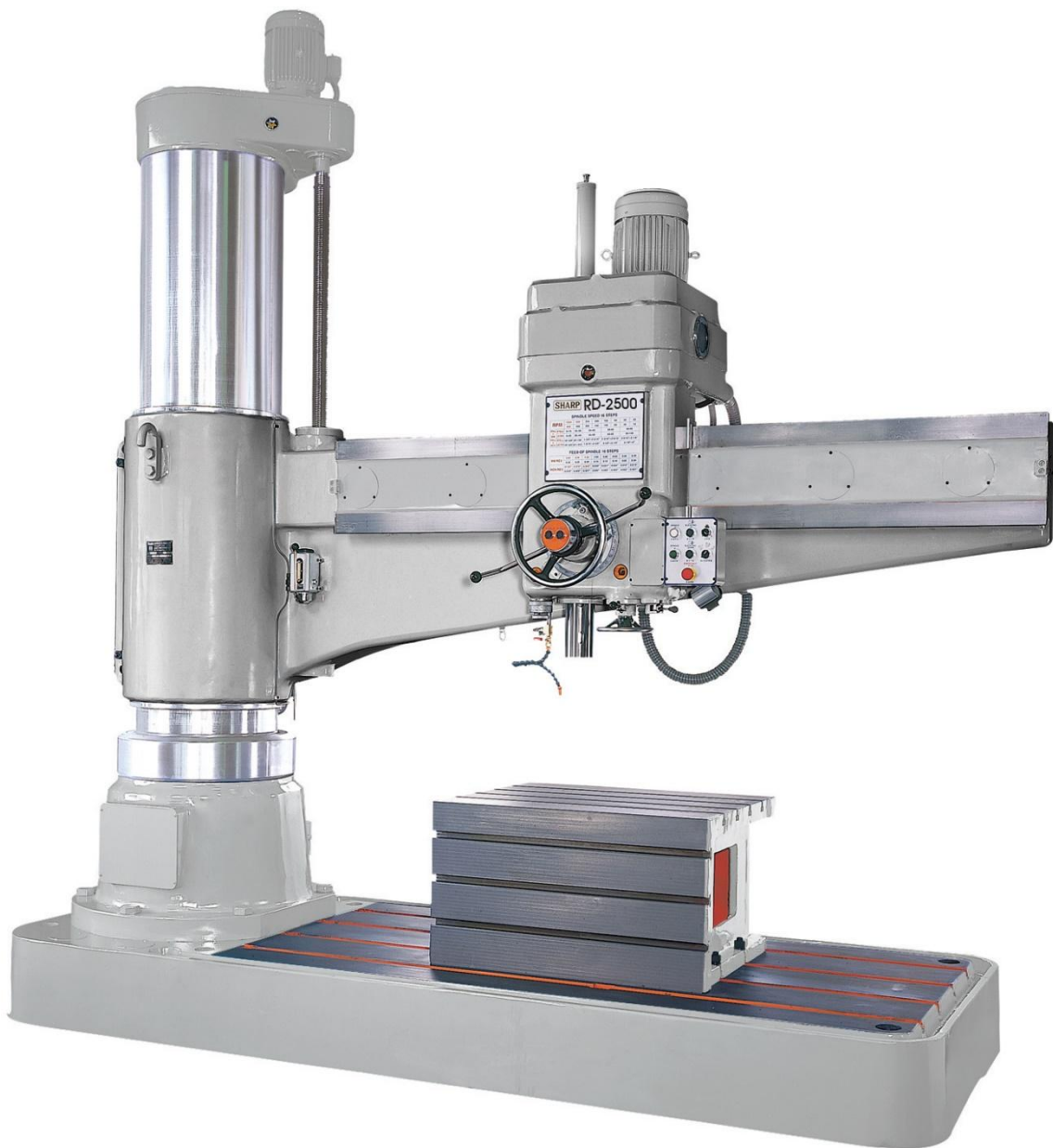


SHARP

RADIAL DRILLS

RD-2500 OPERATION MANUAL



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CHAPTR 1

Safety Guidelines

1.1 Please follow the below basic safety principles :

- (1) Have only sophisticated or experienced personal perform the machine operation or maintenance.**
- (2) Please read and understand the operation manual thoroughly before operation.**
- (3) Please place the manual close to the machine for easy access.**
- (4) Please have only authorized person keep the keys to the machine.**
- (5) All operation and maintenance personnel need to know the location of the emergency switch, its function and operation.**

1.2 Precautions for the transportation and installation.

- (1) Please make sure that the floor is solid enough to support the machine.**
- (2) Only one person is allowed to lift and move the machine for safety reason.**
- (3) When lifting and moving, Nobody is allowed to be under or near the machine.**
- (4) Please wear protective helmet when moving, installing or clearing the machine.**
- (5) All levers, which tighten, need to be tightened.**
- (6) If the moving object weighs over 25kgs, Please use only proper movement equipment for it.**
- (7) Please make sure that the slings are strong enough to lift the machine or the subjects.**
- (8) Please power off before movement and installation. If necessary to power on, please let other persons know the location of the emergent stop.**
- (9) Please put on leather gloves or similar protective equipments when moving, installing or clearing the machine.**

1.3 Precautions for operation:

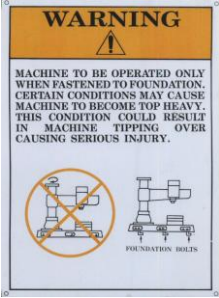




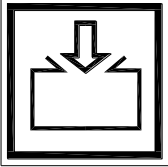
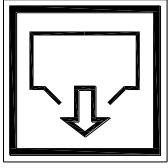

- (1) Please don't remove any protection guard or any safety installation.**
- (2) Please don't remove or alter any location of the limit switches, restraint blocks or interlocking mechanisms.**
- (3) Don't touch any switch with wet hand.**
- (4) Please don't put any part of your body on the moving parts of the machine or near to them.**
- (5) The operation person have better no long hair, if it is impossible, please have it coiled in a topknot and wear a safety helmet.**
- (6) Please wear no hand ring, watch, pearls or loose clothes. Operation should wear a safety clothes.**
- (7) Please wear no slippery shoes while operating.**
- (8) Wearing gloves is needed when loading and unloading material.**
- (9) Only one person is allowed to operate the machine.**
- (10) While operation, Debris may fly off. So please wear a protective mask to prevent from being injured.**
- (11) Please power off after work.**
- (12) Please wear a gauze mask if you are working, using cutting fluids.**
- (13) Please don't use the machine in a explosive environment.**
- (14) A risk of being squeezed is composed when the gearbox and the arm are descending or the spindle is descending to the worktable. (The arm screw moves at a low speed of 0.8 m/min.)**
- (15) Operator should stand in front of the machine. That's the operation position.**

1.4 Precautions for checking and maintenance.

- (1) Please power off first before performing maintenance or checking job.**
- (2) Only have authorized electric technician carry out maintenance or checking job when Power-on is needed in it**
- (3) Please power off after work.**
- (4) Adding or replacing hydraulic oil or lubricant, Please use Tailift recommended oil type or its equivalent. For details, please refer to the chapter 7.**
- (5) Basically, only one person is needed to serve. If more than one person is called for, Good communications is required.**
- (6) Please power off first before getting rid of the iron filings or cleaning the machine.**

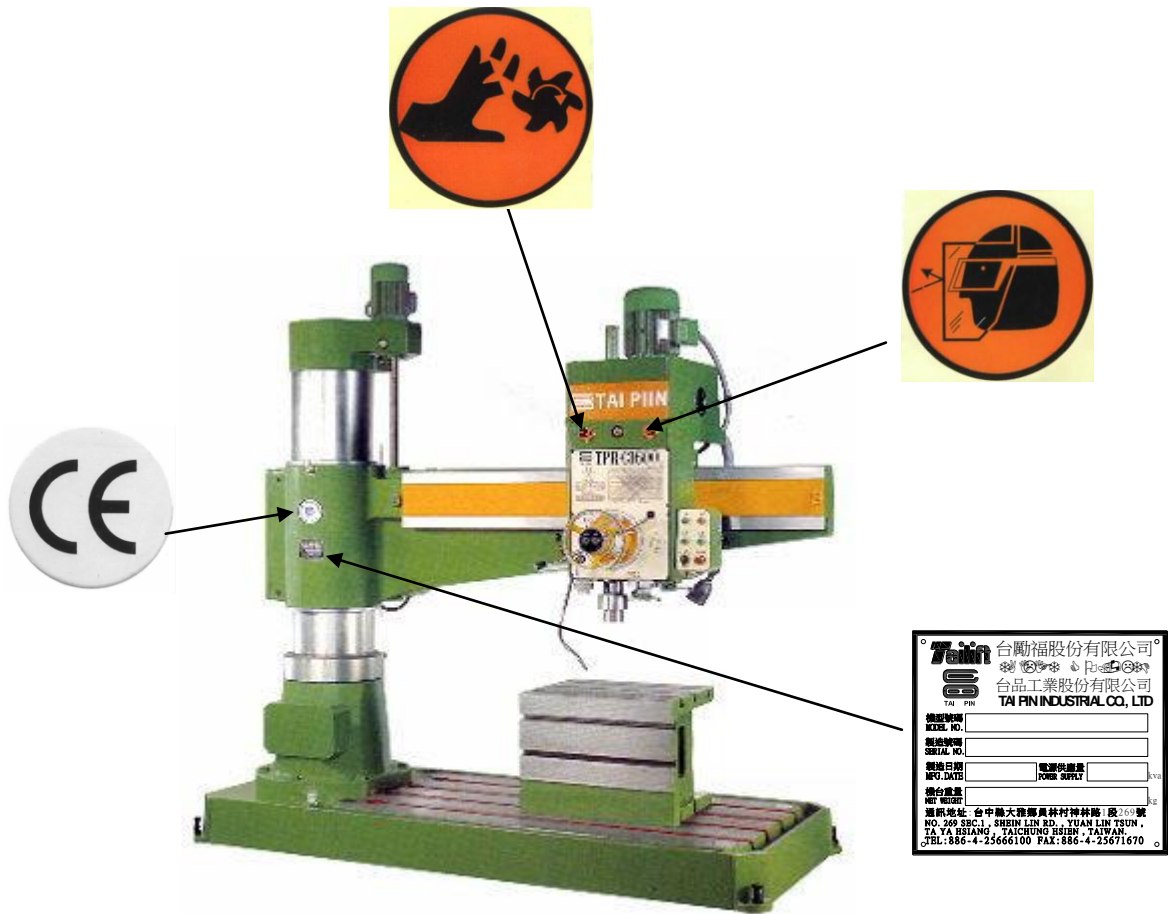
1.5 Warning labels and mark on the machine.

1.5.1 Warning labels and mark introduction

labels	Description
	<p>Please secure the machine with the base fixing bolts, to prevent from any risk.</p>
	<p>Model of a machine.</p>
	<p>Please watch out the running tools.</p>
	<p>Please operators wear a protective glasses during work.</p>
	<p>CE Mark (option)</p>
	<p>Oil filler position.</p>
	<p>Oil drain outlet position.</p>
	<p>Risk of high voltage.</p>

1.5.2 Warning Labels and mark positions

(a) Front view(For TPR-C1250A,TPR-C1600)



Front view(For TPR-C2500)

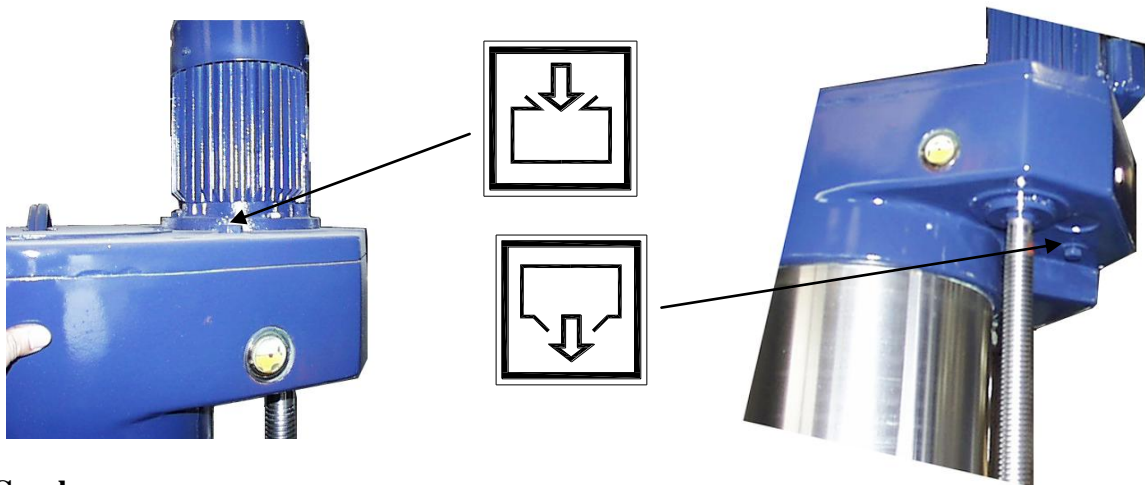


(b) Real view

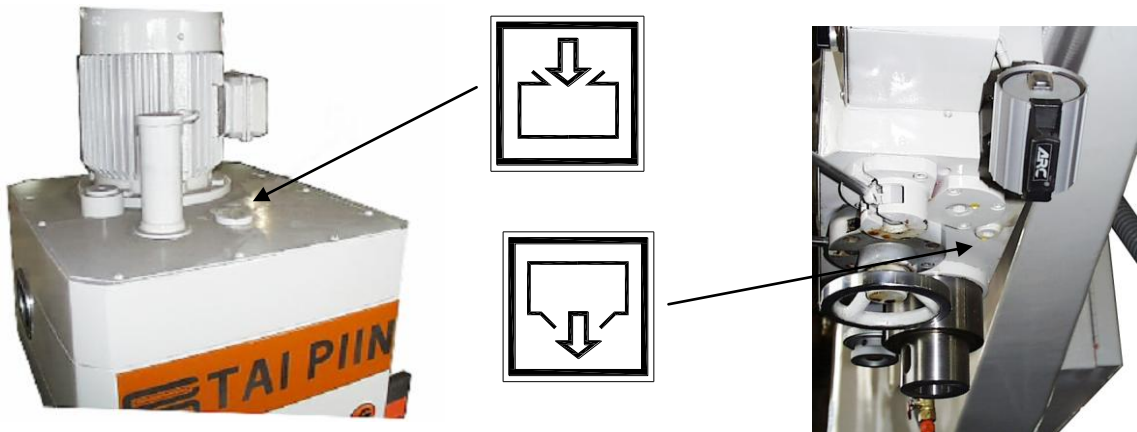


(C) Oil filler position and Oil Drain outlet position

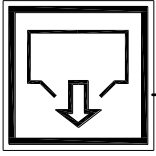
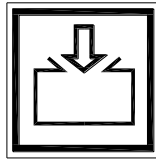
- Arm elevating motor



