.3.4 LUBRICATION, AIR AND COOLANT ...................... 6
  1.3.5 HEALTHY AND SAFETY PROTECTION ................. 7
  1.3.6 MAINTENANCE AND CHECK ............................... 8
  1.3.7 RESCUE THE PERSON WHO TRAPPED INTO MACHINE 8
1.4 WARNING LABEL AND POSITION ............................... 9
1.5 OPERATION AREA ...................................................... 16
1.6 DISPOSE OF WASTE .................................................. 17
1.7 OTHER NOTICES ...................................................... 18

### 2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE MACHINE .................... 19
2.2 DETAILS OF PRINCIPAL COMPONENT .......................... 21
  2.2.1 SPINDLE HEAD .................................................. 21
  2.2.2 COLUMN .......................................................... 21
  2.2.3 BED ................................................................. 21
  2.2.4 TABLE ............................................................... 21
  2.2.5 ATC (AUTOMATIC TOOL CHANGER) ................. 22
  2.2.6 OPERATION PANEL ........................................ 22
  2.2.7 NC SYSTEM ...................................................... 22
  2.2.8 ELECTRIC CABINET ........................................ 22
  2.2.9 PNEUMATIC UNIT ............................................ 22
2.3 MACHINE SPECIFICATIONS ....................................... 23
2.4 MACHINING AREA ..................................................... 26
  2.4.1 SV-2412 / SV-2414 MACHINING AREA ............... 26
2.5 TOOL SHANK AND STUD ........................................... 28

### 3 TRANSFER AND INSTALLATION OF MACHINE .................. 31

3.1 HANGING OF MACHINE ............................................. 31
3.2 REFERANCE DIMENTIONS FOR HANGING ................. 33
3.3 MACHINE TRANSPORT BY FORK LIFT ....................... 34
3.4 HANGING OF PARTS AND ACCESSORIES .................. 35
  3.4.1 COOLANT TANK ................................................. 35
  3.4.2 CHIP CONVEY .................................................. 35
  3.4.3 COOLANT SYSTEM ........................................... 36
  3.4.4 OTHER ACCESSORIES ....................................... 36
3.5 INSTALLATION SPACE ............................................. 37
3.6 INSTALLATION ........................................................ 39
  3.6.1 FOUNDATION .................................................. 39
  3.6.2 INSTALLATION .................................................. 39
3.7 INSTALLATION ENVIRONMENT .................................. 41

### 4 ASSEMBLY PROCEDURE AND TEST RUN ......................... 42

4.1 CLEANING OF MACHINE .......................................... 43

CONTENTS: PAGE 2 / 5
CONTENTS: PAGE 3 / 5

4.2 REMOVAL OF LOCKING DEVICES.................................................................44
4.3 LUBRICATION AND AIR PIPING.................................................................45
  4.3.1 LUBRICATION.........................................................................................45
  4.3.2 AIR PIPING.............................................................................................46
4.4 SWITCHING ON THE POWER SOURCE AND CHECKING.........................47
  4.4.1 WIRING CABLE AND PLACE SEE FIG 4.4.1 .........................................47
  4.4.2 TO CONNECT THE POWER CABLE.........................................................47
4.5 TAKE OFF SPINDLE HEAD SUPPORT DEVICE...........................................50
4.6 LEVELING CHECK.......................................................................................51
4.7 ASSEMBLE OF PARTS AND DEVICES.........................................................52
  4.7.1 MOTORS..................................................................................................53
  4.7.2 CABLE CHAIN.......................................................................................54
  4.7.3 COOLANT MOTOR................................................................................55
  4.7.4 COOLANT TANK....................................................................................56
  4.7.5 CHIP CONVEYOR (OPTION).................................................................57
  4.7.6 SPINDLE CHILLER (OPTION)...............................................................58
  4.7.7 EXHAUST (VACUUM) SYSTEM (OPTION)..........................................59
  4.7.8 OTHER OPTIONS..................................................................................60
4.8 DEVICE PIPING INSTRUCTION.................................................................61
  4.8.1 PIPE LIST............................................................................................61
  4.8.2 PIPING ON TOP OF THE MACHINE.....................................................61
  4.8.3 PIPING ON DEVICES............................................................................62
  4.8.4 POWER CONNECTOR ON ELECTRIC CABINET....................................63
4.9 COOLANT......................................................................................................64
  4.9.1 QUANTITY OF COOLANT.......................................................................64
  4.9.2 TYPE OF COOLANT...............................................................................64
  4.9.3 SAFETY NOTICE...................................................................................64

5 CHECKING AND MAINTENANCE OF MACHINE..........................................65
  5.1 DAILY CHECKING.....................................................................................66
    5.1.1 SAFETY CIRCUIT AND DEVICE CHECK.............................................66
    5.1.2 MACHINE DAILY CHECKING SCHEDULE.........................................68
  5.2 6 MONTH CHECKING................................................................................69
  5.3 YEARLY CHECKING..................................................................................70
  5.4 LUBRICATION OF MACHINE.................................................................71
    5.4.1 LUBRICATION......................................................................................71
    5.4.2 REOILING............................................................................................71
  5.5 LUBRICATION TABLE...............................................................................74
    5.5.1 APPLICABLE LUBRICANTS...............................................................74
    5.5.2 CAUTIONS ON OILING......................................................................74
    5.5.3 MAINTENANCE AND ADJUSTMENT OF LUBRICATION PUMP........75
  5.6 MAINTENANCE AND ADJUSTMENT OF AIR SOURCE AND PNEUMATIC UNITS....76
    5.6.1 AIR SOURCE.......................................................................................76
    5.6.2 AIR LINE LUBRICATOR ( FIG. 5.6.2 ).................................................78
    5.6.3 AIR TANK...........................................................................................79
    5.6.4 JOINT AND HOSE...............................................................................79
    5.6.5 CIRCUIT DIAGRAM OF AIR SYSTEM............................................80
  5.7 PARAMETER FOR LUBRICATION..........................................................82
  5.8 ADJUSTMENT OF SLIDEWAY GIBS.........................................................83

6 TROUBLE SHOOTING..................................................................................84
  1. AIR SYSTEM...............................................................................................84
    1.1 AIR PRESSURE LOW.............................................................................84
  2. SPINDLE COOLANT SYSTEM....................................................................84
    2.1 CAN NOT REACH THE SETTING TEMPERATURE..................................84
    2.2 MOTOR OVERLOAD..............................................................................84
  3. CHIP FLUSH AND COOLANT.................................................................84
3.1 COOLANT FLOW RATE TO LOW ................................................................. 84
3.2 FUNCTION FAILED .................................................................................. 85

4. COOLANT THROUGH SPINDLE ............................................................... 85
   4.1 COOLANT FLOW RATE TO LOW ....................................................... 85
   4.2 FUNCTION FAILED .......................................................................... 85

5. CHIP CONVEYOR .................................................................................. 86
   5.1 NOISE OR RUNNING NOT SMOOTH .................................................. 86
   5.2 FUNCTION FAILED .......................................................................... 86

6. VACUUM DUST COLLECTOR ................................................................. 86
   6.1 WEAK VACUUM POWER .................................................................. 86
   6.2 FUNCTION FAILED .......................................................................... 86
## MODIFICATION RECORDS

<table>
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1  SAFETY INTRODUCTION

WARNING: FAILURE TO FOLLOW THESE RULES MAY CAUSE RESULT IN SERIOUS PERSONAL INJURY

- IN ORDER TO MAINTAIN THE INITIAL MACHINING ACCURACY AND PERFORMANCE, THE MACHINE MUST BE CORRECTLY USED UNDER THE FAVORABLE ENVIRONMENTAL CONDITIONS.
- INADEQUATE OPERATION MAY CAUSE DAMAGES TO THE MACHINE ITSELF AND EXTREME CAUSE SERIOUS ACCIDENT TO OPERATOR.
- TO PREVENT SUCH TROUBLES, PLEASE READ THIS INSTRUCTION MANUAL CAREFULLY UNTIL YOU REACH COMPLETE UNDERSTANDING AND THEN OPERATE THE MACHINE.
- THE FOLLOWING CAUTIONS ARE PARTICULARLY IMPORTANT TO BE OBSERVED FOR SAFE OPERATION.

1.1  FOREWORD

- SV-2414
- THE SV-2414 MACHINING CENTER IS IN THE RANGE OF PROFESSIONAL MACHINERY FOR WORKING OF METAL CUTTING, MADE BY LONG CHANG MACHINERY CO., LTD.
- SINCE THE MODEL DESIGN IS NOT ONLY FOR THE DOMESTIC MARKET BUT ALSO THE EUROPEAN MARKET. DURING DESIGN & CONSTRUCTION OF THIS MACHINE, THE ADDITIONAL RELATIVE EUROPEAN STANDARD, FOR THE SAFETY REGULATION HAS BEEN TAKING INTO ACCOUNT BEFORE THE APPLICATION OF CERTIFICATION.
- CAUTION!
NO PART OF MANUAL MAY BE REPRODUCED OR MODIFIED WITHOUT OUR WRITTEN PERMISSION.
- NOTICE
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ALL RIGHTS ARE RESERVED.
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THE ORIGINAL DESCRIPTION OF THIS MANUAL IS WRITEN IN ENGLISH BY LONG CHANG MACHINERY, ANY FAILURE REGARDING TO TRANSLATIONS OF THIS MANUAL WILL BE RESPONDED BY THE TRANSLATE PARTY.
1.2 USING RESTRICTION

1.2.1 THE FORESEEN USE OF THE MACHINE

A. THE PERSON TO USE THIS MACHINE:

ONLY THE TECHNICIAN WHO HAVE BEEN TRAINED TO USE THE MILLING MACHINE AND TO USE THE CNC CONTROL SYSTEM AND ELDER THEN 18 YEARS OLD CAN USE THIS MACHINE.

B. MACHINING MATERIAL:

CASTING, CARBON STEEL, STANLESS STEEL, COPPER, AND ALUMINUM.

C. MACHINING METHOD:

a. MACHINING BY PROGRAM:

1. MILLING: FACE, OBLIQUE, END, SIDE MILLING, ETC.
2. DRILLING: FRONT AND OBLIQUE DRILLINGS.
3. BORING: FRONT AND OBLIQUE BORINGS BY CUTTERS INSTALLED.
4. MOLDING: PROCESSING OF IRREGULAR CURVES AND MOLD REMOVING ANGLES.
5. POLISHING: SURFACE POLISH ON METALLIC PARTS.

1.2.2 THE FORESEEN OTHER REASONABLE USE OF THE MACHINE

A. THE PERSON TO USE THIS MACHINE:

THE PERSON WHO HAS JUST TRAINED SOME SIMPLE FUNCTIONS (CYCLE START, FEED HOLD, EMERGENCY STOP ... ) ----- MUST DIRECT BY TECHNICIAN PERSON DESCRIBED ABOVE.

B. MACHINING MATERIAL:

WOOD ----- THE WOOD DUST MIGHT RUNS INTO BEARING, SIDEWAYS AND CAUSE SOME DAMAGE.

C. MACHINING METHOD: MACHINING BY MANUAL. ----- SHOULD WEAR THE GOGGLES AND ONLY TECHNICIAN PERSON DESCRIBED IN 1.1.1 CAN OPERATE.

1.2.3 THE FORESEEN UNREASONABLE USE OF THE MACHINE

A. THE PERSON TO USE THIS MACHINE:

THE PERSON WHO HAVE NOT BEEN TRAINED OR UNDER 18 YEARS OLD.
1.3 SAFETY INSTRUCTIONS

1.3.1 REACTION WITH EMERGENCY SITUATION:

A. IN CASE OF ANY EMERGENCY, PUSH THE EMERGENCY STOP BUTTON TO STOP ALL THE MOVEMENT AND THE POWER.

B. ALL OF THE EMERGENCY STOP BUTTONS ARE COLORED RED, AND YELLOW BACKGROUND.

C. THE STANDARD MACHINE PROVIDES ONE EMERGENCY STOP BUTTON IN THE OPERATION PANEL.

D. FOR DIFFERENT OPTIONS THERE COULD BE MORE EMERGENCY STOP BUTTONS SUCH AS:
   a. 24 / 32 TOOL CHANGER
   b. FLAP TYPE CHIP CONVEYOR.
   c. REMOVEABLE HANDWHEEL (MPG.)

E. AFTER EMERGENCY STOP, FOLLOW THE NORMAL START UP PROCEDURE AND SUITABLE OPERATION.

1.3.2 SETTING UP THE MACHINE AND POWER

A. THE ENVIRONMENT TO SET UP THE MACHINE
   a. THAT THIS MACHINE CANNOT BE USED IN THE POTENTIAL EXPLOSIVE ENVIRONMENT. GENERALLY, THIS MACHINE WILL BE INSTALLED ON THE FOLLOWING CONDITION.
      1. AMBIENT TEMPERATURE: 5° ~ 40°C
      2. RELATIVE HUMIDITY: NOT EXCEED 50% AT 40°C
         (HIGHER RELATIVE HUMIDITY MAY BE PERMITTED AT LOWER TEMPERATURE, E.G. 90% AT 20°C)
      3. ATMOSPHERE: FREE FROM EXCESSIVE DUST, ACID FUME, CORROSIVE GASES AND SALT.
      4. AVOID EXPOSING TO DIRECT SUNLIGHT HEAT RAYS WHICH CAN CHANGE THE ENVIRONMENTAL TEMPERATURE.
      5. AVOID EXPOSING TO ABNORMAL VIBRATION.
      6. HAVE TO CONNECT TO EARTH.
         (A TERMINAL FOR THE CONNECTION IF THE EXTENAL GROUND CONDUCTOR IS PROVIDED IN THE VICINITY OF THE ASSOCIATED PHASE CONDUCT TERMINAL WITH MARKED "PE". IT SHOULD MAKE SURE THE "PE" TERMINAL BEING CONNECTION BEFORE MACHINE OPERATE)
      7. THE LIMIT OF ATTITUDE: 0-1000 METER.
      8. ELECTRICAL EQUIPMENT SHALL WITHSTAND THE EFFORTS OF TRANSPORTATION AND STORAGE TEMPERATURE WITHIN A RANGE OF -25°C TO 55°C.