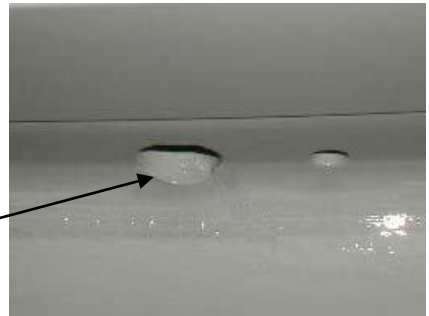
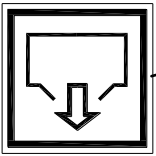
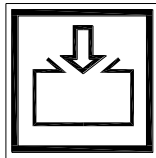
- Gearbox



- **Hydraulic oil pump**



- **Hydraulic oil pump for C2500**



CHAPTER 2

General Specifications

2.1 The anticipated machine life.

The calculation of the anticipated machine life:

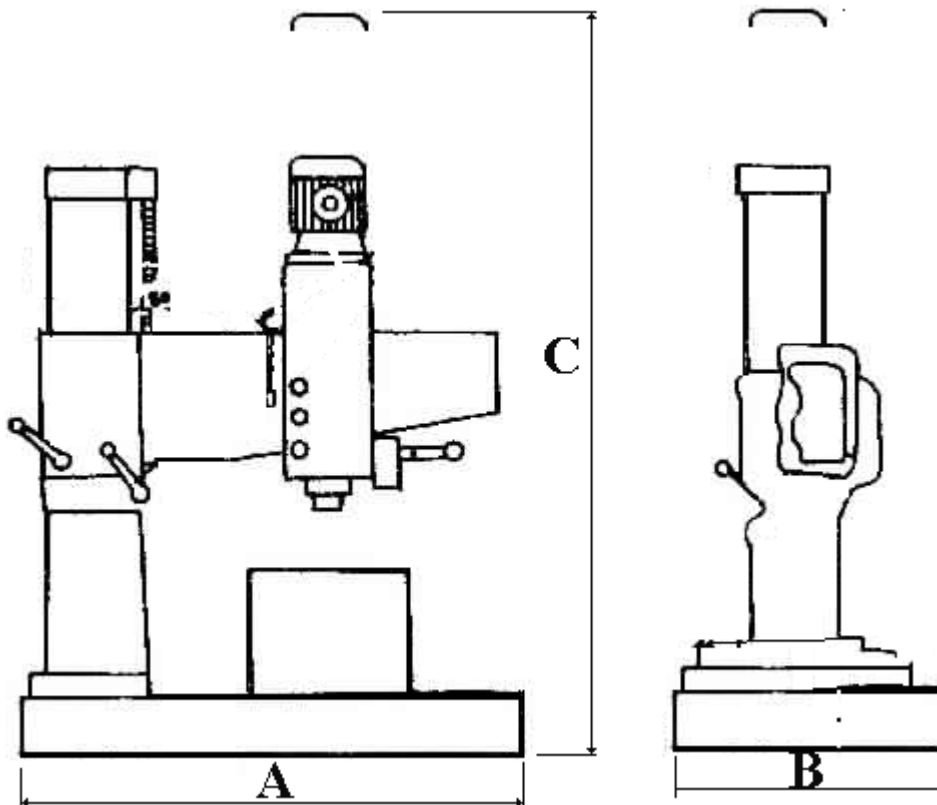
8 hours x 6 days x 50 weeks x 10 years = 24000 hours.

The above calculation is based on a sound maintenance and normal condition, excluding wearing parts.

2.2 Machine dimensions.

The following are the machines' dimensions and its diagrams.

Models	A	B	C
TPR-C1250A	2030mm	980mm	2810mm
TPR-C1600	2380mm	980mm	2810mm
TPR-C2500	3540mm	1400mm	3990mm



2.3 The machine

2.3.1 Description

Radial drills are purposely designed to process bulky objects. Tailift has 20 years of history and experience in behind. It knows radial drills certainly very well.

Tailift radial drills will be your best choice. The material that the machine can process on are : mild steel, metal, stainless steel, cast iron, aluminum, copper,,,, etc, except magnesium alloy. (Note 1)

Note 1: Processing magnesium alloy may cause fire.

2.3.2 Parts (For TPR-C1250A, TPR-C1600, TPR-C2500)

There are six categories of parts on the radial drill: Gearbox, Arm, Column, Top Cover, Box Table and Base. The following are its description and locations.



- | | |
|--------------|---|
| 1. Base | The main aim of the base is to support the whole weight of the machine. In addition, the cutting fluid is contained here and the Box Table is installed on. |
| 2. Gear box | It is the core part for the radial drill for all procession is finished here, like speed switch, auto feed, spindle,,, etc. They are inside of the gearbox. |
| 3. Arm | It is to support the gearbox and is connected with the column. |
| 4. Column | It is to support the gearbox and the arm. It connects the base. |
| 5. Top Cover | It is on the top of the machine, where there is a motor. The motor is to run the gearbox, rise and lower the arm. |
| 6. Box table | Working with clamps, it enables to reach the required accuracy. |

2.4 Specifications.

2.4.1 TPR-C1250 Specification.

TPR-C1250A	
The Column diameter	350mm
Distance from the column surface to the spindle center, max	1250mm
Distance from the column surface to the spindle center, min	350mm
Horizontal travel of the Spindle head.	900mm
Distance from the Base surface to the Spindle end, max.	1220mm
Distance from the Base surface to the Spindle end, min.	340mm
Elevating height of the Arm.	565mm
Effective area of the Box Table.	635mm×500mm×500mm
The dimensions of the Base (L×W×H)	2030mm×980mm×205mm
Taper hole of the Spindle.	MT#5
Stroke of the Spindle.	315mm
R.P.M. of the Spindle. (rounds / min. × step)	25 - 2000 sixteen steps
Feed rate of the Spindle (MM / round × speed)	0.04 – 3.2 sixteen steps
Horse Power of the main motor.	3.75KW(5HP)
Horse Power of the elevating motor.	1.5KW(2HP)
Horse Power of the cooling pump motor.	0.1KW(1/8HP)
Horse Power of the clamp device.	0.75KW(1HP)
The machine height from floor, max.	2810mm
Height from the Column top to floor	2600mm
Net weight (approx.) kgs	3000kg
Shipping Gross weight. (approx.) kgs	3540kg
Shipping dimensions(L×W×H)	2235mm×1220mm×2540mm

The max. processing capacity.

Drilling	Steel	Ø50
	Cast iron	Ø60
Tapping	Steel	Ø45
	Cast Iron	Ø55

2.4.2 TPR-C1600 Specification.

TPR-C1600	
The Column diameter	350mm
Distance from the column surface to the spindle center, max	1600mm
Distance from the column surface to the spindle center, min	350mm
Horizontal travel of the Spindle head.	1250mm
Distance from the Base surface to the Spindle end, max.	1220mm
Distance from the Base surface to the Spindle end, min.	340mm
Elevating height of the Arm.	565mm
Effective area of the Box Table.	630mm×500mm×500mm
The dimensions of the Base (L×W×H)	2380mm×980mm×205mm
Taper hole of the Spindle.	MT#5
Stroke of the Spindle.	315mm
R.P.M. of the Spindle. (rounds / min. × step)	25 - 2000 sixteen steps
Feed rate of the Spindle (MM / round × speed)	0.04 – 3.2 sixteen steps
Horse Power of the main motor.	3.75KW(5HP)
Horse Power of the elevating motor.	1.5KW(2HP)
Horse Power of the cooling pump motor.	0.1KW(1/8HP)
Horse Power of the clamp device.	0.75KW(1HP)
The machine height from floor, max.	2810mm
Height from the Column top to floor	2600mm
Net weight (approx.)kgs	3500kg
Shipping Gross weight. (approx.)kgs	4100kg
Shipping dimensions(L×W×H)	2640mm×1220mm×2540mm

The max. processing capacity.

Drilling	Steel	Ø50
	Cast iron	Ø60
Tapping	Steel	Ø45
	Cast Iron	Ø55

2.4.3 TPR-C2500 Specification.

TPR-C2500	
The Column diameter	550mm
Distance from the column surface to the spindle center, max	2500mm
Distance from the column surface to the spindle center, min	500mm
Horizontal travel of the Spindle head.	2000mm
Distance from the Base surface to the Spindle end, max.	2000mm
Distance from the Base surface to the Spindle end, min.	550mm
Elevating height of the Arm.	1000mm
Effective area of the Box Table.	1000mm×800mm×560mm
The dimensions of the Base (L×W×H)	3540mm×1400mm×320mm
Taper hole of the Spindle.	MT#6
Stroke of the Spindle.	450mm
R.P.M. of the Spindle. (rounds / min. × step)	16-1250 sixteen steps
Feed rate of the Spindle (MM / round × speed)	0.04 – 3.2 sixteen steps
Horse Power of the main motor.	7.5KW(10HP)
Horse Power of the elevating motor.	3.75KW(5HP)
Horse Power of the cooling pump motor.	0.1875KW(1/4HP)
Horse Power of the clamp device.	0.75KW(1HP)
The machine height from floor, max.	3990mm
Height from the Column top to floor	3850mm
Net weight (approx.)kgs	11000kg
Shipping Gross weight. (approx.)kgs	12500kg
Shipping dimensions(L×W×H)	4000mm×1700mm×3850mm

The max. processing capacity.

Drilling	Steel	Ø80
	Cast iron	Ø100
Tapping	Steel	Ø65
	Cast Iron	Ø75

2.5 Standard and Option Accessories.

(1) Standard Accessories:

- a. Adjusting tools (including tool box)
- b. Cooling equipment (including pump)
- c. Lighting installation (including fluorescent lamp)
- d. Box table

(2) Option Accessories:

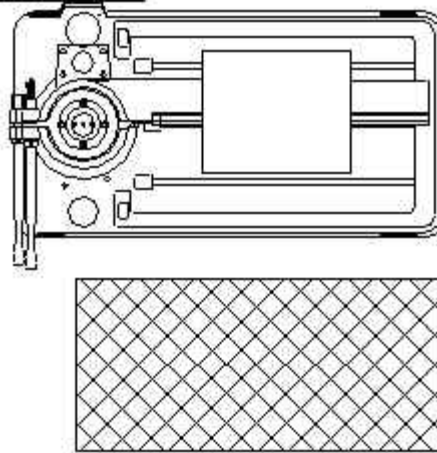
- a. Tilt worktable

2.6 Operation position and noise level.

2.6. Operation position: about 1 meter far from the gearbox surface.

1

Height: 1.6 meter from the ground.



2.6.2 The noise level.

(1) Before being processed,

When the turning speed is 1500 rpm, the noise level is 82 dB(A).

When the turning speed is 88 rpm, the noise level is 79 dB(A).

(2) When processing with tools,

The test conditions are as follow:

Material : SS41

Thickness : 32mm

The tool diameter : \varnothing 32mm

When the turning speed is 88rpm and the feed rate is 0.09 mm, the noise level is 82 dB(A).

When the turning speed is 88rpm and the feed rate is 0.05 mm, the noise level is 80 dB(A).

CHAPTER 3

Preparation to Install

3. Preparation before install.

3.1 Space and room requirement.

3.1.1 Floor requirement.

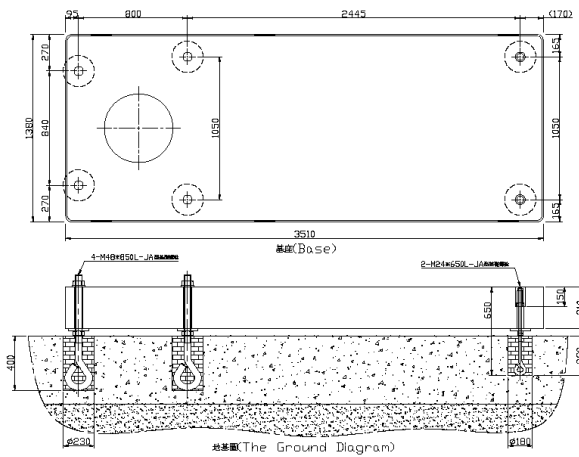
Using this machine requires solid and well-structured floor and its good level.

Note:

1. For adjusting level, please refer to the chapter 6.
2. Adjusting level is needed before using this machine. The level adjusting tolerance must be within 1 mm/m.

TPR-C2500 floor diagrams. (Unit : mm)

1.