B. CONNECTION AND DISCONNECTION OF POWER CABLE
a. SUPPLY VOLTAGE: 0.9 - 1.1 NOMINAL SUPPLY VOLTAGE
b. SOURCE FREQUENCY: 0.99 - 1.01 NOMINAL FREQUENCY
c. WHEN THE POWER CABLE IS DISCONNECTED AND CONNECTED AGAIN, CARE SHOULD BE EXERCISED TO CONNECT EACH TERMINAL IN THE CORRECT PHASE (L1, L2, L3 PHASES).
d. FOR DETAILS OF THE CONNECTION OF THE POWER CABLE, REFER TO CHAPTER 4.4 SWITCHING ON THE POWER SOURCE AND CHECKING.

1.3.3 WHEN OPERATING

A. THE OPERATOR SHOULD WEAR SAFETY SHOES AND GOGGLES.
B. WARM THE MACHINE 15 - 30 min. DAILY, BEFORE OPERATION.
C. CHECK IF THE WORKPIECE IS SECURELY LOCKED ON THE TABLE BEFORE MACHINING.
D. MOVE THE TOOLS AWAY FROM WORKPIECE BEFORE STARTS THE SPINDLE.
E. MANUAL REFERENCE POINT RETURN AFTER TURNING ON THE POWER SWITCH.

AFTER THE POWER SWITCH IS TURNED ON, DO NOT FORGET TO RETURN THE SPINDLE HEAD, SADDLE AND TABLE TO THE REFERENCE POINT IN MANUAL OPERATION MODE.
F. INSTALL PULL STUD TIGHTLY

a. THE PULL STUD SHOULD BE SECURELY INSTALLED TO THE GIVEN TOOL SHANK.
b. IF THE PULL STUD IS LOOSEN DURING CUTTING, THE TOOL CANNOT BE SECURELY CLAMPED IN THE SPINDLE. SINCE LOOSENED TOOL IS VERY DANGEROUS, BE SURE TO CHECK THE PULL STUD BEFORE STARTING THE OPERATION.

G. USE OF SPECIFIED PULL STUD

a. DO NOT USE A PULL STUD NOT SPECIFIED BY US, OTHERWISE THE TOOL CANNOT BE SECURELY CLAMPED IN THE SPINDLE.
b. THEREFORE, ALWAYS USE ONLY THE PULL STUD CONFORMED TO THE STANDARD.
c. DO NOT USE A PULL STUD MADE IN YOUR FACTORY.

H. INSTALLATION AND REMOVAL OF TOOL TO AND FROM SPINDLE BY HAND

a. WHEN TOOL IS INSTALLED TO THE SPINDLE, CARE SHOULD BE TAKEN AS FOLLOWS:
1. THE TOOL AND SPINDLE BORE TAPERS SHOULD BE CLEAN.
2. DO NOT RELEASE HAND FROM THE TOOL UNTIL IT IS ASSURED THAT THE TOOL IS SECURELY CLAMPED IN THE SPINDLE.
3. INSTALL THE TOOL UPRIGHT, BUT DO NOT TILT.
NOTICE: SINCE AIR FOR CLEANING OF THE SPINDLE BORE AND TOOL TAPER BLOWS FROM THE SPINDLE BORE WHEN THE UNCLAMP SWITCH ON THE OPERATION PANEL IS PRESSED, CAREFULLY AND SECURELY HOLD THE TOOL BY HAND AND PREVENT FROM DROPPING OF THE TOOL.

I. WHEN THE TOOL IS REMOVED FROM THE SPINDLE BY HAND, CARE SHOULD BE TAKEN AS FOLLOWS:
   a. AT THE SAME TIME AS THE UNCLAMP SWITCH ON THE OPERATION PANEL IS PRESSED, THE PULL STUD IS PRESSED DOWN AND THE TOOL GOES DOWN APPROXIMATELY 0.5mm (0.02 inch). SINCE AIR BLOW PRESSURE ENHANCES PRESSING DOWN MOVEMENT OF THE TOOL, SECURELY HOLD THE TOOL BY HAND.
   b. AS MENTIONED ABOVE, THE TOOL GOES DOWN WHEN IT IS REMOVED, BE SURE TO RAISE THE SPINDLE HAND AT A POSITION HIGH ENOUGH TO PREVENT CONTACT OF THE TOOL WITH THE WORK OR TABLE.

J. DO NOT ALLOW HAND TO GAIN ACCESS WITHIN THE MOVABLE RANGE OF ATC UNIT.
   IT IS VERY DANGEROUS TO ALLOW YOUR HAND TO GAIN ACCESS WITHIN THE MOVABLE RANGE OF THE ATC UNIT OR TO TOUCH THE PERIPHERY OF THE ATC UNIT.

K. WHEN THE SPINDLE IS UNDER ORIENTATION, DO NOT INSTALL AND REMOVE THE TOOL, WHICH IS PROHIBITED FROM USING A HOLDER IN THE SPINDLE UNDER ORIENTATION, TOGETHER WITH TOOL HOLDER, OTHERWISE THE SPINDLE MIGHT BE DAMAGED.

L. DO NOT USE A HEAVY TOOL.
   a. THE MAXIMUM WEIGHT OF THE TOOLS APPLICABLE TO THE MACHINE IS 7kg (20 TOOLS ATC) AND 8 kg (24 / 32 TOOLS ATC).
   b. DO NOT USE TOOLS HEAVIER THAN 7 kg OR 8 kg.
   c. REFER TO PAGE 2-8

M. DO NOT USE A LARGE TOOL.
   a. FOR 18 TOOLS ATC
      THE MAXIMUM DIAMETER OF THE TOOLS APPLICABLE TO THE MACHINE IS 80 mm (3.1 inch) WHEN TOOLS ARE ADJACENTLY ACCOMMODATED IN THE MAGAZINE. HOWEVER, THE TOOL HAVING THE MAXIMUM DIAMETER OF 140 mm (5.5 inch) IS APPLICABLE WHEN IT IS PLACED IN A MAGAZINE TOOL POST, BOTH THE ADJACENT TOOL POSTS OF WHICH ARE VACANT. DO NOT USE TOOLS LARGER THAN THESE DIAMETERS.
   b. FOR 24 / 32 TOOLS ATC
      THE MAXIMUM DIAMETER OF THE TOOLS APPLICABLE TO THE MACHINE IS 100 mm (3.9 inch)
   c. REFER TO PAGE 1-8

N. THE FRONT DOOR PROTECTION
a. NORMALLY OPERATOR SHOULD CLOSE THE DOOR BEFORE DOING ANY MOVEMENT OF THE MACHINE.

b. IF OPERATED BY OPENING THE FRONT DOOR AND MACHINING BY MANUAL, BE SURE TO WEAR THE GOGGLES, AND ONLY TECHNICIAN PERSON WHO HAS BEEN TRAINED CAN OPERATE IN THIS WAY.

c. FOR MACHINE WITH CE MARK, THERE ARE SECURITY SWITCH FOR DOOR OPEN OPERATION, REFER TO CHPTER 5 FOR MORE INFORMATION.

O. CAUTION TO USE 10,000/min SPINDLE

IN ORDER TO HAVE LONGER LIFE TIME OF THE HIGH PRECISION SPINDLE, WE RECOMMEND TO WARM UP THIS SPINDLE EVERYDAY BEFORE PUT INTO HIGH SPEED MACHINING. PLEASE RUN THE SPINDLE IN LOWER SPEED BETWEEN 1,000 TO 3,000 /min ABOUT 15 - 30 min. AFTER THAT YOU ARE FREE TO RUN THE MAX. SPEED 10,000 /min.

P. SPINDLE CHILLIER SETTING

THIS OPTIONAL SYSTEM IS TO KEEP THE HEAD STOCK MORE STABLE. WE RECOMMEND TO SET THE TEMPERATURE TO 0 - -1° C DEGREE. THIS SYSTEM MAY OPERATE AUTOMATICALLY COMPARE WITH THE ROOM TEMPERATURE.

1.3.4 LUBRICATION, AIR AND COOLANT

A. LUBRICATING OIL SHORTAGE

a. IF LUBRICATING OIL RUNS SHORT, THE SLIDE WAYS AND BALL SCREWS IN X, Y AND Z AXIS WILL BE RAPIDLY WORN AND THE MACHINE IS DEGRADED.

b. BE SURE TO CHECK AMOUNT OF LUBRICATING OIL EVERYDAY AND REPLENISH IF NECESSARY.

c. IF THE LAMP LUBRICATION LEVEL LIGHTS, IMMEDIATELY REPLENISH.

B. AIR SOURCE

a. SINCE EACH PNEUMATIC UNIT AND DEVICE IS DESIGNED TO WORK ON THE AIR SOURCE AT 5.5 bar, ALWAYS SUPPLY COMPRESSED AIR AT 6 bar TO THEM.

b. THE AIR SOURCE SHOULD BE AT CONSTANT PRESSURE. ALTHOUGH AIR FILTER IS INSTALLED AT THE AIR INTAKE TO PROTECT THE PNEUMATIC UNIT, THE SUPPLIED AIR SHOULD BE FREE FROM MOISTURE, OIL AND DUST, AND PURIFIED BY AIR FILTER OF 5 MICRONS MESH.


c. TOO HIGH OR LOW AIR PRESSURE
1. THE REQUIRED PRESSURE OF THE AIR SOURCE GIVEN TO THE MACHINE IS 5.5 bar.
2. TOO HIGH AIR PRESSURE CAN CAUSE TROUBLE WITH PNEUMATIC UNIT OR DEVICE.
3. WHILE TOO LOW AIR PRESSURE CAN RESULT IN UNSTABLE OPERATION OF PNEUMATIC UNIT OR DEVICE.
4. IF AIR PRESSURE GOES DOWN BELOW 4 bar, THE LAMP AIR PRESSURE ON THE OPERATION PANEL LIGHTS, THE ALARM BUZZER SOUNDS AND TOOL CHANGE BECOMES IMPOSSIBLE.
5. SEE CHAPTER 6 FOR MORE INFORMATION.

C. COOLANT
   a. DO NOT TURN ON THE COOLANT PUMP, UNLESS THERE IS ENOUGH COOLANT IN THE TANK, OR THE COOLANT PUMP WILL BROKEN SHORTLY.
   b. WHEN CHANGE THE COOLANT, IT IS SUGGESTING OPERATED WITH PUMP EQUIPMENT TO FILL IN AND EMPTY THE LIQUID TO REACH THE LEVEL.
   c. IF THE LIQUID FLOW OVER TO GROUND, USE CLOTH TO CLEAN THE LIQUID IN ORDER TO PREVENT FORM ACCIDENT.
   d. IT IS SUGGEST USING COOLANT LIQUID WITH ENVIRONMENTAL PROTECTION APPROVAL.

D. PREVENT FROM FIRE

TO PREVENT FIRE, OBEY THE FOLLOWING INSTRUCTIONS FOR UN-MANNED OPERATION AT NIGHT OR FOR CASES WHEN OPERATOR HAS TO BE AWAY FROM THE MACHINE FOR A LONG TIME.
1. USE NON-FLAMMABLE COOLANT ONLY.
2. CHECK THAT LUBRICATION OIL AND COOLANT ARE SUFFICIENT AND ARE WORKING PROPERLY.
3. CHECK THE TOOL TIPS, CUTTING CONDITIONS, CYCLE TIME, TOOL LIFE, ECT.
4. NEVER PLACE FLAMMABLE ITEMS, SUCH AS WOODEN BLOCKS, PAPER, CLOTH, ECT., AROUND THE MACHINE.

1.3.5 HEALTHY AND SAFETY PROTECTION

A. NOISE OF THE MACHINE
   a. CONDITIONS :
      1. PLACEMENT/INSTALLATION : FLOOR-STANDING
      2. HIGHT ABOVE THE FLOOR : STANDING OPERATOR.
      3. MEASUREMENT DISTANCE $d = 1m$
      4. MEASUREMENT TIME PER POSITION $= 30s$
      5. MEASUREMENT POSITION $= 26$ POSITIONS
   b. SUMMERY
1. A WEIGHTED SOUND PRESSURE UNDER NO LOAD
2. \( L_{p,eq} = 73.9 \text{ dB(A)} \).
3. A WEIGHTED SOUND PRESSURE UNDER LOAD
4. \( L_{p,eq} = 79.4 \text{ dB(A)} \).

NOTICE: CUTTING DIFFERENT WORKPIECE MAY CAUSE LOUDER NOISE. WHEN WORKING LONG TIMES IN CUTTING WORKPIECE BE WARE TO WEAR EARPLUGS.

1.3.6 MAINTENANCE AND CHECK

A. MOVE THE TOOLS AWAY FROM WORKPIECE BEFORE MAINTENANCE OR ANY CHECK OF THE MACHINE OR WORKPIECE.

B. SWITCH OFF THE MAIN POWER BEFORE MAINTENANCE

1.3.7 RESCUE THE PERSON WHO TRAPPED INTO MACHINE

A. IF OPERATOR FALLS INTO MACHINE SHUT OFF THE EMERGENCY SWITCH IMMEDIATELY AND KEEP THE FRONT DOOR OPEN. THEN SAVE THE PERSON FROM FRONT DOOR OR SIDE WINDOWS.