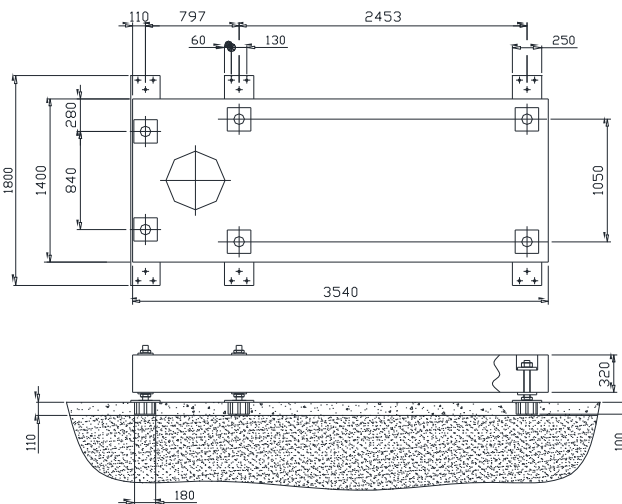


The Ground Diagram

The above diagrams are for the bases and ground bolts, as well as its relative positions of TPR-C2500.

TPR-C2500 floor diagrams. (Unit : mm)

2.

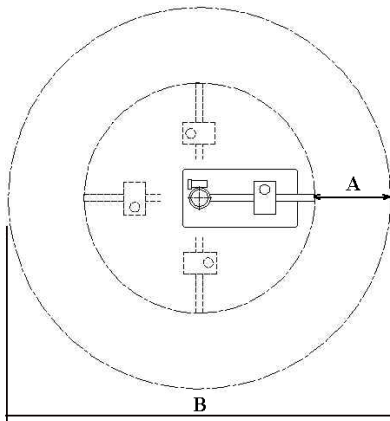


The Ground Diagram

The above diagrams are for the bases and ground bolts, as well as its relative positions of TPR-C2500.

3.1.2 Space requirement.

For safety reason, Path must be considered when installing. For space, it requires:



Its calculation is the area of the arm rotating 360 degree, the most outer circle and plus 1000mm. Different models has different dimensions.

Model	The distance from the column center to the arm limit.	Plus maintenance area (A)	Total space requirement (B)
TPR-C1250A	1770mm	1000 mm	5540mm
TPR-C1600	2145mm	1000 mm	6290mm
TPR-C2500	3200mm	1000mm	8000mm

3.2 Environment requirement.

- Never put the machine in the places where sun shines directly on it.
- Temperature: normal range is between +5°C and 40°C .
- Humidity: between 30% and 95%. At the max. temperature 40°C , The relative humidity should not be over 50%. And at the relative lower temperature, higher humidity is acceptable. I.g. at temperature 20°C , humidity 90% is fine.
- Please keep the machine away from gasoline, chemical substances, dust, acid, sulfides, magnetic interference and explosive environment.
- Please keep the machine away from the electrical interference source like welding machine and EDM.
- The installation ground must be flat.
- The illumination of the work area: greater than 500 lux.
- Good ventilation.
- Please take care there is no hydraulic splash to prevent from anyone slipping tripping and falling in danger.

3.3 Power supply requirement.

- Acceptable voltage fluctuation : normally $\pm 10\%$ vlt.
- Acceptable frequency fluctuation : $\pm 1\text{HZ}$ (50/60HZ)
- Acceptable momentary power-off duration: less than 10m.sec
- Acceptable voltage impulse
The Peak value : 200% or less than the line voltage of the actual value(rms. value)
Duration: 1.5m.sec or less
- Acceptable AC voltage of the waveform distortion.
- Acceptable imbalance of the line voltage: 5% or less

g. Power capacity table

TPR-C1250A&TPR-C1600

Main Motor	3.75Kw
Elevating Motor	1.5Kw
Hydraulic Motor	0.75Kw
Coolant Pump Motor	0.1Kw

The total power requirement should be 8.13 KVA

TPR-C2500

Main Motor	7.5Kw
Elevating Motor	3.75Kw
Hydraulic Motor	0.75Kw
Coolant Pump Motor	0.1875Kw

The total power requirement should be 16.25 KVA

3.4 Electric system calculation

a) All motors capacity

TPR-C1250A&TPR-C1600

$$\begin{aligned} \text{Capacity} &= 3.75+1.5+0.75+0.1 \\ &= 6.1 \text{ kw} \end{aligned}$$

TPR-C2500

$$\begin{aligned} \text{Capacity} &= 7.5+3.75+0.75+0.1875 \\ &= 12.1875 \text{ kw} \end{aligned}$$

b) Current calculation

TPR-C1250A&TPR-C1600

■ Input voltage 220V with full load current

$$I = \text{KVA} * 1000 / (3^{1/2} * E) = 21.34 \text{ A}$$

■ Input voltage 380V with full load current

$$I = \text{KVA} * 1000 / (3^{1/2} * E) = 12.36 \text{ A}$$

TPR-C2500

■ Input voltage 220V with full load current

$$I = \text{KVA} * 1000 / (3^{1/2} * E) = 42.65 \text{ A}$$

■ Input voltage 380V with full load current

$$I = \text{KVA} * 1000 / (3^{1/2} * E) = 24.69 \text{ A}$$

c). The minimum wire diameter in the system capacity and safety current carrying calculation:

The safety current carrying of the minimum wire diameter shall be able to pass the maximum motor current rate 1.25 times and the sum of the other motors' current rate.

Maximum current rate 13.5A(26.5A) for a maximum motor 3.75(7.5) kW:

$$13.5 \times 1.25 = 16.89 \quad (\text{TPR-C1250A\&TPR-C1600})$$

$$26.5 \times 1.25 = 33.11 \quad (\text{TPR-C2500})$$

Other load

TPR-C1250A\&TPR-C1600

$$6.1 - 3.75 = 2.35 \text{ kW}$$

$$2.35 \times 1.3 = 3.13 \text{ KVA}$$

TPR-C2500

$$12.1875 - 7.5 = 4.6875 \text{ kW}$$

$$4.6875 \times 1.3 = 6.25 \text{ KVA}$$

TPR-C1250A\&TPR-C1600

$$I = (3.13 \times 1000) / (1.732 \times 220) = 8.22 \text{ A (The input voltage of other load is 220V)}$$

Safety current carrying 16.89 + 8.22 = 25.11 A (input voltage 220V)

14.54 A (input voltage 380V)

TPR-C2500

$$I = (6.25 \times 1000) / (1.732 \times 220) = 16.4 \text{ A (The input voltage of other load is 220V)}$$

Safety current carrying 33.11 + 16.4 = 49.52 A (input voltage 220V)

28.67 A (input voltage 380V)

d). Selection of the main switch (power supply disconnecting device):

Based on the calculation of safety current carrying, the main switch of 25.11(49.52) A is selected.

e). The cross-sectional area of copper conductor:

According to ICE 364-5-523 (or EN 60204-1 14.6), the minimum cross-sectional area should be above 5.5(8) mm². Therefore incoming supply conductor of 5.5(8) mm² is selected.

f). The cross – sectional area of protective conductors:

According to EN 60204-1 chapter 5.2, 5.5(8)mm² is selected.

CHAPTER 4

Transportation and Installation.

4.1 Disassembly and packaging.

4.1.1 General

Electrical equipment should be designed to stand transportation and storage under the temperature between -25°C and $+55^{\circ}\text{C}$. If this is impossible, proper measurements must be taken to endure the high temperature. The criteria for this measurement is that it can withstand the affection of the high temperature of $+70^{\circ}\text{C}$ within 24 hours. Other considerations like to prevent damage from vibration or shock must be also given.

4.1.2 Packaging.

When sold and being shipped to customer's plant, The machine needs to be packaged and fastened in place.



- a. The way to fasten the machine is illustrated as above diagram.
- b. Press the “LOCK” button to lock 1、2 & 3 position.
- c. 4 is a wooden block : Due to its weight, it might lose its accuracy during transportation. It is to support the weight of the Arm and prevent from collision each other when test running. (Please don't move it when unpacking.)
- d. The block is added to help the Column support the Gearbox.
- e. 5 is a fastening screw. : When being packaged, the machine needs to be fastened with screws. Otherwise, the machine might move during transportation and make the center of the gravity slant, therefore bring the risk that the machine falls.
- f. 6 is the wooden crate base : It will ease the movement by a forklift.

Precaution:

All levers must be tightened. Please refer to the chapter 1, regarding the transportation.

The follow is packaged of size:

MODEL	LENGTH	WIDTH	HIGHT
TPR-C1250A	2235mm	1220mm	2540mm
TPR-C1600	2640mm	1220mm	2540mm
TPR-C2500	4000mm	1700mm	3850mm

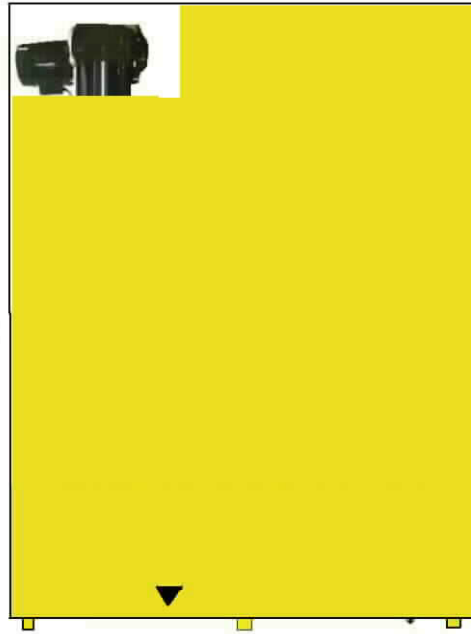
4.2 Transportation.

4.2.1 The diagram of the machine weight and its gravity center.

The weight differ due to the different models. Their data is as blow:

MODEL	TPR-C1250A	TPR-C1600	TPR-C2500
Total Weight	3540 kgw	4100 kgw	12500 kgw
Required Forklift	5 tons	5 tons	12 tons

Note: Please make sure that the forklift tonnage is suitable for the machine.

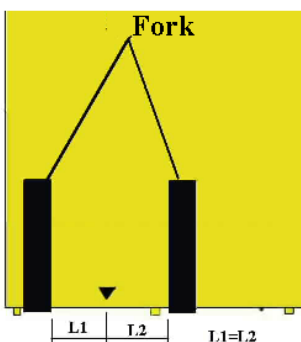


The above arrow pointed place is the machine's gravity center. It is about 200 mm far from the Column, measured from the middle of the wooden crate.

4.2.2 The movement of the machine.

The following ways to move the machine. Using forklift:

The following is the procedure, precaution and illustration for moving the machine with forklift.

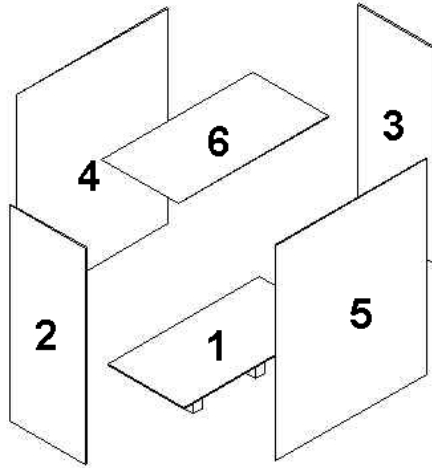


- Have a suitable forklift move to the wooden crate.
- As diagram shown, insert two forks into the underneath of the wooden crate.
- Adjust the distance from the forks to the gravity center till L1 is equal to L2. (L1 & L2=450mm)
- Have forks fully inserted into the underneath of the wooden crate.
- Have the machine fastened to the forks and forklift, using metal chain or wire.

Precaution :

- Forks must be fully inserted.
- L1 must be equal to L2 so that the machine can be in balance.

4.2.3 The order to pack



Please pack according the following procedure:

1.	Place the base plate 1 under the machine and have both the plate and the machine fastened with bolts.
2.	Install the side plate 2.
3.	Install the side plate 3.
4.	Install the side plate 4.
5.	Install the side plate 5.
6.	Install the top plate 6 and pack it.

4.3 Installation of the machine.

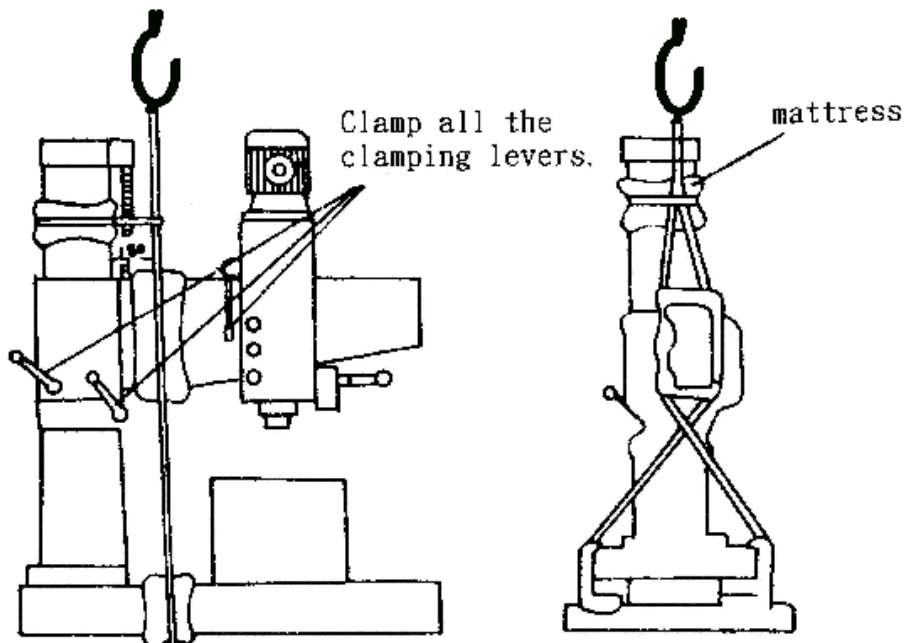
4.3.1 Have the machine set onto the fastening bolts of the crate base.