B. Z AXIS MOTOR BRAKE FAILURE: HANG THE SPINDLE HEAD ON THE HOOK; HANGING POSITION AS FIG BELOW.
1.4 WARNING LABEL AND POSITION

FIG. 1.4.1 WARNING LABEL POSITION
LABEL U
1.5 OPERATION AREA

FIG 1.5.1 SV-2414 OPERATOR POSITION
1.6 DISPOSE OF WASTE

C. ALL THE WASTE SHOULD BE TAKEING CARE BY THE RULE OF LOCAL GOVERNMENT.

D. THE CUTTING CHIP WASTE IS ALWAYS SHARP, DO NOT TOUCH, OR CLEAN THE CHIPS DIRECTLY BY HAND.

E. MOST OF THE CUTTING CHIP ARE RECYCLABLE IT IS SUGGESTE TO RECYCLE THE CUTTING CHIP BY LOCAL RECYCLE AGENT.

F. DISPOSE OF LIQUID WASTE SUCH AS WASTE OIL AND COOLANT IS NECESSARY TO ASSOCIATE WITH LOCAL RECYCLE AGENT.
1.7 OTHER NOTICES

A. IF THE WORK PIECE IS HEAVIER THAN 10kg, PLEASE USE SHOP HANGING EQUIPMENT TO MOVE THE WORK PIECE.

![Diagram of heavy part hanging](image)

FIG 1.6 HEAVY PART HANGING

B. IN CASE OF MAINTENANCE, SERVICING, AND PARTS CHANGES, PLEASE CONTACT OUR SALES AGENCIES OR BUSINESS DEPARTMENT DIRECTLY.

C. SUGGESTIONS FOR IMPROVEMENTS OF THE MACHINE STRUCTURE AND / OR INQUIRIES, INCLUDING PLANT VISITATIONS, ARE CORDIALLY WELCOME.

D. THE MANUFACTURER REVERSES THE RIGHT TO MODIFY THE DESIGN, OPERATIONS, STRUCTURE ETC. ALL OF THE MACHINE WITHOUT ANY PRIOR NOTICE.
2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE MACHINE

A. THE MODEL SV-2414 IS THE VERTICAL SPINDLE MACHINING CENTER FEATURING ELECTRONIC CONTROL EQUIPMENT BUILT-IN COMPACT DESIGN, PERFORMANCE, ACCURACY AND RELIABILITY.

B. THE MODEL BASICALLY CONSISTS OF THE FOLLOWINGS:

   a. MACHINE BODY (INCLUDING SPINDLE HEAD, SPINDLE, COLUMN, BED, SADDLE AND ATC)
   b. OPERATION PANEL
   c. NC SYSTEM
   d. ELECTRIC (POWER SUPPLY) CABINET
   e. PNEUMATIC UNIT

C. THE APPEARANCE AND PRINCIPAL DIMENSIONS OF THE MACHINE AND THE NAME OF EACH PRINCIPAL COMPONENT ARE AS SHOWN IN FIG. 2.1.1, 2.2.2

FIG. 2.1.1 PRINCIPAL COMPONENT NAME
FIG. 2.1.2  SV-2414 APPEARANCE AND PRINCIPAL DIMENSION OF THE MACHINE
2.2 DETAILS OF PRINCIPAL COMPONENT

2.2.1 SPINDLE HEAD

A. THE SPINDLE HEAD IS MOUNTING ON THE SQUARE SLIDE WAYS, WHICH IN TURN ARE VERTICALLY INSTALLING ON THE COLUMN FRONT.

B. THE SPINDLE HEAD IS VERTICALLY (IN Z AXIS) MOVES ALONG THE SLIDE WAYS.

C. A PRACTICALLY MAINTENANCE-FREE AC BRUSHLESS MOTOR IS USED TO DRIVE THE SPINDLE ASSURING IN ASSOCIATION WITH LARGE DIAMETER BEARING SYSTEM, EXTREMELY HIGH PERFORMANCE.

D. CARTRIDGE SPINDLE IS SUPPORTING BY ACCURATE AND GREASED PACKED BEARINGS.

E. TOOL HOLDER RETAINER AND AIR BLOW THAT REMOVES CHIPS FROM THE SPINDLE AND TOOL TAPER ARE INCORPORATE IN THE SPINDLE.

F. THE SPINDLE HEAD FEATURES SIMPLE STRUCTURE AND RELIABLE PERFORMANCE.

2.2.2 COLUMN

A. THE COLUMN IS FIRMLY BOLTED TO THE BED, AND DESIGNED TO HAVE PARTICULAR RIGIDITY. THE SLIDE WAYS ALONG WHICH THE SPINDLE HEAD MOVES ARE OF SQUARE TYPE, AND ELABORATELY GROUND AFTER HARDENING. A TURCITE-B SHEET IS APPLIE TO THE SLIDE SURFACE OF THE SPINDLE HEAD, PROVIDING GOOD ACCOMMODATION TO THE SLIDE WAYS.

B. THE ATC (AUTOMATIC TOOL CHANGER) IS LOCATED AT THE LEFT OF THE COLUMN AND THE PNEUMATIC VALVES IS AT THE BACK OF THE ATC.

C. THE MOTOR THAT DRIVES THE SPINDLE HEAD IN Z AXI (VERTICAL MOVEMENT) IS INSTALLE ON THE TOP OF THE COLUMN.

2.2.3 BED

A. THE BED IS PROVIDE WITH LEVELING BOLTS AT ITS FEET, AND HAS THE SECTION WHERE THE COLUMN IS INSTALLE AS WELL AS THE SLIDE WAYS OF SQUARE TYPE ON THE TOP OF THE BED.

B. THE Y AXIS (CROSSWISE MOVEMENT) FEED MOTOR ARE INSTALLE ON THE BACK WALL OF THE BED.

C. SINCE THE BED SUSTAINING THE WEIGHT OF THE COLUMN MUST ASSURE RELIABLE Y AXIS MOVEMENT, AND LARGELY AFFECTS CUTTING ACCURACY, IT IS DESIGNE TO HAVE EXTREME RIGIDITY.

D. IT IS ALSO CONSIDER IN DESIGNING THE BED THAT CHIPS AND CUTTING OIL CAN BE READILY ELIMINATED AND COLLECTED.

2.2.4 TABLE

A. THE TABLE IS THE ONLY PLACE WHERE YOU CAN LOCK YOUR WORK PIECE ON IT AND MACHINING, IT MOVES ON THE SADDLE IN LENGTHWISE DIRECTION (X AXIS).
2.2.5 ATC (AUTOMATIC TOOL CHANGER)

A. THE ATC IS INSTALLED ON THE LEFT WALL OF THE COLUMN. THE ATC PERMITTING DIRECT TOOL CHANGE; ANY TOOL CAN BE IMMEDIATELY AND RELIABLY CHANGED.

B. THE FEATURES OF THE ATC INCLUDE PNEUMATICALLY DRIVE SYSTEM, SIMPLE STRUCTURE, FAST MOVEMENT, AND RAPID BI-DIRECTIONAL RANDOM TOOL SELECTION IS DIRECTLY DESIGNATED TOOL NO. WITH T CODE. (24 / 32 TOOLS CAM TYPE ATC ARE AVAILABLE AS AN OPTION)

2.2.6 OPERATION PANEL

A. THE OPERATION PANEL IS LOCKED IN THE RIGHT FRONT OF THE MACHINE, AND BASICALLY CONSISTS OF THE NC OPERATION PANEL, IN WHICH PROGRAM LOADING FROM TAPE TO THE MEMORY, PROGRAM EDITION AND MID OPERATION ARE PERFORMED, AND THE OPERATION PANEL (OPERATOR'S STATION) HAVING CONTROL SWITCHES AND PUSH BUTTONS ON THE PANEL AND FUNCTIONAL SWITCHES IN THE PANEL.

B. ALMOST ALL CONTROL SWITCHES AND PUSH BUTTONS NECESSARY TO OPERATE THE MACHINE ARE INSTALLED ON THE OPERATION PANEL, THUS THE OPERATOR CAN READILY CONTROL THE MACHINE OPERATION AT THE FRONT OF THE OPERATION PANEL.

2.2.7 NC SYSTEM

A. THE NC SYSTEM READS SIGNIFICANT INFORMATION FROM THE PROGRAM, AND PRODUCES COMMAND OR INSTRUCTION TO SEQUENTIALLY CONTROL THE MACHINE MOVEMENT AND OPERATION.

B. THE NC SYSTEM IS NORMALLY LOCATED IN THE ELECTRIC CABINET.

2.2.8 ELECTRIC CABINET

A. THE ELECTRIC CABINET RECEIVES THE COMMAND SIGNALS FROM THE NC SYSTEM, AND DRIVES THE MACHINE. IN THE ELECTRIC CABINET, RELAY CIRCUIT AND POWER SOURCE CIRCUIT ARE INCORPORATED.

2.2.9 PNEUMATIC UNIT

A. THE FUNCTIONS OF THE PNEUMATIC UNIT INCLUDE

   a. TOOL UNCLAMPING AT THE SPINDLE,

   b. AIR BLOWING FOR CLEANING THE SPINDLE AND TOOL TAPER.

   c. ATC CROSSWISE MOVEMENT AND ATC MAGAZINE VERTICAL MOVEMENT (20 ATC)

   d. TOOL POT UP/DOWN (24/32 ATC)

B. ONLY STRICTLY SELECTED PARTS AND DEVICES ARE USED IN THE PNEUMATIC UNIT, THUS ASSURING STABLE AND RELIABLE OPERATION
### 2.3 MACHINE SPECIFICATIONS

SPECIFICATION MAY DIFFERENT ACCORDING TO CUSTOM REQUEST OR OPTIONS.

<table>
<thead>
<tr>
<th>TABLE</th>
<th>SV-2412</th>
<th>SV-2414</th>
</tr>
</thead>
<tbody>
<tr>
<td>WORKING SURFACE (X X Y)</td>
<td>700 X 308 mm (27.56 X 12.13 inch)</td>
<td>700 X 350 mm (27.56 X 13.78 inch)</td>
</tr>
<tr>
<td>T SLOT (NO. X WIDTH X PITCH)</td>
<td>4 X 16 X 63.5 mm (4 X 0.6 X 2.5 inch)</td>
<td>5 X 16 X 63.5 mm (5 X 0.6 X 2.5 inch)</td>
</tr>
<tr>
<td>TABLE STROKE (X X Y)</td>
<td>610 X 305 mm (24 X 12 inch)</td>
<td>610 X 355 mm (24 X 14 inch)</td>
</tr>
<tr>
<td>CUTTING FEEDRATE</td>
<td>1-10,000 mm/min (0.04-393 inch/min)</td>
<td></td>
</tr>
<tr>
<td>RAPID TRAVERSE (X, Y)</td>
<td>20,000 mm/min (787 inch/min)</td>
<td></td>
</tr>
<tr>
<td>RAPID TRAVERSE (Z)</td>
<td>18,000 mm/min (708 inch/min)</td>
<td></td>
</tr>
<tr>
<td>X,Y FEED MOTOR (AC SERVO UNIT)</td>
<td>X: Beta 12/3000 11Nm AC MOTOR Y: Beta 12/3000 11Nm AC MOTOR</td>
<td></td>
</tr>
<tr>
<td>Z FEED MOTOR (AC SERVO UNIT)</td>
<td>Z: Beta 22/2000 20Nm AC MOTOR</td>
<td></td>
</tr>
<tr>
<td>TABLE LOAD CAPACITY</td>
<td>350 kg (770 lbs)</td>
<td></td>
</tr>
</tbody>
</table>
FIG. 2.3.1 SV-2412 PRINCIPAL DIMENSIONS OF TABLE

FIG. 2.3.2 SV-2414 PRINCIPAL DIMENSIONS OF TABLE
## SPINDLE

<table>
<thead>
<tr>
<th>Parameter</th>
<th>SV-2412 / SV-2414</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke (Z)</td>
<td>460 mm (18.1 inch)</td>
</tr>
<tr>
<td>Table to Spindle End (Min./Max.)</td>
<td>70 / 530 mm (2.7 / 20.8 inch)</td>
</tr>
<tr>
<td>Spindle Motor</td>
<td>AC Variable Frequency Motor Infinitely Variable 5.5 kW Continuously Rating / 30 Minutes Rating 7.5 kW</td>
</tr>
<tr>
<td>Spindle Rotation Speed</td>
<td>120-8,000 /min</td>
</tr>
<tr>
<td>Max. Spindle Moment of Inertia</td>
<td>138 Nm</td>
</tr>
</tbody>
</table>

## AUTOMATIC TOOL CHANGE

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Tool Storage Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool Change Time (Tool to Tool)</td>
<td>7.5 sec. 3.2 sec</td>
</tr>
<tr>
<td>Tool Change Time (Chip to Chip)</td>
<td>9.1 sec 5.5 sec</td>
</tr>
<tr>
<td>Max. Adjacent Tool Diameter</td>
<td>110 mm (4.3&quot;) 76 mm (3&quot;)</td>
</tr>
<tr>
<td>Max. Tool Weight</td>
<td>8 kg (17.6 lbs) 7 kg (15 lbs)</td>
</tr>
<tr>
<td>Max. Tool Length</td>
<td>230 mm (9.1&quot;)</td>
</tr>
<tr>
<td>Cutting Tool Shank</td>
<td>MAS-BT40</td>
</tr>
<tr>
<td>Max. Tool Pot Weight</td>
<td>10 kg (22 lbs)</td>
</tr>
<tr>
<td>Max. Tool Change Moment of Inertia</td>
<td>0.3042 kgm² 0.457 kgm² 0.3703 kgm²</td>
</tr>
</tbody>
</table>

## GENERAL INFORMATION

<table>
<thead>
<tr>
<th>Parameter</th>
<th>SV-2412 / SV-2414</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Power Required</td>
<td>5.5 bar</td>
</tr>
<tr>
<td>Spindle Center to Column</td>
<td>415 mm (16 inch)</td>
</tr>
<tr>
<td>Floor to Table</td>
<td>835 mm (33 inch)</td>
</tr>
<tr>
<td>Machine Height</td>
<td>2,400 mm (94.4 inch)</td>
</tr>
<tr>
<td>Machine Weight</td>
<td>2,500 kg (5,500 lbs)</td>
</tr>
<tr>
<td>Floor Area Required</td>
<td>2,600 (W) X 2,600 (D) mm (102.3 X 102.3 inch)</td>
</tr>
</tbody>
</table>
2.4 MACHINING AREA

- IT IS RECOMMEND TO PUT THE MACHINING PARTS OR FIXTURE NEAR THE CENTER OF THE TABLE.
- BIG FIXTURE OR PARTS MAY HIT MACHINE BODY OR COVER WHEN TRAVELLING AXIS. MAKE A SLOW TEST RUN REFORE MACHINING.
- BIG OR LONG TOOLS MAY HIT MACHINE BODY OR COVER WHEN TRAVELLING AXIS. MAKE A SLOW TEST RUN REFORE MACHINING.
- BEFORE STOP MACHINE, IT IS RECOMMEND MOVING THE TABLE TO THE CENTER OF X, Y AXIS. TO PERVENT FROM BENDING OF THE MACHINE.