(1) Tools

Sling, lifting equipment, spanner, movement plate(mattress), insertion blocks and level adjusting blocks.

(2) Procedure

- a. After dismantling the wooden crate, get the manuals and tool box out.
- b. Remove the fastening bolts.
- c. Hook it using sling, lift it up and move to site for installation.
- d. Align the ground bolts and the base bores and set the later onto them. Meanwhile, have the level adjusting blocks inserted to the underneath of the level adjusting bolts.
- e. Remove the lifting equipment and slings.
- f. Have nuts for the ground bolts mounted.



4.3.2 Level adjusting.

(1) Tools

- a. A level scale, with tolerance within 0.02mm/m
- b. Spanners, Level adjusting blocks.

(2) Procedure

- a. Please adjust the level adjusting bolts to contact the level adjusting blocks.
- b. Have the level scale put on the worktable.
- c. Locate the peak point using the level scale and make it as a reference level.
- d. Adjust the tolerance of the level adjusting bolts to be within one grad using the level adjusting scale.



1.	The level adjusting bolts.
----	----------------------------

4.3.3 The installation of the electricity.

- a. Prepare long enough wire. (about 30 meters). The diameters for all the models are as follows:
- b. Connect L1、L2 and L3 to the main power switch.
- c. Connect the ground wire to PE base.

Note: The following are the main power switches and its other relating data.

Item	Power supply AC±10%3Φ 50/60HZ									Power equipment capacity (KVA)
	Cross-sectional area of phase conductors supplying the equipment (mm ²)					Rated current (A)				
	220V	380V	415V	440V	PE	220V	380V	415V	440V	
TPR-C1250A	3.5	3.5	3.5	3.5	3.5	25.11	14.54	13.31	12.55	8.13
TPR-C1600	3.5	3.5	3.5	3.5	3.5	25.11	14.54	13.31	12.55	8.13
TPR-C2500	8	5.5	5.5	5.5	5.5	49.52	28.67	26.25	24.76	16.25

4.4 The test after installation.

- a. Have the main power on.
- b. Press the emergent stop button to see whether it stops immediately.
- c. Power on again.
- d. Please check whether the motor is running smoothly. If there is any errors, Please select two of the wires L1, L2 and L3 and change its position.
- e. Check every mechanism to see whether it works normally.

4.5 The procedure for dismantling the machine.

The dismantling procedure is the reverse of the installation one.

CHAPTER 5

Operation

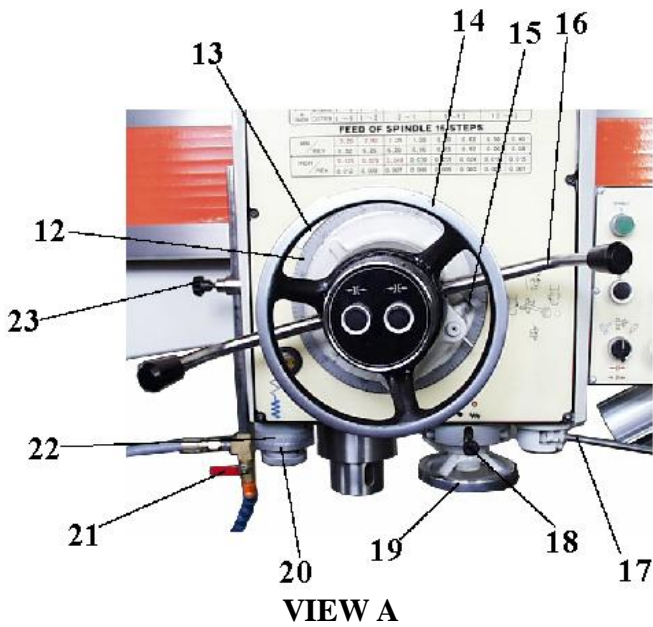
5.1 A brief introduction to the relevant operation hardware.



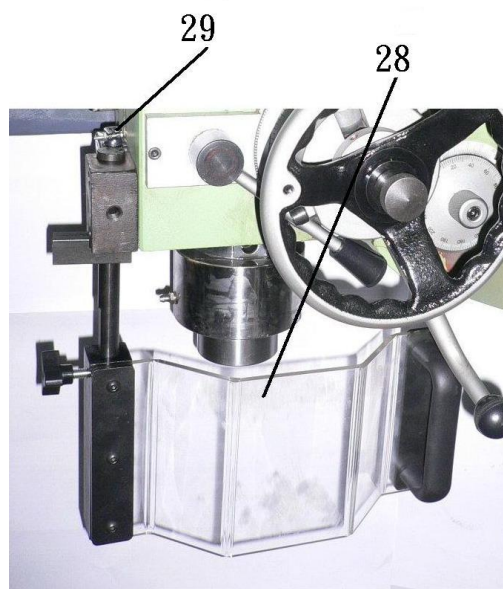
The front view of the machine



The rear view of the machine



VIEW A



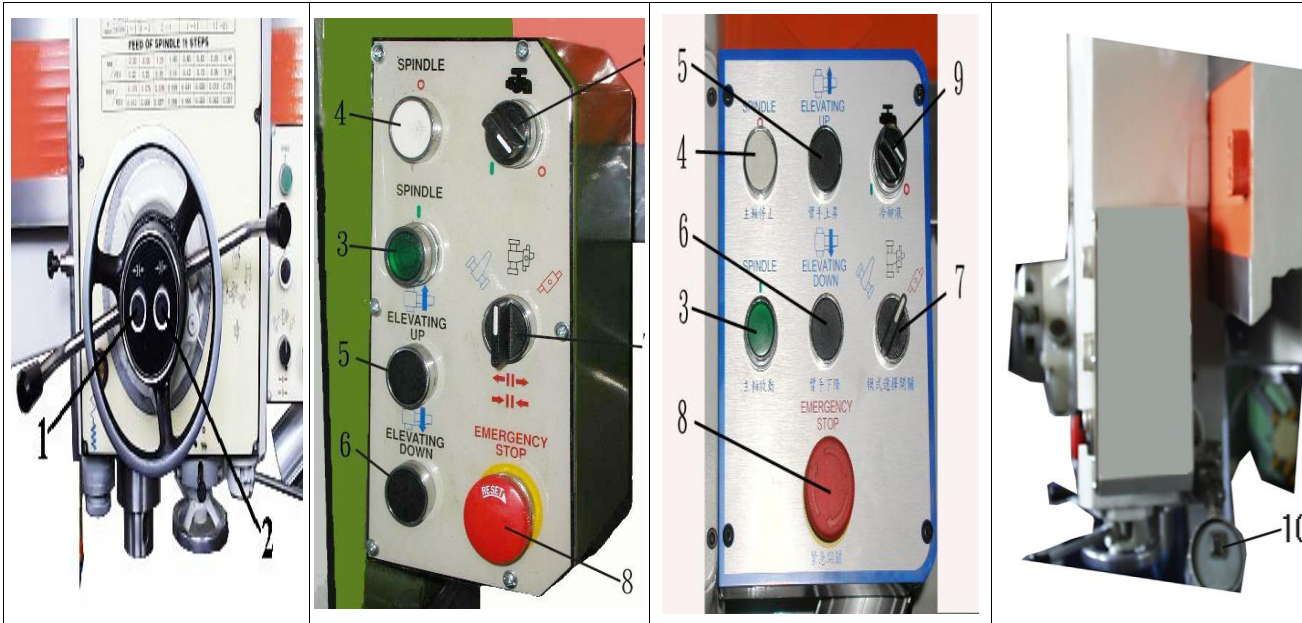
VIEW B

The relevant terms.

No.	Term	Description
1	Arm clamping mechanism	It is to secure the rotation position of the Arm on the Column. e.g. after arm is rotated to a certain degree, you use this lever to secure the Arm on the Column.
2	Column	It is to support the Gearbox and Arm. It is connected with the Base.
3	Top Cap	There is a motor on it, which is to move the Gearbox and Arm up or downwards.
4	Elevating motor	It is to elevate up or down the Arm through ball screw.
5	Electric ball screw	It is the rail of the Arm, which can be lifted or lowered by an elevating motor.
6	Main motor	It is to move the spindle.
7	Arm	It is to support the Gearbox, connecting with the Column.
8	Spindle	It is the place where drill bit, threading head, drill clamp are mounted on.
9	Cutting fluid pipeline	The cutting fluid is used to cool down the work piece and cutting knives. It flows through the pipeline.
10	Worktable	It features a T shape chamfer, which help clamp and position work piece. In addition, the worktable helps shorten the distance between the work piece and the drill bit.
11	Base	It is the gravity center of the machine. It stores the cutting fluids. When no worktable used, it is used to support the work piece and applied as a base for processing. It features also a T shape chamfer, which is very convenient for clamping.
12	Feeding scale ring	It is mainly to control the boring depth.
13	reference point.	It is mainly to reference point the boring depth.
14	Hand wheel	It is to move the head either to right or to left side.
15	Fine tune screw	It is used to help set the boring depth precisely.
16	Lever, for feed trip.	It is to start or stop the automatic Knives Feeding.
17	Cross switch	It is used to reverse the spindle direction and change its speed.
18	Auto feeing lever	If auto feeding is required, it is to be pressed first, then using the feed lever to start it.
19	Hand wheel, for moving head	It is the indicator for the automatic knife feeding. It runs simultaneously with the feeding knives.
20	Default speed scale ring	At processing, different material and bore needs different speed. The setup of the speed is done by this ring.
21	Cutting fluids adjusting knob	It is used to control the floating of the cutting fluids.
22	Default feeding rate ring	When auto feeding is being used, different material and boring bit size requires different feeding speed, which can be achieved by this ring.
23	Cutting fluid flushing height adjusting lever	It is used to adjust the cutting fluid flushing height according to different work piece and size of the boring bit.
24	Control box	All control elements are mounted here.
25	Oil pressure control valve	There are three devices of the clamping mechanism needing the hydraulic pressure. The valve is used to control.
26	Cutting fluids pump	It is to pump the cutting fluids from the container to lubricate the drilling or boring.
27	Hydraulic pump motor	It is the source power for the hydraulic pump.

No.	Term	Description
28	Safety Protective Cover	For to avoid debris fly off. When spindle making the drilling bit,the cover must be close. Another for safety, the spindle must stop rotation, when the cover is open.
29	Limit Switch	The limit switch is controlled by safety protective cover's open or close. If safety protective cover is open,the spindle stop rotation by limit switch' single . Another,if safety protective cover is close,the spindle can rotation.

5.2 Instruction to switches.



(FOR TPR-C1250A,TPR-C1600)

(FOR TPR-C2500)

Description for Switches.

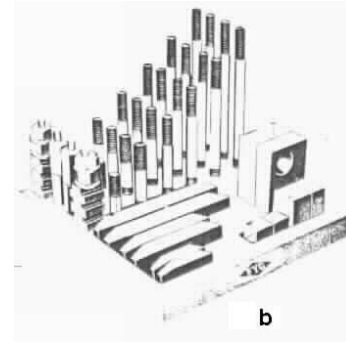
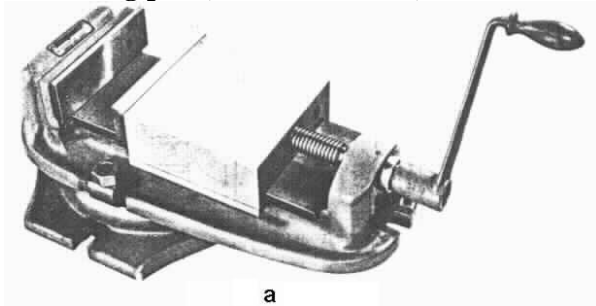
1.	Clamp switch	It is used to tighten the arm and gearbox fastening devices. After n the gearbox finishes moving up- or downwards, forwards or backwards, this device is used to fasten the above mentioned mechanism.
2.	Release switch	It is used to release the fastening devices of the arm and gearbox. So they can move up- or downwards, front- or backwards, right- or leftwards.
3.	Spindle motor starter	It is used to start the spindle motor.
4.	Spindle motor closer	It is used to close the spindle motor.
5.	Arm UP	When switched to "ARM UP", the Arm lifts.
6.	Arm Down	When switched to "ARM DOWN", the arm descends.
7.	Operation mode selection switch.	It is used simultaneously with clamping or releasing switch to perform the clamping mechanism.
8.	Emergent stop	It is pressed to stop the machine when at processing and emergence occurs. Pull it again for back to release the stop.
9.	The cutting fluids switch	It is a switch to start on or off the lubrication when at boring, where the boring or shearing causes high temperature, making the drilling bit easy to wear. The lubrication can reduce the temperature and lengthen the life of the drilling bit. Turn on to start and off to stop the lubrication. The floating capacity is decided by another knob called the cutting fluids adjusting knob.
10.	Work light switch	It is used to improve lighting where illumination is not enough.

5.3 Installation of the clamp (work piece)

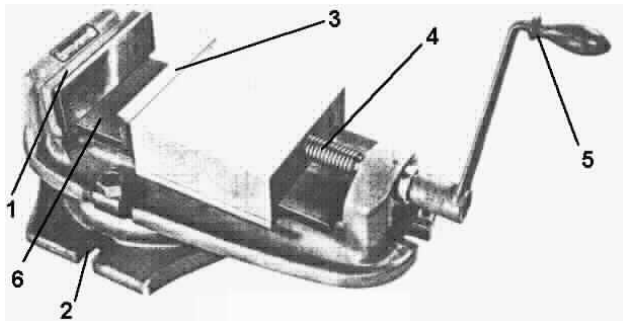
5.3. General

1

Work piece must be placed securely and precisely on the radial drill so that precision and safe procession can be achieved. Regularly, a vise is applied. (as shown picture a). Since the vise has its range limit, universal clamp (as shown picture b) is applied for bulky work piece or any work piece which isn't easy to be clamped. The universal clamp includes T shape chamfer bolts, stacking plate, insertion blocks, which makes clamping easier.



5.3.2 Introduction of the vise and the clamping of the work piece.

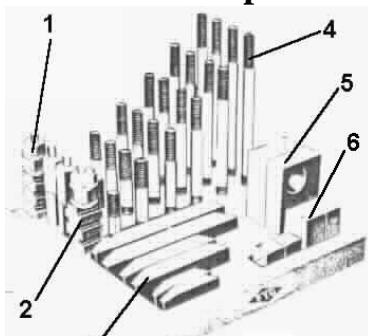


(1)	The fixed side of the vise.
(2)	The fixing side with T shape chamfer bolt and nuts
(3)	The moving side of the vise.
(4)	The screw bar.
(5)	The handle.
(6)	The surface of the vise.

Clamp work piece as the following :

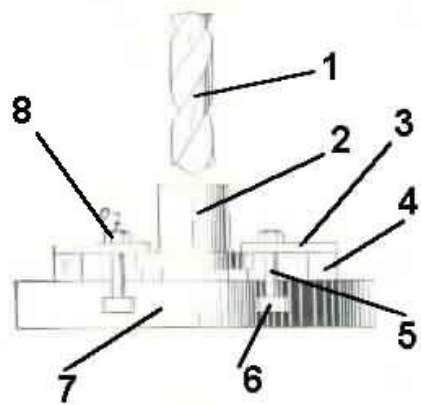
a.	Move away the drilling bit or lift the gearbox to the utmost point.
b.	Using brush, clean the worktable and the vise surface.
c.	Clean the vise surface using clean rag.
d.	Position the work piece on the vise surface. If it is piercing drilling, please insert a block under the work piece so that drilling into vise can be avoided.
e.	Fasten the handle by rotating it clockwise and tighten it. While tightening it, please use plastic hammer or copper bar to hit the work piece till there is no gap between the work piece and the inserted block.

5.3.3 Universal clamp and the clamping of the work piece.



(1)	Hex nuts
(2)	T shape chamfer nuts
(3)	Stacking plate
(4)	Twin head bolts
(5)	Insertion block
(6)	Ladder block

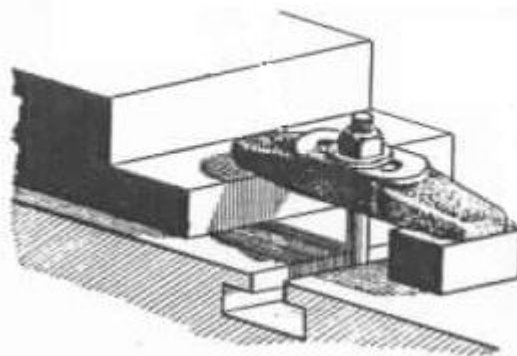
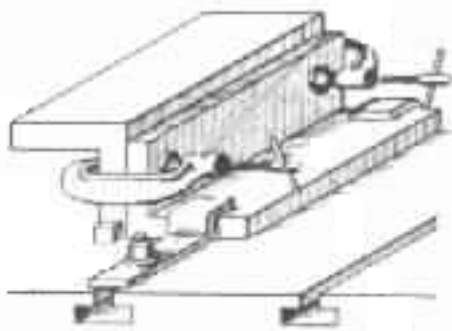
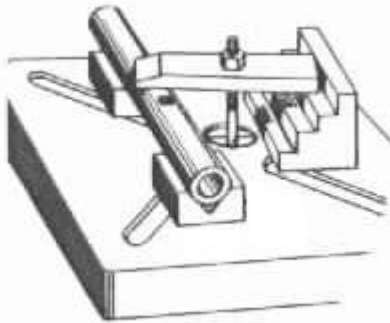
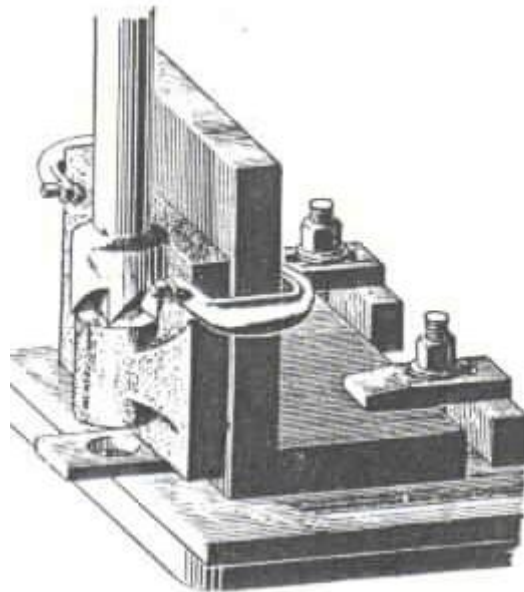
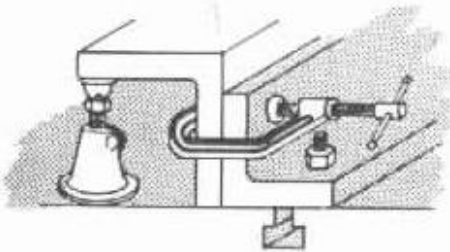
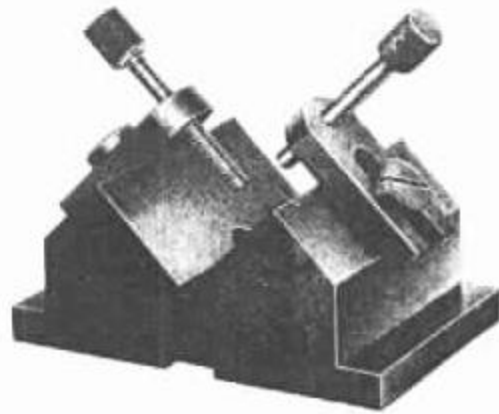
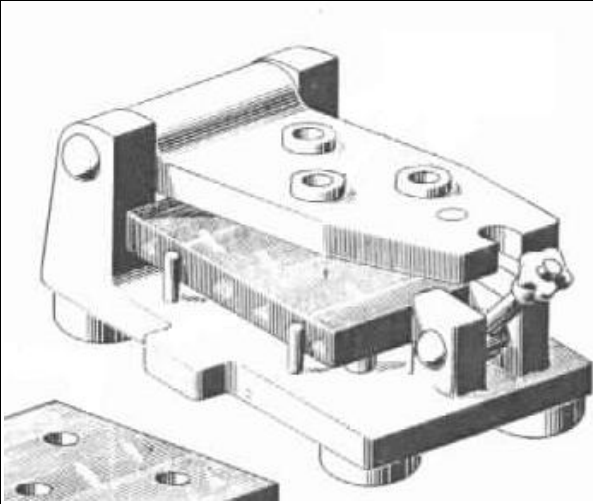
Clamp the work piece as the following : (Since the combination of the universal clamp is very flexible and abundant, The following diagram is applied as an exemplary description.



1.	Drilling bit
2.	Work piece
3.	Stacking block
4.	Insertion block
5.	Twin head bolts
6.	T shape chamfer bolts
7.	Worktable
8.	Hex but

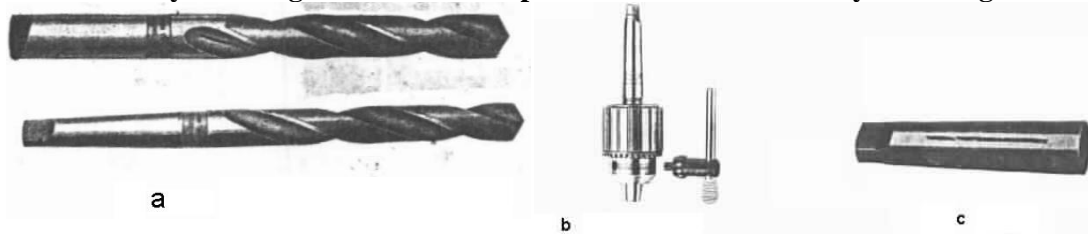
- a. Move away the drilling bit or lift the gearbox to the utmost point.
- b. Using brush, clean the worktable and the vise surface.
- c. Clean the vise surface using clean rag.
- d. Position the work piece on the vise surface. If it is piercing drilling, please insert a block under the work piece so that drilling into vise can be avoided.
- e. After screwing the T shape chamfer nut to the twin head bolts with suitable length, put it into the T shape chamfer of the worktable or the base.
- f. Choose the insertion block or ladder block that is the same high as work flange. Put them in the other side of the bolts.
- g. Using holed stacking block, place them onto the bolts, with one of its side pressing the work flange and another pressing the insertion block or ladder block, then tighten it with hex nuts.

Examples of clamping, using the universal clamp.

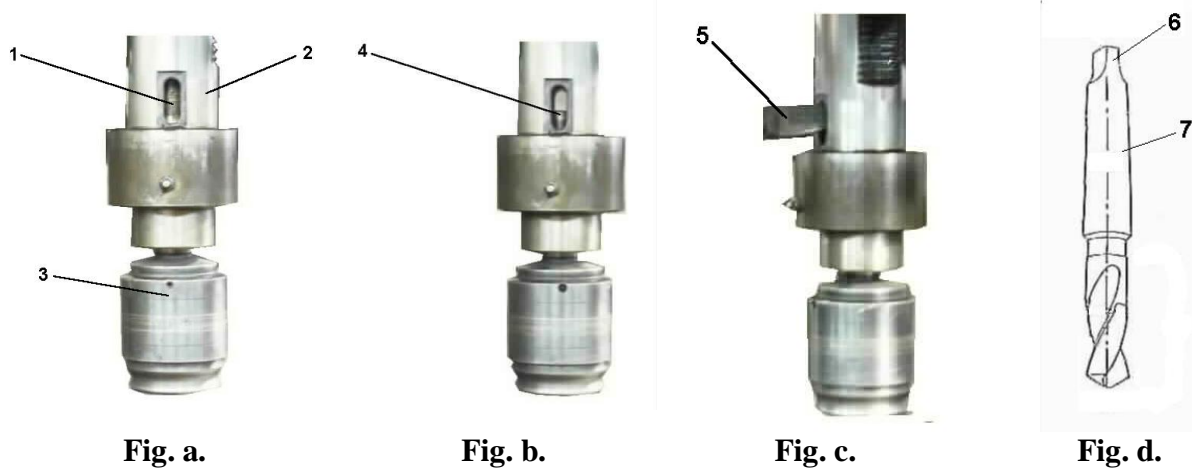


5.4 Installation and change of the drilling bit.

The radial drill is mainly used in drilling. How to clamp the drilling bit is therefore very important. Generally, drilling bits divide into two kinds, one is straight handle drilling bit, and another is tapered handle one. (as fig. a). Their clamping is very different. The straight handle one is fixed by a drilling head while the tapered handle one is fixed by a bushing.



5.4.1 The assembly and disassembly of the drilling head and clamp.



No.	Term
(1)	Revolving shaft
(2)	Shaft bushing
(3)	Speedy drill bit clamp
(4)	The stem for the speedy drill bit clamp
(5)	Pin for releasing drill bit
(6)	Drill shaft end
(7)	Drilling shaft

Disassemble the tapered handle drill bit and the drill head clamp as the following way:

- Move away the drilling bit or lift the gearbox to the utmost point.
- Power off machine.
- Put on gloves.
- Insert a thick wood plate into the underneath of the drill bit and the drill bit head.
- Rotate the feed trip lever clockwise and have the spindle descend about 150 to 200 mm. As fig. a.
- Rotate the revolving shaft from the bushing till that the drill shaft end and drill shaft are visible from the hole of releasing drill bit. as fig. b.
- Insert the pin for releasing the drill bit into the hole, as fig. c.
- Hit the end of the pin for releasing drill bit, using plastic hammer or copper bar, till the drill bit and the drill bit clamp fall onto the wood plate.

Precaution :

The distance between the thick wood plate, drill bit and the end of the drill bit clamp is about 30 mm.

Assemble the drill bit head and the drill bit clamp as the following:

- a. Move away the drilling bit or lift the gearbox to the utmost point.
- b. Power off.
- c. Put on gloves.
- d. Insert a thick wood plate into the underneath of the drill bit and the drill bit clamp.
- e. Rotate the feed trip lever clockwise and have the spindle descend about 150 to 200 mm. As fig. a.
- f. Rotate the revolving shaft from the bushing till that thing behind the machine is visible from the hole of releasing drill bit, as fig. b.
- g. Place the drill bit clamp end up, as fig. d.
- h. Place the drill bit and its clamp end into the revolving shaft and have the drill shaft end inserted into the hole for releasing the drill bit, as fig. b.
- i. Rotate the feed trip lever counter clockwise. Make the spindle descend till the drill bit and the bottom end of the drill bit clamp head contact the wood plate. Apply a little bit force and complete it by confirming that the drill bit won't fall.

Precaution :

The distance between the thick wood plate, drill bit and the end of the drill bit clamp is about 30 mm.

5.4.2 The assembly and disassembly of the straight handle drill bit.



Fig. a.

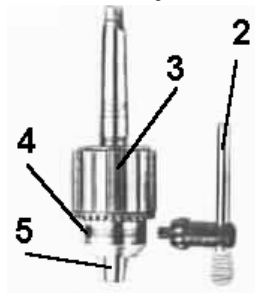


Fig. b.

No.	Term
(1)	Drill bit
(2)	Drill spanner
(3)	Tightening ring
(4)	Hole for drill spanner.
(5)	Drill bit clamp head.

Disassemble the straight drill bit as the following way:

- a. Move away the drilling bit or lift the gearbox to the utmost point.
- b. Power off.
- c. Put on gloves.
- d. Put the drill spanner into the hole for tightening.
- e. Rotate the spanner counter clockwise till the clamp head falls.