2.4.1 SV-2412 / SV-2414 MACHINING AREA

FIG. 2.4.1 SV-2412 MACHINING AREA ( ) FOR SV-2414
2.5 TOOL SHANK AND STUD

**BT SHANK**

![Diagram of BT shank with dimensions](image)

*Units: mm*

<table>
<thead>
<tr>
<th>Model No.</th>
<th>D1</th>
<th>D2</th>
<th>d1</th>
<th>d2</th>
<th>L</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>b</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT40</td>
<td>6.3</td>
<td>44.45</td>
<td>17</td>
<td>M16</td>
<td>65.4</td>
<td>25</td>
<td>10</td>
<td>16.6</td>
<td>2</td>
<td>16.1</td>
<td>22.6</td>
</tr>
</tbody>
</table>

**BT40 STUD**

![Diagram of BT40 stud](image)

*Cooling though spindle*
## CAT SHANK TAPER (ANSI B5.50-78)

<table>
<thead>
<tr>
<th>CAT40</th>
<th>D1</th>
<th>D6</th>
<th>D8</th>
<th>L1</th>
<th>F2</th>
<th>F3</th>
<th>A</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.750</td>
<td>2.500</td>
<td>1.750</td>
<td>2.687</td>
<td>1.375</td>
<td>.750</td>
<td>.125</td>
<td>5/8-11</td>
</tr>
<tr>
<td></td>
<td>(44.45)</td>
<td>(63.05)</td>
<td>(44.45)</td>
<td>(68.25)</td>
<td>(35.00)</td>
<td>(19.05)</td>
<td>(3.18)</td>
<td>thread</td>
</tr>
</tbody>
</table>

### CAT40 STUD

Cooling Though Spindle
DIN 69871 A

<table>
<thead>
<tr>
<th>Taper</th>
<th>b (H12)</th>
<th>d1</th>
<th>g</th>
<th>d3 (H7)</th>
<th>d6</th>
<th>d7</th>
<th>L1</th>
<th>L5</th>
<th>L6</th>
<th>L7</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>16.1</td>
<td>44.45</td>
<td>M16</td>
<td>17</td>
<td>63.55</td>
<td>56.25</td>
<td>68.4</td>
<td>18.5</td>
<td>22.8</td>
<td>25</td>
</tr>
</tbody>
</table>

DIN STUD

<table>
<thead>
<tr>
<th>d1</th>
<th>d2</th>
<th>d3</th>
<th>d4</th>
<th>d5</th>
<th>d6</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>L4</th>
<th>L5</th>
<th>s</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>14</td>
<td>23</td>
<td>17</td>
<td>M16</td>
<td>7</td>
<td>54</td>
<td>26</td>
<td>20</td>
<td>21</td>
<td>4</td>
<td>19</td>
</tr>
</tbody>
</table>
3 TRANSFER AND INSTALLATION OF MACHINE

3.1 HANGING OF MACHINE

BEFORE HANGING AND TRANSFERRING THE MACHINE, BE SURE TO CHECK THE TRANSFERRING ROUTE FOR SAFETY. LOCATE THE SADDLE BY THE COLUMN, AND THE TABLE AT THE CENTER OF ITS STROKE TO BALANCE THE MACHINE.

WE BALANCED THE MACHINE BEFORE SHIPPING.

MACHINE WEIGHT:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SV-2412 / SV-2414</td>
<td>2,500 kg (5500lbs)</td>
</tr>
</tbody>
</table>

A. CHECK THE HOOK, HANGING DEVICE AND LIFT FORK CAREFULLY BEFORE HANGING AND LIFTING FOR SAFETY OPERATION.

B. DURING MOVING THE MACHINE, FOR SAFETY OPERATION, EVACUATE THE MACHINE MOVING AREA, NO PEOPLE SHOULD NEAR THE MACHINE.

C. WHEN LOCATE THE MACHINE BE WARE TO CLEAR THE LOCATION AREA (MAKE SURE THERE IS NO PIPE, CABLE … )

D. BEFORE HANGING THE MACHINE, TAKE OFF THE UPPER COVER OF COLUMN AS SHOWN IN FIG. 3.1.1 TO PREVENT FROM DAMAGE OF THE MACHINE.

E. THE MACHINE HAS HOOKS. TO HANG THE MACHINE, APPLY TWO WIRE ROPE, OR SLING, TO THE HOOKS AS SHOWN IN FIG. 3.2.1.

F. BEFORE HANGING THE FRONT POINT OF THE MACHINE, TAKE OFF THE FRONT COVER OF Y AXIS TO FIND OUT THE HANGING POINT.

G. BE SURE TO USE A WIRE ROPE OF A SIZE LARGER THAN HOOK SIZE AND MAKE SURE THAT THE WIRE ROPE DOES NOT LEAVE THE HOOKS DURING TRANSFERRING OF THE MACHINE.

H. PUT A RUBBER SHEET OR RAG ON THE MACHINE SURFACE WITH WHICH THE WIRE ROPE CAN COME INTO CONTACT TO PREVENT DAMAGE TO THE MACHINE SURFACE (PAINT).

I. DURING HANGING AND TRANSFERRING OF THE MACHINE, USE CARE NOT TO GIVE DETRIMENTAL VIBRATION OR SHOCK TO THE MACHINE, AND TO MAINTAIN THE MACHINE UPRIGHT.

NOTICE: THAT THE MACHINE IS LIABLE TO TILT BECAUSE THE ELECTRICAL UNIT EQUIPPED VERTICAL MACHINING CENTER HAS THE CENTER OF GRAVITY RELATIVELY HIGH POSITION.
FIG 3.1.1 HANGING THE MACHINE
3.2 REFERANCE DIMENSIONS FOR HANGING

200x200 mm H SHAPE STEEL,
WELD SUPPORTED STEEL ON BOTH SIDE.

THE "O" TYPE HOOKER
SHOULD SUSTAIN
MORE THEN 2,500kg.

Ø12mm (1/2")
STEEL WIRE ×2,
LENGTH 2.5 METER,
ON BOTH END SIDE,
MAKE A CIRCLE,
(make sure to secure
THE CIRCLE TIGHTLY)

Ø12mm (1/2")
STEEL WIRE,
LENGTH 1.1 METER,
ON BOTH END SIDE,
MAKE A CIRCLE,
(make sure to secure
THE CIRCLE TIGHTLY)

FIG 3.2.1 HANGING DIMENSIONS AND POSITION
3.3 MACHINE TRANSPORT BY FORK LIFT

USE A FORK LIFT WITH MINIMUM CAPACITY OF 6 kN

THE LENGTH OF THE FORK MUST LONGER THEN 1800mm.

WHEN MOVING MACHINE KEEP THE POSITION LOWER AND MOVE IT SMOOTH AND SLOWER.

FIG 3.3.1 MACHINE TRANSPORTED BY FORK LIFT
3.4 HANGING OF PARTS AND ACCESSORIES

3.4.1 COOLANT TANK

FIG 3.4.1 HANGING OF COOLANT TANK

NET WEIGHT APPROX. = 100kg

3.4.2 CHIP CONVEYER

FIG 3.4.2 CHIP CONVEYER HANGING

WEIGHT APPROX. = 220kg
3.4.3 COOLANT SYSTEM

FIG 3.4.3 COOLANT SYSTEM HANGING

3.4.4 OTHER ACCESSORIES

FOR OTHER ACCESSORIES NOT LIST HERE, CHECK WITH YOUR MACHINE AGENT FOR SAFETY HANGING INFORMATION.
3.5 INSTALLATION SPACE

- RESERVED SPACE FOR OPERATION AREA AND MAINTANCE AREA IS NECESSARY FOR SAFETY AND EFFICIENCY USE OF THE MACHINE AFTER INSTALLATION, FIG 3.5.1.
- IT IS NOT USUAL FOR THIS MACHINE TO HAVE VACUM SYSTEM, IF YOU HAVE THIS OPTION YOU NEED MORE SPACE FOR INSTALLATION, CHECK WITH YOUR AGENT.
- IF YOU HAVE ANY QUESTION ABOUT INSTALLTION SPACE, CHECK WITH YOUR MACHINE AGENT BEFORE INSTALLTION.
FIG 3.5.1 INSTALLATION SPACE
3.6 INSTALLATION

THIS INSTALLATION IS ROUGHLY PUT THE MACHINE APPROPRIATELY ON THE SUPPORTING PADS, FOR DETAIL ADJUSTING LEVELING REFER TO CHAPTER 4.

3.6.1 FOUNDATION

A. THE FOUNDATION ON WHICH THE MACHINE INSTALLED SHOULD BE RIGIDLY CONSTRUCTED WITH CONCRETE.

B. SINCE MACHINING ACCURACY IS LARGELY GOVERNED BY THE ADEQUACY OF FOUNDATION AND INSTALLATION, ELABORATELY CONSTRUCT THE FOUNDATION AND INSTALL THE MACHINE ON IT.

C. THE MACHINE SHOULD BE LOCATED WHERE IS NOT SUBJECTED TO VIBRATION FROM OTHER MACHINERY, AND TO DIRECT SUNBEAM.

D. THE THICKNESS AND SIZE OF THE CONCRETE FOUNDATION SHOULD BE DETERMINED CONSIDERING THE GROUND CONDITION.

E. WHEN FOUNDATION BOLT IS NOT USED, USE LEVELING PADS FURNISHED TO THE MACHINE TO INSTALL THE MACHINE.

3.6.2 INSTALLATION


B. CAREFULLY LOWER THE HUNG MACHINE SO THAT EACH FOOT OF THE MACHINE CAN REST ON THE RECESS OF EACH LEVELING PADS. THEN ADJUST THE LEVEL OF THE MACHINE BY THE LEVELING BOLTS.

C. WHEN ANCHOR BOLT IS USED, INSTALL THE MACHINE ACCORDING TO THE PLAN.

D. BECAUSE MORTARED HOLD MAY SINK WITH TIME UNTIL THE MORTAR IS COMPLETELY SET, PERIODICALLY CHECK THE LEVEL OF THE MACHINE FOR 6 TO 8 MONTHS AFTER THE INSTALLATION AND READJUST IF NECESSARY.

E. FOR CHECKING THE LEVEL, USE A LEVEL VIAL WITH SCALE OF 0.02mm / 1000mm.
FIG. 3.6.1 FLOOR PLAN (SV-2412 / SV-2414)

FIG. 3.6.2 FOUNDATION DRAWING
3.7 INSTALLATION ENVIRONMENT

PLease refer to chapter 1.3.2 for more information.
4 ASSEMBLY PROCEDURE AND TEST RUN

WARNING: ALL ELECTRIC, HYDRAULIC, COOLANT SYSTEM, PNEUMATIC CONNECTING, AND MACHINE ASSEMBLY MUST BE DONE BY QUALIFIED TRAINED AND AUTHORIZED TECHNICAL PERSON.

QUICK REFERENCE

1. CLEANING OF MACHINE
2. REMOVAL OF LOCKING DEVICES
3. LUBRATION AND AIR PIPING
4. SWITCHING ON THE POWER SOURCE AND CHECKING
5. TAKE OFF SPINDLE HEAD SUPPORT DEVICE
6. LEVELING CHECK
7. ASSEMBLE OF PARTS AND DEVICES
8. DEVICE PIPING INSTRUCTION
9. COOLANT
4.1 CLEANING OF MACHINE

A. ANTICORROSIVE AGENT HAS BEEN APPLIED ON THE MACHINE TO PREVENT CORROSION.

B. REMOVE THE ANTICORROSIVE AGENT BEFORE STARTING TEST RUN.
   NOTICE THAT ANY MOVABLE PART OF THE MACHINE, SUCH AS TABLE, SPINDLE HEAD AND ATC, SHOULD NOT BE MOVED BEFORE THE ANTICORROSIVE AGENT HAS BEEN THOROUGHLY REMOVED.

C. PARTICULAR CARE SHOULD BE GIVEN TO THOROUGHLY REMOVE THE ANTICORROSIVE AGENT FROM THE SLIDE WAYS, ATC AND SPINDLE TAPER.
4.2 REMOVAL OF LOCKING DEVICES

A. ACCORDING TO THE DRAWING FIG. 4.2.1, REMOVE ALL LOCKING DEVICES USED TO SECURE THE MOVABLE COMPONENTS OF THE MACHINE DURING THE TRANSPORT, SUCH AS Y AXIS LOCKING DEVICES (2 AND 3), X AXIS LOCKING DEVICES (4 AND 5) AND ATC LOCKING DEVICE (1) (18 TOOLS ATC).

B. HOWEVER, DO NOT REMOVE THE SPINDLE HEAD SUPPORT DEVICE (9) WHICH SHOULD BE REMOVED AFTER THE POWER SOURCE IS GIVEN TO THE MACHINE. (SHOULD CONTINUE TO READ THIS MANUAL UNTIL 7.8 FOR REMOVING ALL LOCKING DEVICES.)