Assemble the straight handle drill bit as the following way:

- a. Move away the drilling bit or lift the gearbox to the utmost point.
- b. Power off.
- c. Put on gloves.
- d. Adjust the tightening ring till the drill bit can be inserted.
- e. Insert the drill bit into the clamp head at least 25 mm.
- f. Put the drill spanner into the hole for tightening.
- g. Rotate the spanner clockwise till the drill bit is tightened.

Precaution :

The drill bit must be inserted at least over 25 mm, otherwise the bit get easily broken or can't drill very precisely.

5.5 Power on and off.

5.5.1 Power on

- a. Turn outside main switch to "ON" position.
- b. Turn the machine power switch to "ON" position.

5.5.2 Power off

- a. Turn the machine power switch to "OFF" position.
- b. Turn outside main switch to "OFF" position.

Precaution :

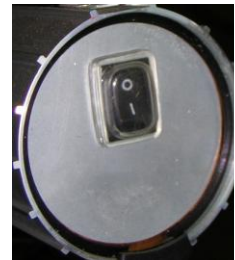
When at emergency, please press down the emergent stop button to shut down the power supply.

But the emergent stop button can't be used as a switch for normally stopping machine or normal power off.

5.6 Work light

Turn on the work light. Switch the work light to "ON" position.

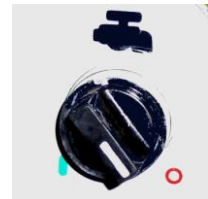
Turn off the work light. Switch the work light to "OFF" position.



5.7 Cutting fluids

Turn on the cutting fluids. Switch the cutting fluids to "ON" position.

Turn off the cutting fluids. Switch the cutting fluids to "OFF" position.



5.8 Arm elevating

Move arm upwards.

Please press the button "1" as shown at the right picture to move the arm upwards.

Move arm downwards.

Please press the button "2" as shown at the right picture to move the arm downwards.

Precaution :

For safety, please stop the spindle rotation when the arm is elevating.

Example



5.9 Moving drill arm front- or backwards, right- or leftwards.



(FOR
TPR-C1250A,TPR-C160
0) (FOR TPR-C2500)

No.	Name
1	Clamp switch
2	Release switch
3	Operation mode selection switch.
4	Hand wheel

Part	Relative position	Note
a	arm	It is selected to fasten or release the arm clamp only.
b	Arm and gearbox	It is selected to fasten or release both the arm and gearbox clamp.
c	Gearbox	It is selected to fasten or release the gearbox clamp only.

5.9.1 How to move the gearbox.

step	description
1.	Turn the switch 3 shown at the above picture to the location c.
2.	Press the release switch 2 shown at the above picture. (duration about 2 seconds.)
3.	Turn the hand wheel 4 shown at the above picture to right or left.
4.	When the gearbox moves to the required location, press the clamp switch 2 shown at the above picture. (duration about 2 seconds) to clamp the gearbox.

5.9.2 How to move the arm.

Step	Description
1.	Turn the switch 3 shown at the above picture to the location a.
2.	Press the release switch 2 shown at the above picture. (duration about 2 seconds.)
3.	Turn the hand wheel 4 shown at the above picture to the front or the back.
4.	When the arm moves to the required location, press the clamp switch 2 shown at the above picture. (duration about 2 seconds) to clamp the gearbox.

5.9.3 How to move the arm and gearbox.

Step	Description
1.	Turn the switch 3 shown at the above picture to the location b.
2.	Press the release switch 2 shown at the above picture. (duration about 2 seconds.)
3.	Turn the hand wheel 4 shown at the above picture to the front or the back, left- or rightwards.
4.	When the arm and gearbox move to the required location, press the clamp switch 2 shown at the above picture. (duration about 2 seconds) to clamp the gearbox.

Precaution

If 180 degree rotation is needed, the ground needs to be processed according the method in the chapter 3, where the base bolts are required and need to be fastened by nuts.

5.10 The spindle rotation speed and switch.

5.10.1 The speedometer

(For TPR-C1250A, TPR-C1600)

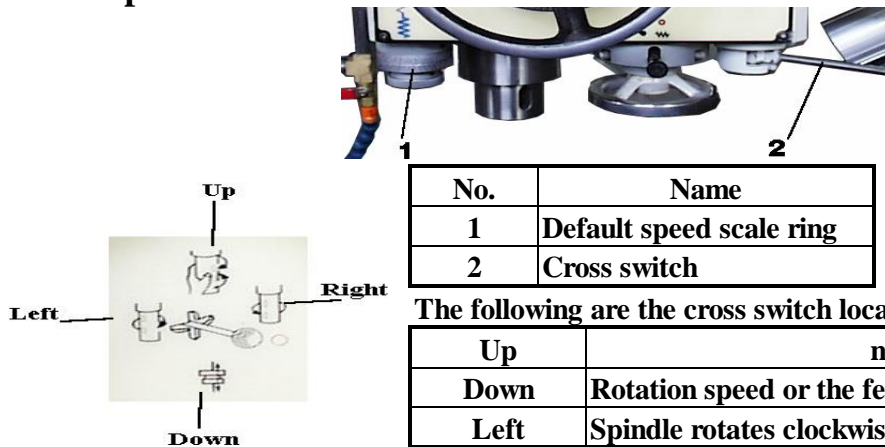
Speed (RPM)		2000	800	500	320	200	125	80	40
		1250	630	400	250	160	100	63	25
Suitable drilling diameter (mm)	Mild steel	Ø3-Ø6	Ø6-Ø13	Ø13-Ø20		Ø20-Ø40		Ø40-Ø55	
	Cast iron	Ø3-Ø10	Ø10-Ø19	Ø19-Ø25		Ø25-Ø45		Ø46-Ø65	

Speed (RPM)		2000	800	500	320	200		125	80	40
		1250	630	400	250			160	100	63
threading(metric)mm		Not suggested.			M3-M6		M6-M16		M16-M20	

(For TPR-C2500)

Speed (RPM)		1250	500	315	200	125	80	50	25
		800	400	250	160	100	63	40	16
Suitable drilling diameter (mm)	Mild steel	Ø3-Ø15	Ø15-Ø35	Ø35-Ø55		Ø55-Ø65		Ø65-Ø80	
	Cast iron	Ø3-Ø20	Ø20-Ø40	Ø40-Ø60		Ø60-Ø80		Ø80-Ø100	

5.10.2 Speed switch



No.	Name
1	Default speed scale ring
2	Cross switch

The following are the cross switch locations and its actions.

Up	neutral
Down	Rotation speed or the feeding speed changes.
Left	Spindle rotates clockwise.
Right	Spindle rotates counter clockwise.

The way to change speed :

- Have the spindle motor power on.
- Confirm that the cross switch is turned to the middle location as shown at the above picture 2.
- After the spindle stops rotating, switch the default speed scale ring, as shown at the above picture 1, to the required speed.
- Switch the cross switch to “down” location, as shown at the above picture 2.. If the spindle rotates, it means that the switch is achieved.
- Switch the cross switch to “left” or “right” location, as shown at the above picture2, to have the spindle rotate.
- After the spindle stops, please turn the cross switch to the middle location, as shown at the above picture 2.

Precaution to speed switch:

- At switching speed, the spindle must stop.
- After the spindle stops rotation completely, Speed can be switched only.

5.11 Automatic Feed.

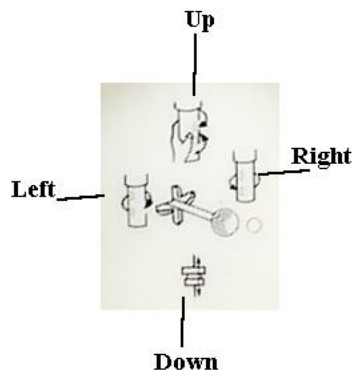
Warning :

Spindle temperature will go up making operation in trouble when the spindle speed is set at high rotation mode without movement of the quill. So please do not set the spindle speed at high rotation mode when no movement of the quill.

5.11.1 Automatic feed rate table

Steps	1	2	3	4	5	6	7	8
Feed rate	0.04	0.06	0.10	0.13	0.16	0.20	0.25	0.32
Steps	9	10	11	12	13	14	15	16
Feed rate	0.40	0.50	0.63	0.80	1.00	1.25	2.00	3.20

5.11.2 The way to switch the feeding rate:



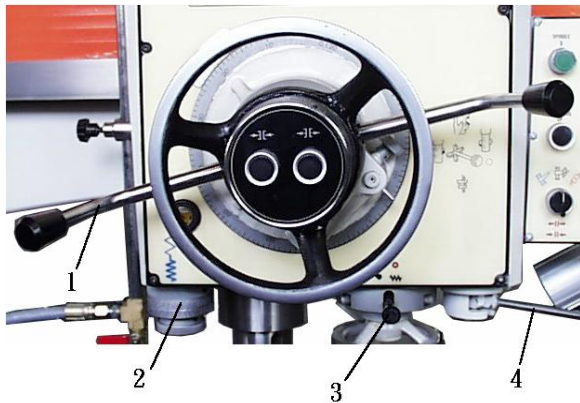
No.	Name
1	Default feeding rate ring.
2	Auto feeding lever
3	Cross switch

The following is the cross switch location and its actions.

Up	Neutral
Down	To change rotation speed or the feeding rate.
Left	The spindle rotates clockwise.
Right	The spindle rotates counter clockwise.

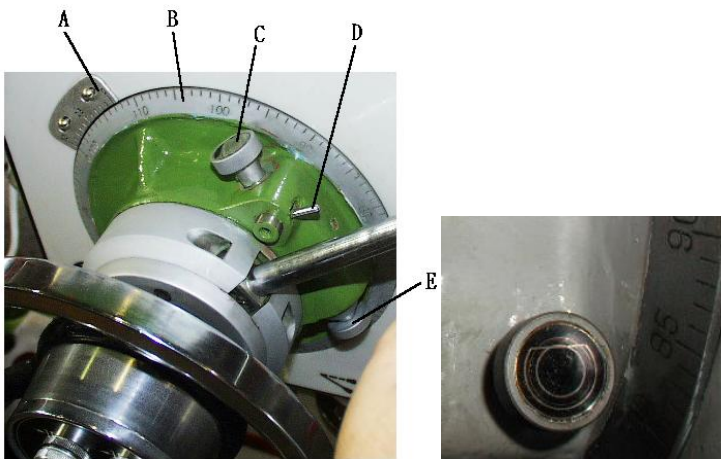
a.	Have the spindle motor power on.
b.	Be sure that the cross switch is turned to the middle position, as shown at the above picture 2.
c.	After the spindle stops rotation, Set the default feeding rate ring to the desired speed, as shown at the above picture 1.
d.	Turn the cross switch to the “down” position, as shown at the above picture 2. If the spindle rotates, it means the action of switching the feeding rate is achieved.

5.11.3 The way to set the auto feeding depth:



The following are the related parts name.

No.	Name
1	Feeding lever
2	Default feeding rate ring.
3	Auto feeing lever
4	Cross switch



The following are the related parts name.

Positions	name
A	Depth reference point.
B	Main scale
C	Adjusting screw
D	Feeding setup pin
E	Fastening bolt

The way to set up the auto feeding depth:(The following is to suppose that the feeding rate has been adjusted.)

a.	Turn the feeding lever ,as shown at the above picture 1, counter clockwise until it's bit contacts the work piece.
b.	Release the Fastening bolt, as shown part E.
c.	Release the fastening bolt, marked E.Turn the main scale, align 0, as shown parts B, to the depth reference point 0, as shown part A.
d.	Turn the main scale, marked B, clockwise to the required depth. Since it is difficult to pinpoint the precise depth using the main scale, you can use the adjusting screw, as marked C, to fine tune. (with the adjusting screw, you can fine tune, i.g. to minus or plus 3 mm.)
e.	After the exact depth is set up, insert the feeding setup pin, marked D, forwards and tighten the fastening bolt.
f.	Turn the cross switch, as marked 4, to left.
g.	Press the auto feeding lever, marked 3, downwards.
h.	After the feeding lever, marked 1, is turned a little bit counter clockwise and then pulled backwards, the spindle will feed at the selected speed and stop itself at the preset depth.

Example : The setup for feeding 30 mm.

a.	Turn the feeding lever, marked 1, until its bit contacts the work piece.
b.	Release the fastening bolt, marked E.
c.	Turn the adjusting screw, marked B to align 0 to 0 point of the main scale, marked A.
d.	Turn the main scale, marked B, clockwise to scale 29. then fine tune to 30 using the adjusting screw, marked C.
e.	After the scale 30 is set up, push the depth setup pin, marked D, for wards and tighten the fasten bolt, marked E.
f.	Turn the cross switch, marked 4, leftwards.
g.	Press the auto feeding lever, marked 3, downwards.
h.	Turn the feeding on, marked 1, counter clockwise a little bit and then pull it backwards.

Precaution :

a.	The feeding rate must be set up before the auto feeding can move.
b.	The auto feeding is suitable to be used in boring., but not in threading

5.11.4 Suppose that the work piece is by the machine

The way to move (less than 25kgs.)

Suppose that the work piece is by the machine, the way to move it is as follows:

- 1. Power off.**
- 2. Put on gloves.**
- 3. Squat facing the work piece.**
- 4. Lift the work piece with two hands.**
- 5. When you are standing up, lift and move the work piece with your feet strength.**
- 6. Move the work piece toward the worktable.**

The way to move (greater than 25kgs.)