C. IF THE SURFACE IS FOUND FOUL AFTER THE REMOVAL OF LOCKING DEVICE OR SCREW THOROUGHLY CLEAN.

D. ONCE REMOVED PACKING MATERIAL AND LOCKING DEVICES ARE NO LONGER USED. PUT THEM ASIDE FOR SAFE WORK.

FIG. 4.2.1 LOCKING DEVICE
4.3 LUBRICATION AND AIR PIPING

4.3.1 LUBRICATION

A. BEFORE STARTING THE OPERATION, THE MACHINE SHOULD BE PROPERLY OILED.

B. USE A HIGH QUALITY, PURE OIL SPECIFIED IN THE LUBRICATION TABLE AND FILL EACH PART. BEFORE STARTING THE TEST RUN,

C. THE FOLLOWING PARTS SHOULD BE OILED

<table>
<thead>
<tr>
<th>PART TO BE OILED</th>
<th>Q'TY</th>
<th>LUBRICANT</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>LUBRICATION PUMP</td>
<td>4.6L</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>LUBRICATOR OF PNEUMATIC</td>
<td>0.17L</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LUBRICANT</th>
<th>SHELL</th>
<th>ESSO</th>
<th>MOBIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SHELL TONNAOIL</td>
<td>FEBIS K68</td>
<td>MOBIL VACTRA OIL NO.2</td>
</tr>
<tr>
<td>4</td>
<td>SHELL TURBIN OIL T32</td>
<td>TERESSO 32</td>
<td>MOBIL DTE OIL LIGHT</td>
</tr>
</tbody>
</table>

FIG. 4.3.1 LUBRICATION
4.3.2 AIR PIPING

A. CONNECT THE PIPES TO THE AIR INLET OF THE PNEUMATIC UNIT.

B. THE PNEUMATIC DEVICES ARE DESIGNED TO WORK WITH COMPRESSED AIR AT 5.5 bar.

C. THEREFORE, USE AN AIR SOURCE AT CONSTANT PRESSURE OF AT LEAST 6 bar.

D. THE AIR PRESSURE HAVE BEEN PROPERLY SET UP BEFORE SHIPPING OUT THE MACHINE, IF ANY PROBLEM PLEASE CHECK CHAPTER 6.


FIG. 4.3.2 AIR PIPING
4.4 SWITCHING ON THE POWER SOURCE AND CHECKING

- FOR TRANSPORT REASON, SOMETIMES THE Z AXIS MOTOR, Y AXIS MOTOR OR OTHER MOTOR COULD BE TAKEN OFF BEFORE SHIPPING, IN THIS CASE, ASSEMBLE THESE MOTORS BEFORE THIS PROCEDURE.
- ONLY OTHERIZED PERSON CAN DO THE MOTOR ASSEMBLE.

4.4.1 WIRING CABLE AND PLACE SEE FIG 4.4.1

NOTICE: MAKE SURE THE VOLTAGE AND CAPACITY IS SAME AS REQUIRED BEFORE WIRING.

<table>
<thead>
<tr>
<th>PE WIRE (mm²)</th>
<th>SUPPLY WIRE (mm²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.0</td>
<td>10.0</td>
</tr>
</tbody>
</table>

A. SUPPLY VOLTAGE: 0.9 - 1.1 NOMINAL SUPPLY VOLTAGE
B. SOURCE FREQUENCY: 0.99 - 1.01 NOMINAL FREQUENCY
C. WHEN THE POWER CABLE IS DISCONNECTED AND CONNECTED AGAIN, CARE SHOULD BE EXERCISED TO CONNECT EACH TERMINAL IN THE CORRECT PHASE (L1, L2, L3 PHASES).

- MAKE SURE THAT CLEANING OF MACHINE OILING AND OIL PIPING HAVE BEEN COMPLETED

4.4.2 TO CONNECT THE POWER CABLE

OPEN ELECTRIC CABINET AND CONNECTED TO QF1 AND PE IN THE ELECTRIC CABINET. THE POWER CABLE SHOULD HAVE CRAMP TERMINALS AND EACH TERMINALS SHOULD BE FULLY TIGHTENED WITH PLUS SCREWDRIVER,
POWER SOURCE
ALIMATION : 3PH 50/60Hz L1,L2,L3+PE
SUPPLY : WIRRING VOLTAGE MAY DIFFERENT PLEASE CHECK
CABLE LENGTH : MAX: 3m
SUPPLY VOLTAGE: 0.9 - 1.1 NOMINAL SUPPLY VOLTAGE
SOURCE FREQUENCY: 0.99 - 1.01 NOMINAL FREQUENCY

FIG. 4.4.1 POWER SOURCE DRAWING

- TURN ON THE POWER SWITCH TO "ON" POSITION MAKE SURE INTO THE CONTROL POWER SOURCE IS REQUIRED AND FAN WILL ON.
- HOLD DOWN THE PUSH-BUTTON "POWER ON" ON THE NC CONTROL PANEL FOR 2-3 sec. DURING WHICH THE POWER SOURCE WILL BE GIVEN TO THE SERVO SYSTEM, INVERTER AND OTHER ELECTRIC UNITS AND DEVICES, THEN PERFORM THE FOLLOWING CHECKING
A. CHECK IF ANY ALARM MESSAGE APPEARS? (CRT OR OP PANEL LED)

B. CHECK COOLANT PUMP ROTATION, SPINDLE FAN ROTATION, OR ATC ROTATION FOR CORRECT DIRECTION OF POWER SOURCE.

C. IF ALARM MESSAGE OCCURS REFER TO CHAPTER 7 TROUBLE SHOOTING USING ERROR MESSAGE#, TNC MESSAGE AND ELIMINATE THE CAUSE OF THE ALARM

D. IF MOTOR DIRECTION RUN WRONG DIRECTION STEP AS NEXT

   a. TURN POWER OFF ON OPERATION PANEL

   b. ALSO TURN MAIN POWER SWITCH OFF

   c. OPEN CABINET (LEFT SIDE) CHANGE POWER CABLE CONNECTION 2 OF 3 WIRES (L1,L2,L3) AGAIN CHECK MOTOR DIRECTION

   NOW POWER CABLE CONNECTION HAS BEEN COMPLETED
4.5 TAKE OFF SPINDLE HEAD SUPPORT DEVICE

REFER TO CHAPTER 2.4 OF ELECTRIC OPERATOR’S MANUAL
4.6 LEVELING CHECK

A. PLACE TWO PRECISION LEVEL VIAL
   a. MOVE AND PLACE THE TABLE IN THE CENTER OF THE X AND Y AXIS MOVEMENT,
   b. FOR CHECKING THE LEVEL, USE A LEVEL VIAL WITH SCALE OF 0.02 mm / 1000 mm.
   c. PLACE TWO PRECISION LEVEL VIAL NEAR THE CENTER SURFACE OF TABLE (FIG 4.6.1)

   ![FIG. 4.6.1 LEVELING CHECK]

B. ADJUST THE LEVEL OF THE MACHINE BY THE LEVELING BOLTS
   a. ADJUST THE LEVEL OF THE MACHINE BY THE LEVELING BOLTS (FIG. 4.6.2)
   b. MAKE SURE EVERY LEVELING PADS ARE FIRMLY SECURED BY LEVELING BOLTS.
   c. ONCE YOU HAVE SET UP THE LEVELING, AFTER USING THE MACHINE 6 MONTH IT IS SUGGESTED TO CHECK THE LEVELING AGAIN, THEN YOU HAVE TO CHECK THE LEVELING ONCE A YEAR,
4.7 ASSEMBLE OF PARTS AND DEVICES

- BE WARE TO SWITCH OFF THE MAIN POWER WHILE ASSEMBLE OF PARTS AND DEVICES.
- FOR HANNING INFORMATION OF PARTS AND DEVICES PLEASE REFER TO CHAPTER 3.

FIG. 4.7.1 ASSEMBLE OF PARTS AND DEVICES
4.7.1 MOTORS

A. SOMETIMES DUE TO TRANSPORT REASON THE Z AXIS, Y AXIS, OR OTHER MOTOR COULD BE TAKEN OFF BEFORE TRANSPORT.

B. ASSEMBLE THESE MOTOR BEFORE POWER WIRING.

C. ONLY OTHERIZED PERSON CAN DO THE MOTOR ASSEMBLE.

D. FOR MORE INFORMATION, CHECK YOUR MACHINE AGENT.
4.7.2. CABLE CHAIN

A. CABLE CHAIN COULD BE RELEASED FOR TRANSPORTATION REASON.

B. TO OPEN, CLOSE AND ADJUST CABLE CHAIN AS FIG 4.7.2

**FIG. 4.7.2 CABLE CHAIN**

- **OPEN CABLE CHAIN COVER**
  - Use a "-" screw, push the joint and open both side.

- **CLOSE CABLE CHAIN COVER**
  - Reverse to joint back.

- **ADJUST LENGTH OF CABLE CHAIN**
  - Use a "-" screw, insert this cap and rotate screw to release the joint.
4.7.3 COOLANT MOTOR

A. BEFORE SETTING UP THE TANK, DO NOT FILL COOLANT LIQUIDE INTO THE TANK.

B. SECURE COOLANT MOTOR, ON THE TANK, FOR PIPING AND WIRRING, REFER TO NEXT SECTION “DEVICE PIPING INSTRUCTION”.

C. THERE ARE ALSO WHEELS AND LOCK SCREW UNDER THE TANK.
4.7.4 COOLANT TANK

A. BEFORE SETTING UP THE TANK, DO NOT FILL COOLANT LIQUIDE INTO THE TANK.

B. THERE ARE WHEELS AND LOCK SCREW UNDER COOLANT TANK.

C. PUSH COOLANT UNDER THE MACHINE.

D. FOR USERS WHICH HAVE CHIP CONVEYOR OPTION, IT IS NECESSARY TO PUT CONVEYOR ONTO COOLANT TANK, THAN PUSH THE WHOLE SET UNDER THE MACHINE.

FIG. 4.7.4 FRONT COOLANT TANK
4.7.5 CHIP CONVEYOR (OPTION)

A. PUT CONVEYOR ONTO COOLANT TANK, THAN PUSH THE WHOLE SET UNDER THE MACHINE.

B. THERE ARE TWO TYPES OF CHIP CONVEYOR, SCREW TYPE AND FLAT TYPE.

C. THIS OPTION INCLUDES A CHIP CART, WHICH HAVE WHEELS UNDER THE CART.
4.7.6 SPINDLE CHILLER (OPTION)

A. AS SET THE SPINDLE CHILLER IN POSITION.

B. IT IS IMPORTANT TO KEEP THE SPINDLE CHILLER IN STANT POSITION DURING MOVING. (CAN NOT ROTATE THE CHILLER)

C. ACCORDING TO THE REFRIGERANT LIQUID IN THE CHILLER, BEFORE START THE CHILLER IT IS NECESSARY TO WAIT 30 min. AFTER MOVING THE CHILLER.

D. REFER TO SPINDLE CHILLER’S OPERATIONAL MANUAL FOR MORE INFORMATION

SPINDLE CHILLER

445 x 365
4.7.7 EXHAUST (VACUUM) SYSTEM (OPTION)

A. SPECIFICATION

<table>
<thead>
<tr>
<th>TYPE</th>
<th>DIMENTION</th>
<th>POWER</th>
<th>INLET</th>
<th>AIR CAPACITY</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS300</td>
<td>2000mm</td>
<td>800mm</td>
<td>600mm</td>
<td>2.3 kW</td>
<td>Ø200mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30-45 m³/min</td>
<td></td>
</tr>
</tbody>
</table>

B. AS FIG 4.7.1 SET THE EXHAUST (VACUUM) SYSTEM IN POSITION. REMEMBER TO GIVE PLACE FOR MAINTENANCE.

C. CONNECT THE EXHAUST (VACUUM) PIPE TO THE TOP OF THE MACHINE.

D. CONNECT THE POWER TO THE SIDE OF POWER CABINET. (BE WARE TO SWITCH OF MAIN POWER)

E. REFER TO VACUUM SYSTEM'S OPERATIONAL MANUAL FOR MORE INFORMATION
4.7.8 OTHER OPTIONS

FOR OTHER OPTIONS NOT LIST ABOVE, CHECK YOUR MACHINE AGENT FOR INSTALLTION PROCEDURE.
4.8 DEVICE PIPING INSTRUCTION

4.8.1 PIPE LIST

<table>
<thead>
<tr>
<th>NO</th>
<th>PARTS NO.</th>
<th>TYPE</th>
<th>SPEC.</th>
<th>Q</th>
<th>REMARK</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>1051-2638-100</td>
<td>A</td>
<td>1/2&quot; (18.50mm) x 0.8 m</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>1000-2435-100</td>
<td>B</td>
<td>1/2&quot; (18.50mm) x 1.15 m</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>1051-2238-100</td>
<td>C</td>
<td>3/4&quot; (24.00mm) x 2.5 m</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>d</td>
<td>1051-2735-100</td>
<td>C</td>
<td>3/4&quot; (24.00mm) x 1.2 m</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>1051-2736-100</td>
<td>C</td>
<td>3/4&quot; (24.00mm) x 2 m</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

TYPE A: RESIST COMPRESSION PIPE.
TYPE B: NYLON PIPE
TYPE C: OIL RESIST PIPE

4.8.2 PIPING ON TOP OF THE MACHINE
4.8.3 PIPING ON DEVICES

- **4C1**: Spindle Chiller (Main Spindle Cooler)
- **4C2**: Oil In
- **5D1**: To Left Chip Flushing System
- **5D2**: To Right Chip Flushing System

Diagram:
- Front Coolant Tank
- Side Coolant Tank
- Chip Flushing Motor

Diagram shows the piping connections for left and right chip flushing systems, with arrows indicating the flow direction.
4.8.4 POWER CONNECTOR ON ELECTRIC CABINET
4.9 COOLANT

4.9.1 QUANTITY OF COOLANT

THE APPROXIMATELY QUANTITY FOR COOLANT TANK AS FOLLOW:

<table>
<thead>
<tr>
<th></th>
<th>SV-2412 / SV-2414</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUANTITY</td>
<td>160 Liter</td>
</tr>
</tbody>
</table>

4.9.2 TYPE OF COOLANT

A. THERE ARE TWO TYPES OF COOLANT, WATER SOLUBLE, AND NONE WATER SOLUBLE, RESPECTIVE OF WHICH HAVE MANY VARIATIONS. THE SUITABLE COOLANT DEPENDS ON CUTTING CONDITION AND OTHERS. THE FOLLOWING TABLE IS ONLY FOR REFERENCE. FIND YOUR COOLANT DEALER FOR MORE INFORMATION.

<table>
<thead>
<tr>
<th>BRAND REFERENCE</th>
<th>MATERIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Hangsterfer's S-500 2. YUSHIROKEN MIC-700A</td>
<td>CASTING</td>
</tr>
<tr>
<td>DILUTE WITH WATER (COOLANT : WATER)</td>
<td>1:20</td>
</tr>
</tbody>
</table>

4.9.3 SAFETY NOTICE

A. TO PREVENT FIRE, OBEY THE FOLLOWING INSTRUCTIONS FOR UNMANNED OPERATION AT NIGHT OR FOR CASES WHEN OPERATOR HAS TO BE AWAY FROM THE MACHINE FOR A LONG TIME.

a. USE NON-FLAMMABLE COOLANT ONLY.

b. CHECK THAT LUBRICATION OIL AND COOLANT ARE SUFFICIENT AND ARE WORKING PROPERLY.

c. CHECK THE TOOL TIPS, CUTTING CONDITIONS, CYCLE TIME, TOOL LIFE, ETC.

d. NEVER PLACE FLAMMABLE ITEMS, SUCH AS WOODEN BLOCKS, PAPER, CLOTH, ETC., AROUND THE MACHINE.
5 CHECKING AND MAINTENANCE OF MACHINE

WARNING: ORDER TO GUARANTEE TROUBLE FREE, LONG USE OF THE MACHINE, IT IS VERY IMPORTANT TO ELABORATELY CHECK EACH PART OF THE MACHINE PERIODICALLY. IF ANY TROUBLE OR SIGN IF TROUBLE IS FOUND DURING CHECKING, BE SURE TO IMMEDIATELY REMEDY IT. THE DAILY CHECKING AND MAINTENANCE SCHEDULE THAT SHOULD BE AT LEAST PERFORMED BEFORE STARTING DAILY WORK IS SHOWN BELOW.
5.1 DAILY CHECKING

5.1.1 SAFETY CIRCUIT AND DEVICE CHECK

THE FAILURE OF SAFETY CIRCUIT AND DEVICE COULD CAUSE SERIOUS INJURY OR DEATH DURING OPERATION, CONTACT YOUR MACHINE AGENT TO SOVE THE PROBLEM BELOW.

A. BEFORE STARTING MACHINE

1. CHECK IF THE FRONT DOOR AND TOOL MAGAZINE DOOR IS CLOSED, OTHERWISE CANNOT TURN ON THE SYSTEM PROPERLY.

2. IF THE FRONT DOOR OR TOOL MAGAZINE DOOR IS NOT CLOSED PROPERLY AND STILL CAN START THE SYSTEM THAT MEANS...
   - THE HARDWARE OF THE DOOR SWITCH IS MODIFIED OR DAMAGED.
   - THE SOFTWARE HAS BEEN MODIFIED.

B. AFTER STARTING MACHINE

1. WHEN THE SYSTEM IS READY AND THE MACHINE IS NOT RUNNING, PUSH THEN OPEN THE FRONT DOOR.
   THE MACHINE SHOULD NOT EXECUTE ANY CONTROL (SUCH AS AXIS MOVEMENT, SPINDLE RUNNING, TOOL CHANGE, COOLANT PUMP, CHIP CONVEYOR OR OTHER OPTION DEVICE).
   IF THE MACHINE CAN EXECUTE ANY DEVICE FUNCTION MEANS...
   - THE HARDWARE OF THE DOOR SWITCH IS MODIFIED OR DAMAGED.
   - THE SOFTWARE HAS BEEN MODIFIED.

2. WHEN THE SYSTEM IS READY AND THE MACHINE IS NOT RUNNING, OPEN THE TOOL MAGAZINE DOOR.
   CHECK PROCEDURE AS ABOVE.

3. IN MANUAL MODE START THE SPINDLE RUNNING, PUSH ANY EMERGENCY STOP BUTTON (TOOL MAGAZINE, REMOVEABLE HANDWHEEL, CHIP CONVEYOR).
   SHOULD STOP THE SPINDLE IMMEDIATELY, IF NOT, CHECK THE ELECTRIC CIRCUIT OR REPLACE THE SWITCH AND TEST AGAIN.

C. PARTS REPLACEMENT

1. TO REPLACE THE ELECTRICAL PARTS, REFER TO PARTS LIST IN THE ELECTRICAL DIAGRAM, FOR THE CORRECT SPECIFICATION OF PARTS.
   AFTER CHANGE PARTS, CONFIRM THE SAFETY CIRCUIT AND DEVICE CHECK AS ABOVE PROCEDURE A AND B.
   IF ANY QUESTION CONTACT YOUR MACHINE AGENT.
5.1.2 MACHINE DAILY CHECKING SCHEDULE

A. BEFORE STARTING MACHINE

<table>
<thead>
<tr>
<th></th>
<th>VISUALLY CHECK THE APPEARANCE OF THE MACHINE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>CHECK IF ANY OBJECT IS LOCATED WITHIN THE MOVEABLE RANGE OF THE TABLE, SADDLE AND SPINDLE HEAD.</td>
</tr>
<tr>
<td>3</td>
<td>CLEAN THE SPINDLE BORE TAPER AND THE CIRCUMFERENCE OF THE SPINDLE</td>
</tr>
<tr>
<td>4</td>
<td>CHECK THE WIPPERS FOR THE SPINDLE HEAD, SADDLE AND SADDLE SIDEWAYS.</td>
</tr>
<tr>
<td>5</td>
<td>CHECK THE GIBS USED IN X, Y AND Z AXIS.</td>
</tr>
<tr>
<td>6</td>
<td>CHECK THE SIDE WAYS FOR DAMAGE, SCORE OR DEFECTS. IF ANY DAMAGE OR SCORE IS FOUND, FLATTEN USING AN OIL STONE.</td>
</tr>
<tr>
<td>7</td>
<td>CHECK THE TOOL TAPER FOR CLEANLINESS AND CLEAN IF NECESSARY.</td>
</tr>
<tr>
<td>8</td>
<td>CHECK THE TOOL PULL STUD FOR LOOSENED. NOTICE THAT LOOSENED PULL STUD IS VERY DANGEROUS DAILY</td>
</tr>
<tr>
<td>9</td>
<td>CHECK LUBRICATION OIL IN THE LUBRICATION PUMP USING THE FURNISHED LEVEL GAUGE AND REPLENISH IF NECESSARY.</td>
</tr>
<tr>
<td>10</td>
<td>WHEN COOLANT UNIT (OPTION) IS USED, CHECK COOLANT LEVEL USING THE FURNISHED LEVEL GAUGE AND REPLENISH IF NECESSARY.</td>
</tr>
<tr>
<td>11</td>
<td>CHECK COMPRESSED AIR PRESSURE (TO BE 5.5 bar) THROUGH PRESSURE GAUGE INCORPORATED IN THE PNEUMATIC UNIT AND ADJUST IF NECESSARY.</td>
</tr>
</tbody>
</table>

B. AFTER STARTING MACHINE

<table>
<thead>
<tr>
<th></th>
<th>CHECK IF UNUSUAL SOUND, VIBRATION OR HEAT RISE OCCURS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>CHECK THAT LUBRICATION OIL IS SATISFACTORILY GIVEN TO EACH SIDE WAYS. DEPRESS THE INSTANT PUSH BUTTON OF THE LUBRICATION PUMP TO DELIVER OIL IF NECESSARY.</td>
</tr>
<tr>
<td>3</td>
<td>BEFORE STARTING THE OPERATION, LET RUN THE SPINDLE AT A LOW SPEED AND MOVE THE SPINDLE HEAD, SADDLE AND TABLE WITHIN THESE FULL STROKES WITHOUT LOAD FOR 10 - 20 min.</td>
</tr>
</tbody>
</table>

C. WHEN DAILY WORK ENDS

<table>
<thead>
<tr>
<th></th>
<th>WHEN DAILY WORK ENDS, BE SURE TO THOROUGHLY CLEAN THE MACHINE, PARTICULARLY SIDE WAYS. APPLY MACHINE OIL TO THE SPINDLE TAPER TO PREVENT CORROSION. WHEN DAILY WORK ENDS, DO NOT FAIL TO REMOVE THE OIL BEFORE STARTING THE MACHINE.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>WHEN DAILY WORK ENDS, CHECK IF THE CUTTING CHIPS IS TOO MUCH THAT MAYBE EFFECT THE MOVEMENT OF X AND Y AXIS MOVEMENT, USE A EXHAUST (VACUUM) TO CLEAN IT FROM THE FRONT DOOR.</td>
</tr>
</tbody>
</table>
## 5.2 6 MONTH CHECKING

### 6 MONTH CHECKING SCHEDULE

<table>
<thead>
<tr>
<th></th>
<th>CHECK UP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ATC</td>
</tr>
<tr>
<td></td>
<td>GREASE ON MAGAZINE ROTATION AND TOOL POT UP/DOWN PARTS.</td>
</tr>
<tr>
<td></td>
<td>CHECK IF THE ROTATION AND MOVEMENT IS SMOOTHLY.</td>
</tr>
<tr>
<td>2</td>
<td>COUNTERWEIGHT ROLLER CHAIN (OPTION)</td>
</tr>
<tr>
<td></td>
<td>CHECK IF THE ROLLER CHAIN IS IN GOOD CONDITION,</td>
</tr>
<tr>
<td></td>
<td>GREASING TO COUNTERWEIGHT ROLLER CHAIN.</td>
</tr>
<tr>
<td>3</td>
<td>SPINDLE GEAR BOX (OPTION)</td>
</tr>
<tr>
<td></td>
<td>REPLENISH IF OIL LEVEL IS FOUND BELOW THE SPECIFIED LEVEL</td>
</tr>
<tr>
<td></td>
<td>CHECK IF THE GEAR BOX RUNNING SMOOTHLY.</td>
</tr>
<tr>
<td>4</td>
<td>SLIDEWAY GIB</td>
</tr>
<tr>
<td></td>
<td>IN GENERAL PRACTICE, THE ADJUSTMENT SHOULD BE MADE IN 3 MONTHS AND 6</td>
</tr>
<tr>
<td></td>
<td>MONTHS AFTER INSTALLATION. AFTER THAT, CHECK SLIDE WAY LEVEL YEARLY AND</td>
</tr>
<tr>
<td></td>
<td>ADJUST IT IF NECESSARY.</td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>
### 5.3 YEARLY CHECKING

**YEARLY CHECKING SCHEDULE**

<table>
<thead>
<tr>
<th>CHECK UP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
</tr>
<tr>
<td>ATC</td>
</tr>
<tr>
<td>GREASE ON MAGAZINE  ROTATION AND TOOL POT UP/DOWN PARTS.</td>
</tr>
<tr>
<td>CHECK IF THE ROTATION AND MOVEMENT IS SMOOTHLY.</td>
</tr>
<tr>
<td><strong>2</strong></td>
</tr>
<tr>
<td>COUNTERWEIGHT ROLLER CHAIN (OPTION)</td>
</tr>
<tr>
<td>CHECK IF THE ROLLER  CHAIN IS IN GOOD CONDITION,</td>
</tr>
<tr>
<td>GREASING TO COUNTERWEIGHT ROLLER CHAIN.</td>
</tr>
<tr>
<td><strong>3</strong></td>
</tr>
<tr>
<td>SPINDLE GEAR BOX (OPTION)</td>
</tr>
<tr>
<td>REPLENISH IF OIL LEVEL IS FOUND BELOW THE SPECIFIED LEVEL</td>
</tr>
<tr>
<td>CHECK IF THE GEAR BOX RUNNING SMOOTHLY.</td>
</tr>
<tr>
<td><strong>4</strong></td>
</tr>
<tr>
<td>SLIDEWAY GIB</td>
</tr>
<tr>
<td>IN GENERAL PRACTICE, THE ADJUSTMENT SHOULD BE MADE IN 3 MONTHS AND 6 MONTHS AFTER INSTALLATION. AFTER THAT, CHECK SLIDE WAY LEVEL YEARLY AND ADJUST IT IF NECESSARY.</td>
</tr>
<tr>
<td><strong>5</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>6</strong></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
5.4 LUBRICATION OF MACHINE

5.4.1 LUBRICATION

- LUBRICATION IS VERY IMPORTANT AND NOT NEGLIGIBLE TO ASSURE LONG LIFE AND HIGH LEVEL OF ACCURACY OF THE MACHINE.
- SINCE THE MACHINE CENTER IS USUALLY OPERATED CONTINUOUSLY FOR LONG HOURS UNDER HEAVY DUTY AND THERE ARE MANY PARTS THAT REQUIRES LUBRICATION, THE MACHINE EMPLOYS THE LUBRICATION SYSTEM BEST SUITED FOR SUCH APPLICATION, REQUIRING ONLY MINIMUM CARE OF LUBRICATION TO OPERATOR.
- LUBRICATION TO EACH PART OF MACHINE IS AS FOLLOWS:
  
  A. X, Y AND Z AXIS BALL SCREW AND SIDEWAYS ARE FORCIBLY OILED BY LUBRICATION PUMP.
  
  B. GREASE IS APPLIED TO THE COUNTERWEIGHT CHAINS, AND CROSS ROLLER GUIDE WHICH IS INSTALLED FOR ATC CROSSWISE MOVEMENT.
  
  C. FOR ALL OTHER BEARINGS, GREASE SEALED LUBRICATION IS EMPLOYED.

5.4.2 REOILING

IT IS MANDATORY TO MAINTAIN A SUITABLE AMOUNT OF OIL OR GREASE WHERE LUBRICATION IS REQUIRED TO ASSURE TROUBLE-FREE, LONG OPERATION OF THE MACHINE.