Suppose that the work piece is by the machine, the way to move it is as follows:

- 1. Power off.**
- 2. Put on gloves.**
- 3. Push the arm backwards.**
- 4. Move a lifting devise close to the work piece.**
- 5. Place lifting ropes or slings under the work piece, (please use two ropes or slings). If the work piece has holes for lifting ropes or slings, please lock it with ring head pin, then lift and move it with a hook.**
- 6. Move the work piece toward the worktable.**

5.12 The spindle rotation.



1. Have the main motor power on.
2. Turn on the spindle motor, as marked 1, by pressing. Now the power for the spindle is on.
3. Switch the cross switch, marked 3, to left, to let the spindle rotate clockwise, as illustrated in a. and switch to right, to let the spindle rotate counter clockwise, as illustrated in b.
4. If the cross switch is turned to the middle position, the spindle stops rotation.
5. Press the spindle motor closer, marked 2, to close the spindle motor.

5.13 Safety Protective Device



Precaution :

1.	When user close the safety protective cover(As marked A) , the limit switch (As marked B)can message a signal to allow the spindle rotation.Therefore, user can operation the machine.
2.	When user open the safety protective cover(As marked A) , the limit switch (As marked B)can message a signal to stop the spindle rotation immediately.

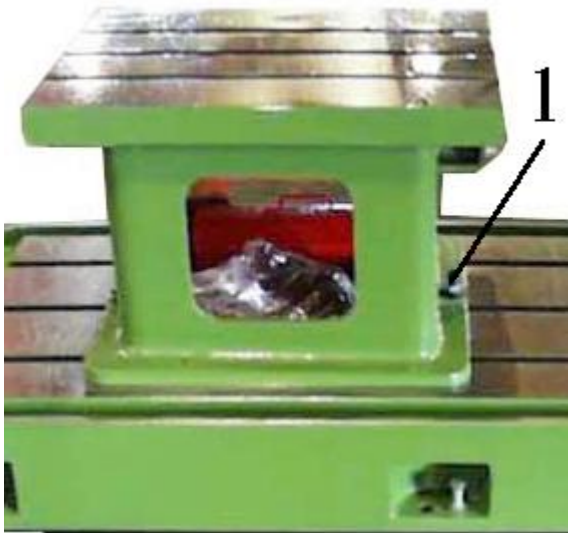
5.14 Threading

The way to thread:

a.	Have the taper clamped by the drill adapter.
b.	Move the spindle to above the work piece surface.
c.	Turn the feeding lever a little bit counter clockwise.
d.	After the cross switch is turned to SPDL. FOR. The spindle starts to rotate clockwise.
e.	Turn the feeding lever counter clockwise until the threading is finished. (The threading depth must be controlled by the operator.)
f.	Turn the cross switch to SPDL. REV. to let the spindle rotate counter clockwise until the taper draw out completely.
g.	Turn the cross switch to the middle position to stop the spindle rotation.

5.15 The assembly and disassembly of the work table.

Disassemble it as follows:



1.	Release 1, as shown in the picture, using a spanner. That's to move the spanner counter clockwise.
2.	Apply the above to the other side.

Assembly it as follows:

1.	Clean the debris from the base with a metal brush.
2.	Clean the worktable and the base with rags.
3.	Place T shape Bolts into the T shape chamfer of the base.
4.	Tighten the nuts.

5.16 Cutting fluids for all kinds of material.

Soft steel	crude oil \ animal fat
Mild steel	crude oil \ animal fat
High carbon steel	crude oil \ animal fat
Stainless steel	crude oil \ animal fat
Manganese steel	crude oil \ animal fat
Cast iron	Without
Malleable cast iron	Crude oil
Brass, bronze	Kerosene
Aluminum and alloy	Kerosene

When cutting fluids is not applied, Having the turning speed and the feed rate reduced is the only way to extend the tool life.

If cutting fluids leaks or injects to the aisle, please clean it immediately from the floor.

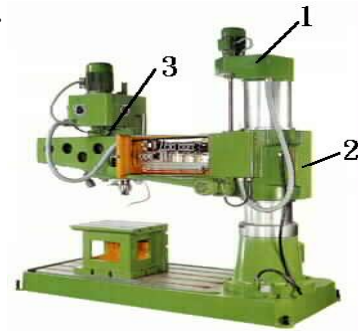
CHAPTER 6

Adjustment

6.1 general

After the machine serves a period of time, some parts will get loose or worn out, therefore adjustment is needed. Generally, there are three parts needed to be adjusted:

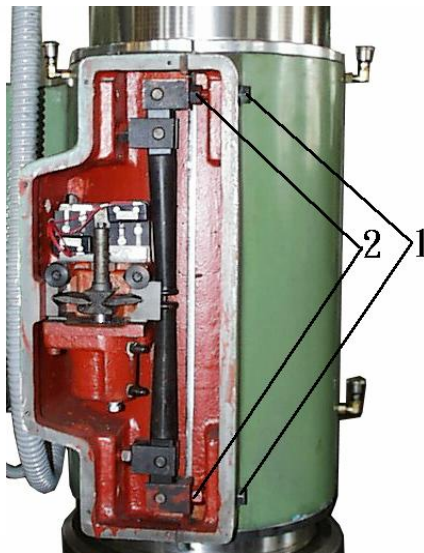
1. The arm clamping mechanism, marked 2 in the right picture.
2. The backlash of the rail for the arm and gearbox, marked 3 in the right picture.
3. The column clamping mechanism, marked 1.



6.2 The arm clamping mechanism.

After the machine services a period of time, the clamping force will decrease. Therefore it must be adjusted to restore the clamping force.

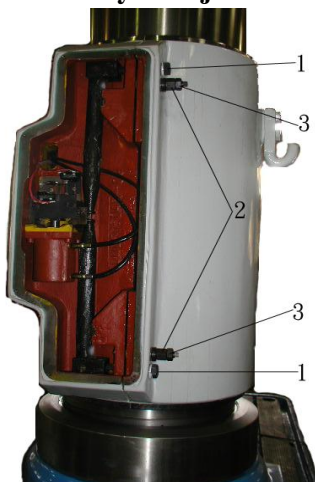
TPR-C1250A , TPR-C1600 The way to adjust the arm clamping lever follows as :



No.	Name
1.	The arm clamping lever
2.	The arm adjusting nuts
3.	The fastening bolts

a.	Remove the cover.
b.	Release the fastening bolts, marked 2 in the above picture.
c.	Using spanner, turn the adjusting bolt, marked 1 in the left picture, until the arm can move up- and downwards smoothly and be clamped to the column.
d.	Tighten the fastening bolts, marked 2 in the left picture.
e.	Restore the cover.

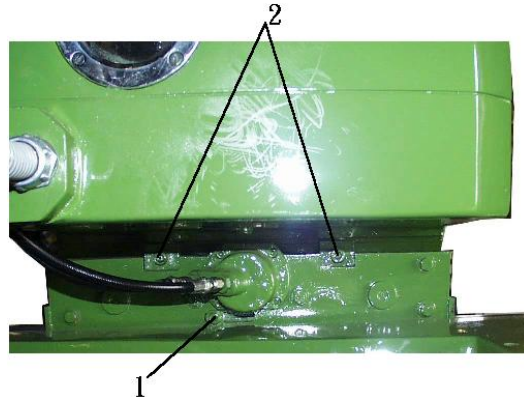
TPR-C2500 The way to adjust the arm clamping lever follows as :



a.	Remove the cover.
b.	Using spanner, turn the adjusting bolt, marked 1 , 2 in the left picture, until the arm can move up and downwards smoothly and be clamped to the column.
c.	Tighten the fastening bolts, marked 3 in the left picture.
d.	Restore the cover.

6.3 Adjust the backlash of the rail for the gearbox and arm.

After the machine serves a period of time, the backlash of the rail for the gearbox and arm appears. Therefore it is necessary to adjust the tightness between the rail and gearbox as well as between the rail and the arm.



6.3.1 Adjust the gearbox clamping mechanism.

- a. Using a spanner, release the fastening bolt, marked 1 in the above picture.
- b. Move the fastening bolt rightwards, marked 1 in the above picture and tighten it again.

6.3.2 Adjust the tightness between the gearbox and supporting plate.

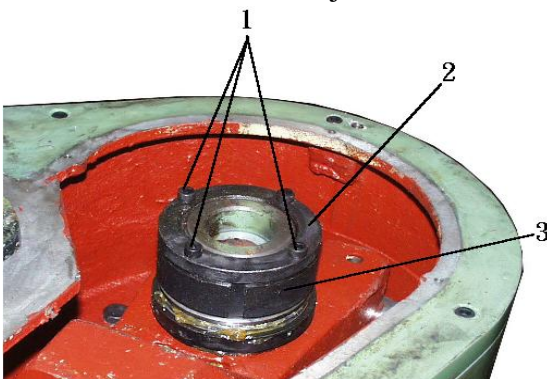
- a. Using a spanner, tighten the fastening bolt, marked 1 in the above picture.

Precaution:

Be aware of the tightness of the above adjustment positions. When the gearbox clamping mechanism is released, it should be able to move easily. But when it is tightened, the tightness between the gearbox and supporting plate should be so moderate that after adjustment, using the hand wheel to pull and push, adjust the backlash between the gearbox and supporting plate to the minimum as well as the gearbox is still easy to move.

6.4 The column clamping mechanism.

After the machine service a period of time, a backlash of the column clamping mechanism appears. Therefore it needs to be adjusted.



a.	Release the bolts to the top cover and remove the cover.
b.	Using a spanner, release the fastening bolts, marked 1 in the left picture.
c.	Tighten the bearing nut, marked 2 in the left picture.
d.	Using a spanner, tighten the fastening bolts marked 1 in the left picture.
e.	Tighten the fastening bolts, marked 1 in the left picture and affix the cover.

CHAPTER 7

Maintenance

7.1 General

Whether the machine is maintained well or not will lead to its long or short life. If well served, the machine lasts long and is easy to maintain.

7.2 Daily Maintenance.

7.2.1 Clearing

Only one person is allowed to do the clearing. Before clearing, please power off.

7.2.2 Please clean every parts using a metal brush and a rag, dipped with oil, to rub them.

(Please use CC68) After every day's work, please proceed the following maintenance.



No.	Parts
1.	Column
2.	The arm rail
3.	Spindle
4.	Work table
5.	The base
6.	The ball screw

7.2.3 The way to clean iron filings:

1. Power off.
2. Put on gloves.
3. Clean from upside down using a brush.
4. When the iron filings comes down to the base, please collect it and put it at the right side of the operation position.
5. Find a dustpan and place it under the machine.
6. Sweep it to the dustpan using the brush.
7. Rub every part of the machine with rags, particularly the parts where is contaminated with the cutting fluids.
8. Rub every metal part of the machine using a oil-dipped rags.

7.2.4 Lubrication

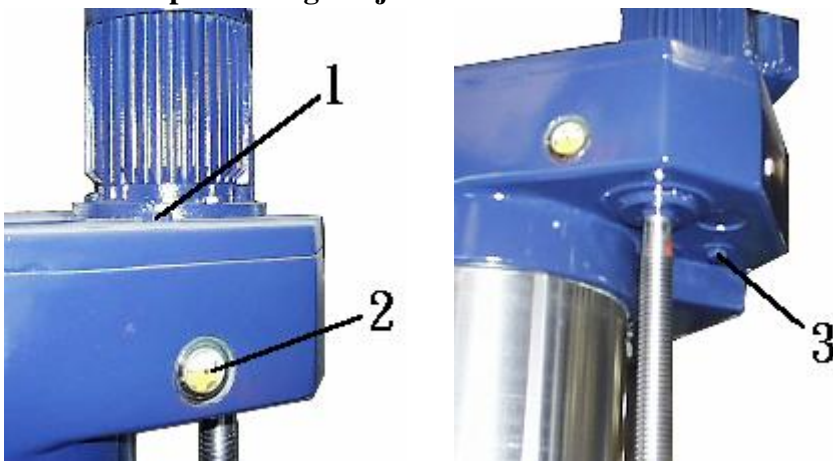
Before every day's work, please proceed the following maintenance.



No.	1	2
Part	Oil filler points of the column	All of the sliding surface
Oil type	CC68	CC68
Volume	2Times/per day	

7.2.5 Change oil inside of the speed reduction of the arm elevating motor.

It requires only one person to do it. Please press down the emergent stop button and power off before proceeding the job.



Part	Name
1.	Oil filler points
2.	Oil gauge
3.	Drain outlet

The following is the method to replace the oil.

Tool

Oil 2(CC68) L

Container and spanner.

The steps:
1. Power off.
2. Press down the emergent stop button.
3. Place the container under the drain outlet.
4. Release the drain plug using a spanner.
5. After draining, tape the plug with a sheet of band and tighten it back to the drain outlet.
6. Release the oil filler plug.
7. Add oil to the upper limit of the oil gauge.
8. Tighten the oil filler plug.

7.2.6 Chang the oil inside the gearbox.

It calls for only one person to do it. Please power off and press down the emergent stop button before carrying out the job.



Instruction to the relevant parts.

1.	Oil filler points	It is the open where oil is added after the oil in the container isn't enough or needs to be replaced.
2.	Oil gauge	The volume of the oil is visible here. Generally, The oil level should be between the upper and the lower lines. If it reaches the lower limit, oil needs to be added, at the utmost to its upper line, but not over it.
3.	Oil drain outlet	It is to drain the oil when oil is to be replaced.

The following is the method for replacing the oil.