BE SURE TO REPLENISH THE HIGH QUALITY, PURE OIL OR GREASE SPECIFIED IN THE LUBRICATION TABLE, AS INSTRUCTED IN THE TABLE.

A. REOILING TO LUBRICATION PUMP TANK

  a. FOR DETAILS ABOUT LUBRICATION PUMP REFER 5.4.2 MAINTENANCE AND ADJUSTMENT OF LUBRICATION PUMP. THE LUBRICATION PUMP TANK (A) AS SHOWN IN FIG. 5.4.1 HAS A CAPACITY OF 4.6 L. WHEN THE POWER SOURCE IS TURNED ON, THE PUMP AUTOMATICALLY STARTS AND DELIVERS OIL TO THE SPEED REDUCTION GEARINGS. THE PUMP IS ADJUSTED BY US AT SHIPPING TO DELIVER OIL AT A RATE OF 6 cc FOR EVERY 15 min.

  b. AS NECESSARY, ADJUST THE RATE IN ACCORDANCE WITH 5.4.2 MAINTENANCE AND ADJUSTMENT OF LUBRICATION PUMP.

  c. WHEN THE PUMP IS LEFT OUT OF OPERATION FOR ANY LENGTH OF TIME, OIL LEVEL GO DOWN IN THE PIPING. THEREFORE, HOLD DOWN THE INSTANT PUSH BUTTON (B) OF THE PUMP BEFORE STARTING THE MACHINE OPERATION, UNTIL SUFFICIENT AMOUNT OF OIL IS DISTRIBUTED TO EACH SIDE WAY.

  d. REPLENISH OIL IN THE TANK TO THE SPECIFIED LEVEL THROUGH THE OIL FILLER HOLE (C) AT THE TOP OF THE TANK WITH A SUITABLE FREQUENCY (USUALLY ONCE TWO WEEKS) THAT DEPENDS ON THE SERVICE CONDITION.
e. If the oil level goes down to one fourth of the specified level, the lamp "Lubrication Level" will lights, immediately replenish oil.

![Diagram of Lubrication Pump Tank](image)

**FIG. 5.4.1 REOILING LUBRICATION PUMP TANK**

**B. REOILING TO LUBRICATOR OF PNEUMATIC UNIT**

Remove the bowl guard as shown in Fig 5.4.2 to replenish oil in the lubricator of pneumatic unit. The lubrication should be filled with oil up to the upper limit of the level gauge (about 80% of lubricator capacity).

Notice: too much oil may cause standstill to the lubricator. Check oil level weekly and replenish oil if necessary.

![Diagram of Lubricator of Pneumatic Unit](image)

**FIG. 5.4.2 REOILING TO LUBRICATOR OF PNEUMATIC UNIT**

**C. GREASING TO AUTOMATIC TOOL CHANGER SYSTEM**

The cross cam mechanism guide (A) as shown in Fig 5.4.3 is used for ATC crosswise movement. The Geneva mechanism (B) as shown in Fig 5.4.3 is used for ATC tool disk rotateing.
TO GREASE, REMOVE ATC MAGAZINE COVER. BE SURE TO
GREASE EVERY 3 MONTHS.
CHECK ATC USER MANUAL FOR MORE INFORMATION.

FIG. 5.4.3 GREASING TO AUTOMATIC TOOL CHANGER SYSTEM
5.5 LUBRICATION TABLE

<table>
<thead>
<tr>
<th>PART TO BE OILED</th>
<th>FREQUENCY</th>
<th>Q'TY</th>
<th>LUBRICANT</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A  LUBRICATION PUMP</td>
<td>1-2 WEEKS</td>
<td>4L</td>
<td>1</td>
<td>CHECK OIL LEVEL IN THE TANK AND REPLENISH IF NECESSARY.</td>
</tr>
<tr>
<td>B  COUNTERWEIGHT ROLLER CHAIN</td>
<td>6 MONTHS</td>
<td>3</td>
<td></td>
<td>BRUSH LUBRICANT.</td>
</tr>
<tr>
<td>C  LUBRICATOR OF PNEUMATIC</td>
<td>WEEKLY</td>
<td>0.17L</td>
<td>2</td>
<td>IMMEDIATELY REPLENISH IF OIL LEVEL IS FOUND BELOW THE SPECIFIED LEVEL</td>
</tr>
<tr>
<td>D  ATC GEAR OIL</td>
<td>EVERY YEAR</td>
<td>5.5 L</td>
<td>2</td>
<td>IMMEDIATELY REPLENISH IF OIL LEVEL IS FOUND BELOW THE SPECIFIED LEVEL</td>
</tr>
<tr>
<td>E  TOOL MAGAZINE</td>
<td>6 MONTHS</td>
<td>3</td>
<td></td>
<td>BRUSH LUBRICANT</td>
</tr>
<tr>
<td>F  SPINDLE GEAR BOX</td>
<td>6 MONTHS</td>
<td>25 L</td>
<td>2</td>
<td>IMMEDIATELY REPLENISH IF OIL LEVEL IS FOUND BELOW THE SPECIFIED LEVEL</td>
</tr>
</tbody>
</table>

5.5.1 APPLICABLE LUBRICANTS

<table>
<thead>
<tr>
<th>LUBRICANT</th>
<th>SHELL</th>
<th>ESSO</th>
<th>MOBIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SHELL TONNAOIL</td>
<td>FEBIS K68</td>
<td>MOBIL VACTRA OIL NO.2</td>
</tr>
<tr>
<td>2</td>
<td>SHELL TURBIN OIL T32</td>
<td>TERESSO 32</td>
<td>MOBIL DTE OIL LIGHT</td>
</tr>
<tr>
<td>3</td>
<td>SHELL ALVANIA GREASE 2</td>
<td>TENPCEX N2</td>
<td>MOBIL UX 2</td>
</tr>
</tbody>
</table>

5.5.2 CAUTIONS ON OILING

- THE FOLLOWING CAUTIONS ARE VERY IMPORTANT WHEN OILING.

A. USE ONLY SPECIFIED OIL OR GREASE WITH SPECIFIED QUANTITY. THE USE OF OIL OR GREASE OTHER THEN SPECIFIED AND TO MUCH AMOUNT OF OIL OR GREASE MAY ADVERSELY AFFECT THE PERFORMANCE OF THE MACHINE.

B. CLEAN THE SIDE WAYS, OIL FILLER HOLES, OIL TANK, ETC. BEFORE POURING OIL AND USE CARE NOT TO POLLUTE OIL WHEN POURING OIL.

C. WHEN POURING OIL, PLACE A FILTER OVER OIL FILLER HOLE TO ELIMINATE DUST AND CONTAMINATOR. IF FILTER IS NOT AVAILABLE, USE A WIRE NET OF 150 MESH OR FINER.

D. SUCCESSIVELY USE THE IDENTICAL OIL OR GREASE. NOTICE THAT THE USE OF OIL HAVING DIFFERENT PROPERTIES MIGHT DEGRADE THE OIL.

E. EVEN WHEN NEW OIL IS DRAINED, AND USED AGAIN FOR REASSEMBLING, REPLACEMENT OF PART OR ANY OTHER REASON, BE SURE TO FILTER THE OIL WHEN POURING THE OIL AGAIN.

F. DO NOT FULLY USE OIL OF OIL CAN, BUT LEAVE A SMALL QUANTITY OF OIL IN THE CAN. THIS CAUTIONS SHOULD BE FOLLOWED TO ELIMINATE MOISTURE AND SEDIMENT FROM OIL.
G. LUBRICATION TANK SHOULD BE CLEAN EVERY 6 MONTH. CLEAN AND QUALIFY OIL IS CONCERNING MACHINE LIFE AND DISTRIBUTER OF OIL PIPING (MIGHT CAUSE STUCK AND SHORT THE MACHINE LIFE)

5.5.3 MAINTENANCE AND ADJUSTMENT OF LUBRICATION PUMP

A. LUBRICATION PUMP WITH A PRESSURE GAUGE AND MANUAL SWITCH FOR MANUAL DISCHARGE. WHEN NECESSARY, THIS PUMP ARE CONTROL BY PLC 30 SECONDS OF RUNNING TIME AND 1000 SECOND OF INTERMITTENT TIME. THIS TIMER WAS BE PRESENTED INSIDE OF CNC PLC. PLEASE REFER TO YOUR LADDER DIAGRAM FOR DETAIL.

B. AS A FLOAT SWITCH WAS EQUIPPED WHEN OIL LEVEL DROOPS. THE LAMP WILL BE LIGHTED AND BUZZER SOUND AND SWITCH TO SINGLE BLOCK AUTOMATICALLY. PLEASE REPLENISH THE OIL FOR CONTINUE OPERATIONS.
5.6 MAINTENANCE AND ADJUSTMENT OF AIR SOURCE AND PNEUMATIC UNITS

THE FOLLOWING MOVEMENT AND FUNCTIONS ARE DRIVEN BY COMPRESSED AIR.

A * SPINDLE TOOL UNCLAMP.
B * SPINDLE AIR BLOW.
C * TOOL POT MOVEMENT (UP / DOWN)
D * SPINDLE TURNING AIR BLOW.
E * COOLANT THROUGH SPINDLE AIR BLOW. (OPTION)

5.6.1 AIR SOURCE

A. THE PNEUMATIC AIR SOURCE.

a. THE PNEUMATIC ARE DESIGNED TO WORK WITH COMPRESSED AIR AT 5.5 bar THERE FOR, USE AN AIR SOURCE AT CONSTANT PRESSURE OF AT LEAST 6 bar.

b. THE PNEUMATIC AIR SOURCE HAS BEEN SET UP BEFORE SHIPPING OUT THE MACHINE.

c. TO ADJUST THE AIR PRESSURE (SEE FIG. 5.6.1) PULL THE STUD (B) ADJUST IT TO 6 bar. IF THE AIR PRESSURES STILL NOT ENOUGH, CHECK THE AIR SOURCE.

d. ALTHOUGH AIR FILTER IS PROVIDED TO PROTECT THE PNEUMATIC LINE, THE AIR FREE FROM MOISTER OIL AND DUST SHOULD BE SUPPLIED, AND PURIFIED BY AIR FILTER OF 5 MICRONS.

e. IT IS SUGGESTED TO ADD A EXTRA MIST SEPARATOR INFRONT OF THE PNEUMATIC AIR SOURCE IF FOUND THE QUATILY OF THE AIR SOURCE CONTANT MUCH MOISTURE.

f. FOR DETAIL OF THE AIR LINE, REFER TO THE AIR CIRCUIT DIAGRAM FIG 6.6.1.

g. THE PNEUMATIC UNIT ( THAT CONSISTS OF AIR FILTER, REDUCTION VALVE, PRESSURE GAUGE, LUBRICATOR, ETC. ) MIST SEPARATOR REDUCTION VALVE AND PRESSURE SWITCH ARE INSTALLED AT THE BACK OF THE MACHINE.

h. THE SOLENOID VALVES AND SPEED CONTROLLER AND EXHAUST CLEANER ARE INSTALLED ON THE TOP OF THE ATC.

i. REFER TO PARTS LIST FOR DETAIL CONNECTION PARTS NO.

B. THE AIR PRESSURE DETECTOR

a. IF THE AIR PRESSURE IS UNDER 6 bar, IT MAY CAUSE THE ERROR MOVEMENT OF THE MACHINE, THE AIR PRESSURE DETECTOR CAN MAKE SURE THE AIR PRESSURE ALWAYS HIGHER THEN 6 bar. IF THE AIR PRESSURE IS UNDER 4 bar, MACHINE ALARMS AND YOU HAVE TO CHECK THE AIR SOURCE.
b. THE AIR PRESSURE DETECTOR HAVE BEEN SET UP BEFORE SHIPPING OUT THE MACHINE.

c. TO ADJUST THE AIR PRESSURE DETECTOR, (SEE FIG. 5.61) ADJUST (E) TO 0 (WITH DRIVE SCREW) AND ADJUST (F) TO 4.

C. SPINDLE TOOL UNCLAMP

a. AIR BLOW ACTIVE WHEN EXCUTE TOOL UNCLAMP.

b. AS FIG 5.6.1 GAUGE (A) ADJUST THE AIR PRESSURE TO 6 bar, PULL THE STUD (B) TO ADJUST.

D. SPINDLE AIR BLOW

a. AIR BLOW ACTIVE WHEN EXCUTE TOOL UNCLAMP.

b. AS FIG 6.6.1 GAUGE (C) ADJUST THE AIR PRESSURE TO 2 bar, PULL THE STUD (D) TO ADJUST.

E. COOLANT THROUGH SPINDLE AIR BLOW

a. AIR BLOW ACTIVE WHEN EXCUTE COOLANT THROUGH SPINDLE.

b. AS FIG 5.6.1 GAUGE (G) ADJUST THE AIR PRESSURE TO 2 bar, PULL THE STUD (H) TO ADJUST.

F. SPINDLE TURNING AIR BLOW

a. AIR BLOW ACTIVE WHEN SPINDLE TURNING.

b. AS FIG 5.6.1 GAUGE (K) ADJUST THE AIR PRESSURE TO 2 bar, PULL THE STUD (L) TO ADJUST.

FIG. 5.6.1 AIR LINE LUBRICATOR
5.6.2 AIR LINE LUBRICATOR (FIG. 5.6.2)

This device supplies lubricating oil, necessary to oil each cylinder and cylinder valve.

A. SETTING UP:
   a. The lubricator should be filled while under level. Just remove the oil fill plug and fill the lubricator to oil level limit line using clean and pure lubricant.
   b. Oil feed rate can be adjusted by the needle stud. Clockwise rotation of the needle stud decreases oil feed rate.
   c. The oil feed rate of air line lubricator has been set up to "10 момент with one drop." Check the drop from the sight dome.

B. MAINTENANCE:

   If oil does not flow from oil drip tube.
   a. Make sure the air installed in the correct direction. If not, reinstall it.
   b. Check the oil level. Adjust oil quantity if the level exceed the limit line or does not reach the end of siphon tube.
   c. If oil leaks around the needle stud check if the needle stud is open excessively, if so, close it to the right position.
   d. Take off bowl guard and check O ring (on the top of the bowl guard), if the O ring is damaged, replace it.
CAUTION: DO NOT USE THE LUBRICATOR NEAR OR IN CONTACT WITH SUCH ORGANIC SOLVENTS AS LACQUER THINNERS, ALCOHOL, ETC., AS THE MATERIALS WILL DAMAGE THE PLASTIC BOWL. IF NECESSARY TO CLEAN THE PLASTIC BOWL, USE NEUTRAL CLEANSER ONLY.

TEMPERATURE AND OPERATING PRESSURE SHOULD NOT EXCEED THE MAXIMUM LIMITS MARKED ON THE LUBRICATOR BOWL.

5.6.3 AIR TANK

RELEASE THE MOISTURE LEASE VALVE IN THE BOTTOM OF THE TANK EVERY WEEK, IF FOUND MANY WATER COMING OUT, CHECK THE QUALITY OF THE INCOMING AIR.

HIGHEST PRESSURE: 10 bar

5.6.4 JOINT AND HOSE

A. AIR HOSE

MARKER: U - KHAN
MODEL: POLYURETHANE 5 X 8 O.D. X I.D. : 8 X 5 mm
MINIMUM BENDING DIAMETER: 55 R mm
TEMP. : -40 0°C - 100 0°C
HIGHEST PRESSURE: 7 bar

B. QUICK-FIT JOINT

MARKER: NIHON LEGRIS
MODEL: CONNECTOR 31750813 ELBOW 31090813

a. EACH PNEUMATIC DEVICE IS CONNECTED WITH NYLON RESIN HOSE AND QUICK-FIT TYPE JOINT IS USED. THE QUICK-FIT TYPE JOINT PERMITS HOSE TO BE IMMEDIATELY CONNECTED ONLY BY INSERTING THE HOSE IN THE JOINT.

b. AFTER THE CONNECTION, MAKE SURE THE CONNECTOR IS SECURELY HELD IN THE COUPLING AND NO LEAKAGE OCCURS.

c. FOR DISCONNECTION OF HOSE, PRESS DOWN THE RING-LIKE PART AND PULL THE HOSE AS FIG. 5.6.3.

FIG. 5.6.3 DISCONNECTING OF HOSE
5.6.5 CIRCUIT DIAGRAM OF AIR SYSTEM

Tool unclamp air blow
打刀吹氣

Tool pot up/down
刀套上下

Tool clamp/unclasp
鎖退刀

O.P
Air blow system for dry cutting
側邊吹氣

Axis bear air blow
軸向軸承吹氣

Spindle turn air blow
旋轉吹氣

Tool unclamp air blow
打刀吹氣

Tool pot up/down
刀套上下

Tool clamp/unclasp
鎖退刀

O.P
Air blow system for dry cutting
側邊吹氣

Axis bear air blow
軸向軸承吹氣

Spindle turn air blow
旋轉吹氣

X軸
Y軸
Z軸
### #40 DIRECT DRIVE SPINDLE AIR SYSTEM PARTS LIST

<table>
<thead>
<tr>
<th>PARTS NO.</th>
<th>DESCRIPTION</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30E-3PCE-5046</td>
<td>ADJUSTABLE PRESSURE FILTER</td>
</tr>
<tr>
<td>2</td>
<td>V2000-2351-100</td>
<td>SOFT START-UP VALVE</td>
</tr>
<tr>
<td>3</td>
<td>5541-3208-100</td>
<td>MUFFLER</td>
</tr>
<tr>
<td>4</td>
<td>V43-2309-100</td>
<td>3 PORT DISTRIBUTION</td>
</tr>
<tr>
<td>5</td>
<td>1000-2411-100</td>
<td>PRESSURE SWITCH</td>
</tr>
<tr>
<td>6</td>
<td>1500-1086-100</td>
<td>ADJUSTABLE PRESSURE VALVE</td>
</tr>
<tr>
<td>7</td>
<td>30E-VM230-02-01S</td>
<td>MECHANICAL VALVE</td>
</tr>
<tr>
<td>8</td>
<td>5541-3205-500</td>
<td>SOLENOID VALVE</td>
</tr>
<tr>
<td>9</td>
<td>5541-3320-200</td>
<td>SOLENOID VALVE</td>
</tr>
<tr>
<td>10</td>
<td>5541-3208-800</td>
<td>MUFFLER</td>
</tr>
<tr>
<td>11</td>
<td>5541-3208-600</td>
<td>MUFFLER</td>
</tr>
<tr>
<td>12</td>
<td>5541-3345-100</td>
<td>SOLENOID VALVE</td>
</tr>
<tr>
<td>13</td>
<td>1000-1203-100</td>
<td>2 PORT DISTRIBUTION</td>
</tr>
<tr>
<td>14</td>
<td>5541-3336-100</td>
<td>AIR COCK</td>
</tr>
<tr>
<td>15</td>
<td>SPRINKLER PIPE</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>VT18-1033-100</td>
<td>AIR CYLINDER</td>
</tr>
<tr>
<td>17</td>
<td>30E-3PCE-5122</td>
<td>AIR FILTER</td>
</tr>
<tr>
<td>18</td>
<td>1051-2603-100</td>
<td>5 PORT DISTRIBUTION</td>
</tr>
</tbody>
</table>
### 5.7 PARAMETER FOR LUBRICATION

<table>
<thead>
<tr>
<th>DGN TIMMER SETTING ADDR’S</th>
<th>DESCRIPTION</th>
<th>DEFAULT SETTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>LUBRICATING RUNNING TIME</td>
<td>19968 (ABOUT 20 sec)</td>
</tr>
<tr>
<td>3</td>
<td>LUBRICATION CYCLE TIME</td>
<td>999984 (ABOUT 17 min)</td>
</tr>
</tbody>
</table>
5.8 ADJUSTMENT OF SLIDEWAY GIBS

WITH TIME, THE SLIDE WAY WEAR AND THEREFORE MUST BE ADJUSTED THROUGH THE GIBS.


IN GENERAL PRACTICE, THE ADJUSTMENT SHOULD BE MADE IN 3 MONTHS AND 6 MONTHS AFTER INSTALLATION. AFTER THAT, CHECK SLIDE WAY LEVEL YEARLY AND ADJUST IT IF NECESSARY.

TO ADJUST SLIDE WAY LEVEL, PROCEED AS FOLLOWS: (AS SHOWN IN FIG. 5.8.1)

A. LOOSEN 3 - 4 TURNS GIB LOCK SCREW.
B. FULLY TIGHTEN GIB ADJUSTING SCREW.
C. LOOSEN ONE TURN THE GIB ADJUSTING SCREW.
D. TIGHTEN THE GIB LOCK SCREW.

NOTICE: THAT TOO TIGHTLY CLAMPED GIB MAY HINDER SMOOTH MOVEMENT, ACCELERATE WEAR AND, IN EXTREME CASE, RESULT IN SEIZURE. WHEN ADJUSTING SLIDE WAY GIBS, PLEASE INFORM OUR SERVICEMAN.

FIG. 5.8.1 ADJUSTMENT OF SLIDE WAY GIBS
### 6 Trouble Shooting

#### Device 1. Air system

<table>
<thead>
<tr>
<th>Status</th>
<th>1.1 Air pressure low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reason 1</td>
<td>Inlet of air pressure to low.</td>
</tr>
<tr>
<td>Reason 2</td>
<td>Air leaking</td>
</tr>
<tr>
<td>Reason 3</td>
<td>Air filter blocked.</td>
</tr>
<tr>
<td>Reason 4</td>
<td>Magnetic valve failure.</td>
</tr>
<tr>
<td>Fix 1</td>
<td>Check the inlet pressure.</td>
</tr>
</tbody>
</table>
| Fix 2 | 1. Check the leaking  
2. Replace the pipe or connector. |
| Fix 3 | Clean the air filter |
| Fix 4 | Replace the magnetic valve. |

#### Device 2. Spindle coolant system

<table>
<thead>
<tr>
<th>Status</th>
<th>2.1 Can not reach the setting temperature.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reason 1</td>
<td>Wrong setting.</td>
</tr>
<tr>
<td>Reason 2</td>
<td>Filter blocked.</td>
</tr>
<tr>
<td>Reason 3</td>
<td>Cycling coolant oil not enough.</td>
</tr>
<tr>
<td>Reason 4</td>
<td>Refrigerative not enough.</td>
</tr>
<tr>
<td>Fix 1</td>
<td>Set the temperature difference to -2 (compare with room temperature)</td>
</tr>
<tr>
<td>Fix 2</td>
<td>Clean the filter.</td>
</tr>
</tbody>
</table>
| Fix 3 | 1. Refill the coolant oil  
2. Check if oil pipe leaking. |
| Fix 4 | 1. Refill Refrigerative.  
2. This operation need to be done by certificate technical person.  
**Warring!! Do not operate by yourself.**  
3. Call your machine agent for replacement. |

#### Device 2.2 Motor overload

| Reason 1 | Overload of motor protective switch |
| Reason 2 | Motor defective |
| Reason 3 | Wrong power inlet phase |
| Fix 1 | 1. Check motor protective switch  
2. Check oil pipe  
3. Check oil |
| Fix 2 | Check motor power line isolation |
| Fix 3 | Change power inlet phase |

#### Device 3. Chip Flush and coolant

<table>
<thead>
<tr>
<th>Status</th>
<th>3.1 Coolant flow rate to low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reason 1</td>
<td>Coolant filter blocked.</td>
</tr>
</tbody>
</table>
### 3.2 Function failed

<table>
<thead>
<tr>
<th>Reason</th>
<th>Fix 1</th>
<th>Fix 2</th>
<th>Fix 3</th>
<th>Fix 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Clean the filter</td>
<td>Check if any leaking or blocked of the pipe.</td>
<td>Check motor protective switch</td>
<td>Change power inlet phase</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Chip jammed, clean the filter, remove the chip</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 4. Coolant through spindle

#### 4.1 Coolant flow rate to low

<table>
<thead>
<tr>
<th>Reason</th>
<th>Fix 1</th>
<th>Fix 2</th>
<th>Fix 3</th>
<th>Fix 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Clean the filter</td>
<td>Check if any leaking or blocked of the pipe.</td>
<td>Shuttle valve is on the top of the spindle over the tool clamping cylinder. (check parts list for detail)</td>
<td>C.T.S. connector is on the top of the spindle. (check parts list for detail)</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td>there are two inlet on the top and one outlet on the side.</td>
<td>check if the connector breakdown. (bracken or change shape) change a new one.</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td>test with air blow from one of the inlet and check if there is leaking from another inlet.</td>
<td>if the connector is dirt and stocked, clean it and reassemble. (in this case be ware to check the filter in the C.T.S. coolant tank)</td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### 4.2 Function failed

<table>
<thead>
<tr>
<th>Reason</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Wrong tool shank and stud.</td>
</tr>
<tr>
<td>Reason</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>2</td>
<td>Low coolant level</td>
</tr>
<tr>
<td>3</td>
<td>Overload of motor protective switch</td>
</tr>
<tr>
<td>4</td>
<td>Motor defective</td>
</tr>
<tr>
<td>5</td>
<td>Wrong power inlet phase</td>
</tr>
<tr>
<td>6</td>
<td>Level sensors fault</td>
</tr>
</tbody>
</table>

| Fix 1       | Must use tool shank and stud for coolant through spindle. |
| Fix 2       | Refill the coolant.                                  |
| Fix 3       | 1. Check motor protective switch                    |
|            | 2. Chip jammed, clean the filter, remove the chip   |
|            | 3. Check coolant pipe                               |
| Fix 4       | Check motor power line isolation                   |
| Fix 5       | Change power inlet phase                           |
| Fix 6       | Check level sensors                                |

### 5. Chip conveyor

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>Noise or running not smooth</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reason</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chip stock on the conveyor.</td>
</tr>
<tr>
<td>2</td>
<td>Conveyor screw change shape. (spiral type)</td>
</tr>
</tbody>
</table>

| Fix 1     | 1. Machine Power off.                            |
|           | 2. Check and clean the chip stock in the conveyor. |
| Fix 2     | 1. Machine power off                             |
|           | 2. Take off the screw and try to recover the shape. |
|           | 3. If screw can not recover, contact your machine agent. |

### 6. Vacuum dust collector

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1</td>
<td>Weak vacuum power</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reason</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Vacuum filter blocked.</td>
</tr>
<tr>
<td>2</td>
<td>Vacuum pipe leaking.</td>
</tr>
</tbody>
</table>

| Fix 1     | Clean the filter.                               |
| Fix 2     | 1. Check the vacuum pipe.                       |
|           | 2. Replace if necessary.                        |

### 6.2 Function failed

<table>
<thead>
<tr>
<th>Reason</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Overload of motor protective switch</td>
</tr>
<tr>
<td>2</td>
<td>Motor defective</td>
</tr>
<tr>
<td>3</td>
<td>Wrong power inlet phase</td>
</tr>
</tbody>
</table>

| Fix 1     | 1. Check motor protective switch                 |
|           | 2. Powder jammed, clean the filter, remove the powder |
| Fix 2     | Check motor power line isolation                 |
| Fix 3     | Change power inlet phase                         |