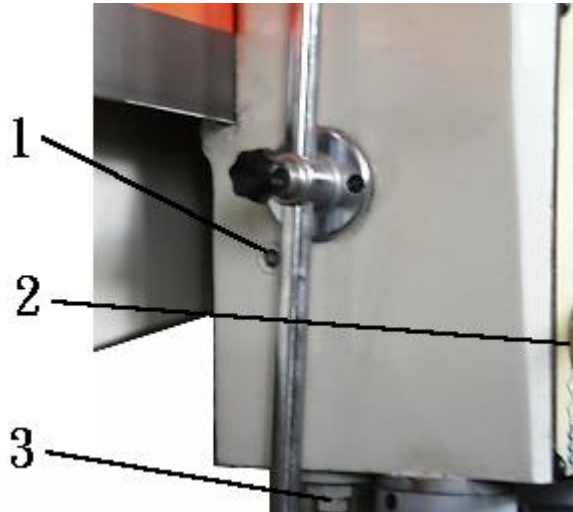
Tool

Oil 6 (CC68) L

Container and spanner

The Steps :

1.	Power off.
2.	Press down the emergent stop button.
3.	Place a container under the oil drain outlet.
4.	Release the drain plug using a spanner.
5.	After draining, tape the plug with a sheet of band and tighten it back to the drain outlet.
6.	Release the oil filler plug.
7.	Add oil to the upper limit of the oil gauge.
8.	Tighten the oil filler plug.



Instruction to the relevant parts.

1.	Oil filler points	It is the open where oil is added after the oil in the container isn't enough or needs to be replaced.
2.	Oil gauge	The volume of the oil is visible here. Generally, The oil level should be between the upper and the lower lines. If it reaches the lower limit, oil needs to be added, at the utmost to its upper line, but not over it.
3.	Oil drain outlet	It is to drain the oil when oil is to be replaced.

The following is the method for replacing the oil.

Tool

Oil 1 (CC68)L

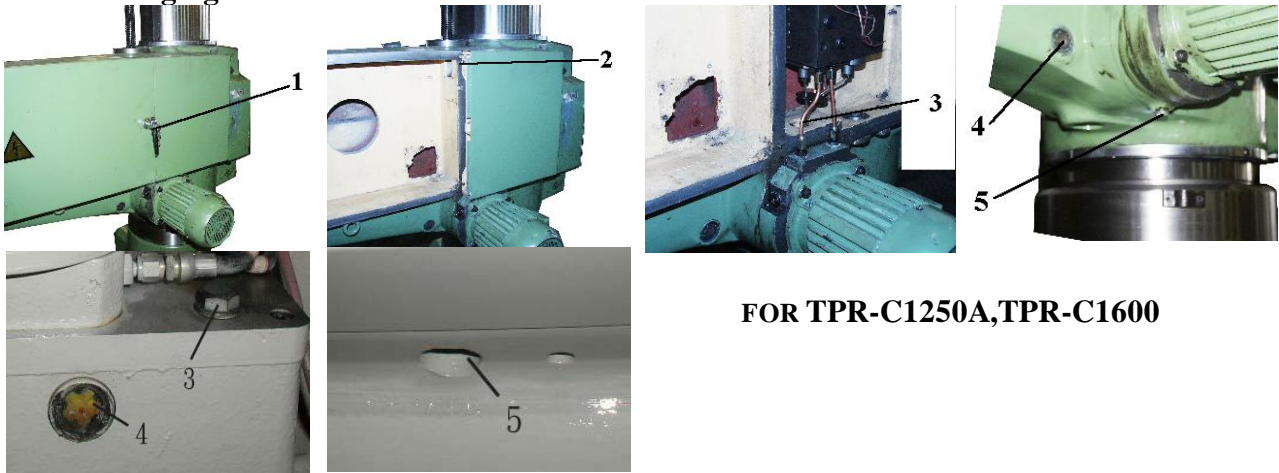
Container and spanner

The Steps :

1.	Power off.
2.	Press down the emergent stop button.
3.	Place a container under the oil drain outlet.
4.	Release the drain plug using a spanner.
5.	After draining, tape the plug with a sheet of band and tighten it back to the drain outlet.
6.	Release the oil filler plug.
7.	Add oil to the upper limit of the oil gauge.
8.	Tighten the oil filler plug.

7.2.7 Changing hydraulic oil in the hydraulic oil pump.

It requires only one person to operate it. Please power off and press down the emergent stop before changing.



FOR TPR-C1250A,TPR-C1600

FOR TPR-C2500

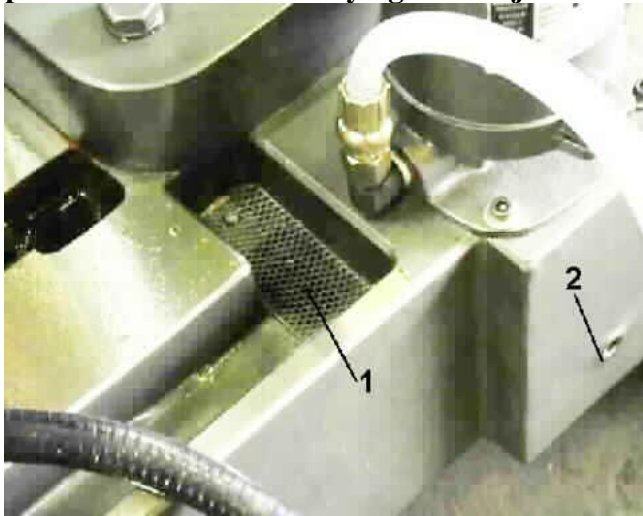
1.	Knob	2.	Screw	3.	Oil filler points	4.	Oil gauge
						5.	Drain outlet
The following is the method to change the hydraulic oil.							
Tools							
Oil(CB32)4.5 L							
Container and spanner							

The steps to drain the oil follows as:

1.	Power off.
2.	Press down the emergent stop button.
3.	Place a container under the oil drain outlet.
4.	Release the drain plug using a spanner.
5.	After draining, tape the plug with a sheet of band and tighten it back to the drain outlet.
6.	Open the control box.
7.	Release the screw .
8.	Add oil to the oil filler points, and add oil to the upper limit of the oil gauge.
9.	Tighten the screw.
10.	Close the control box.

7.3 Replace the cutting fluids.

It requires only one person to do it. Please power off and press down the emergent stop power button before carrying out the job.



Instruction to the relevant parts.

1.	Oil filler points
2.	Oil drain outlet

The following is the method to replace the cutting fluids.

Tool

- The cutting fluids 40L
- Container and spanner

The steps :

1.	Power off.
2.	Press down the emergent stop button.
3.	Place a container under the oil drain outlet.
4.	Release the drain plug using a spanner.
5.	After draining, tape the plug with a sheet of band and tighten it back to the drain outlet.
6.	Refill the cutting fluids through the oil filler inlet to the level under 5 mm under the oil filter.

7.4 Maintenance and replacement period.

No.	Position	Items.	Period
1.	Oil filler points of the column	CC68	once per day.
2.	Replace oil for the speed reduction of the arm elevating motor.	CC68	once per year.
3.	Change oil inside of the gearbox.	CC68	once per year.
4.	Change the cutting fluids.	The cutting fluids	once per month.
5.	The arm transmit ion ball screw	XM 2	Once per month
6.	Replace the hydraulic oil	CB32	once per year.

A suitable Oil Type comparison:

ISO DIS-3498	SHELL	MOBIL	ESSO	CHINA
CB32	TELLUS C32	DTE OLL LIGHT	TERESSO 32	R32
CC68	OMALA 68	MOBILGEAR 620	SPARTAN EP68	HD68
XM2	ALVANIA R2	MOBILUX 2	BEACON 2	#2

7.5 Waste disposition.

Please proceed waste disposition such as machine oil, iron filings, old machine or replaced parts according to your country's relevant legal regulation.

CHAPTER 8

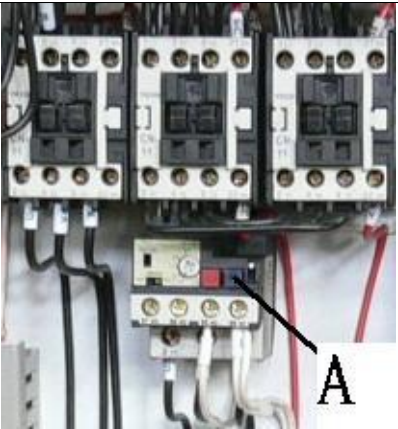
Troubleshooting

8.1 The spindle overloads and the relay jumps.

8.1.1 The cause.

- a. The drill bit is too big.
- b. The feed rate is too fast.
- c. Operation not in compliance with speedometer and the automatic feed rate table.
- d. The fuse burned out.
- e. The voltage is too low.

8.1.2 The solution

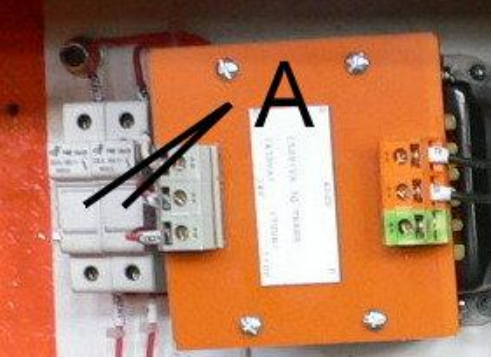
	a. Power off.
	b. Open the control box.
	c. Press the relay switch to open, as shown in the left picture, three minutes after the spindle stops. (blue Button)
	d. Close the control box.
	e. Power on.

8.2 The spindle overloads and the fuse burns out.

8.2.1 The cause

- a. The drill bit is too big.
- b. The feed rate is too fast.
- c. Operation not in compliance with speedometer and the automatic feed rate table.

8.2.2 The solution.

	a. Power on.
	b. Open the control box.
	c. Replace the fuse as shown in the picture A.
	d. Close the control box.
	e. Power on.

8.3 What if the drill bit get broken ?

- a. Stop the spindle.**
- b. Press down the emergent stop button.**
- c. Push the gearbox backwards.**
- d. Pinch the end of the broken bit with a pliers.**
- e. Rotate counter clockwise and pull it out upwards.**

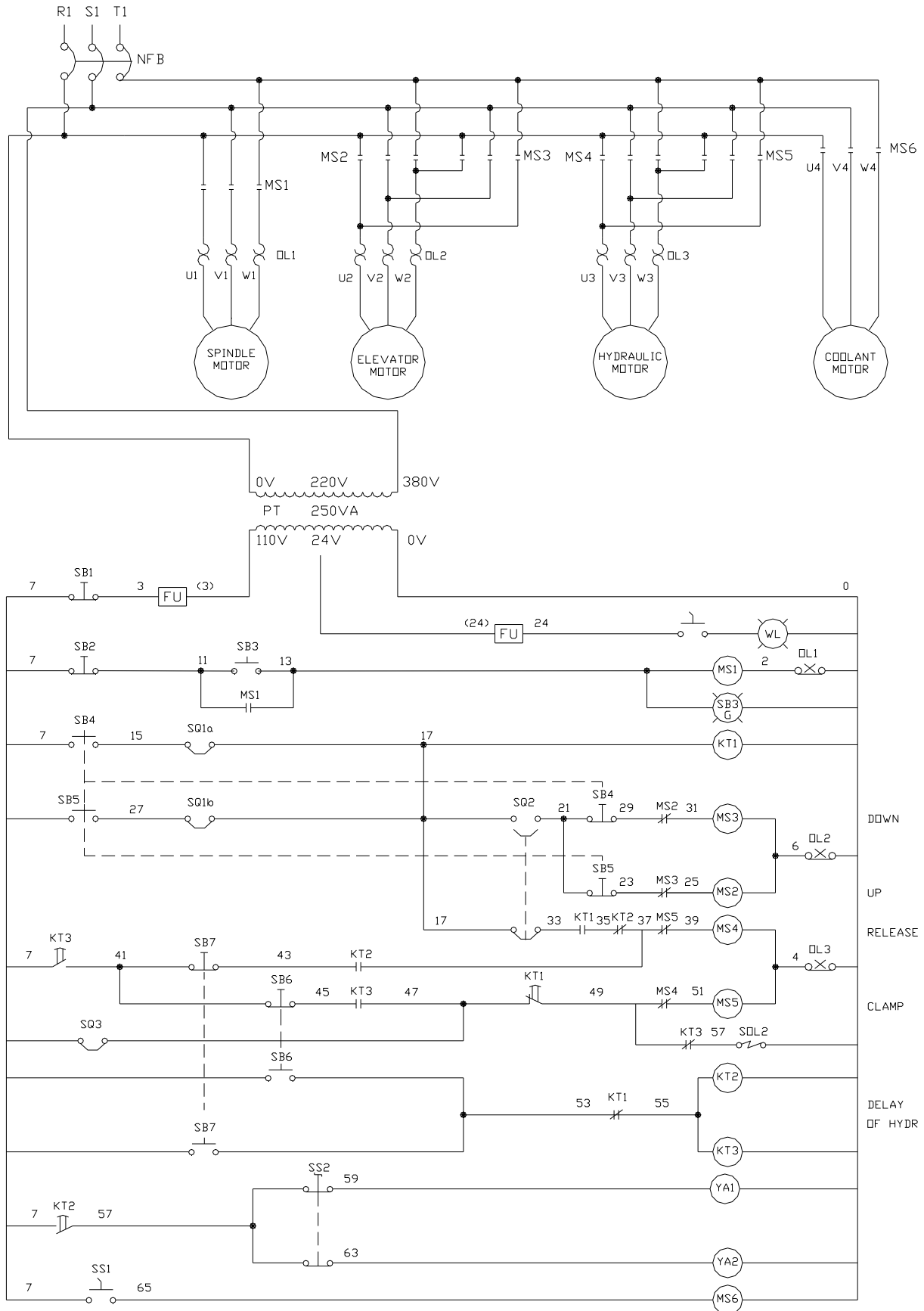
8.4 What if the screw tap get broken?

- a. Stop the spindle.**
- b. Press down the emergent stop button.**
- c. Using thread releaser, rotate the screw tap counter clockwise till it comes out. If it is impossible to pull it out, you may think to melt it out with EDM or declare it unusable.**

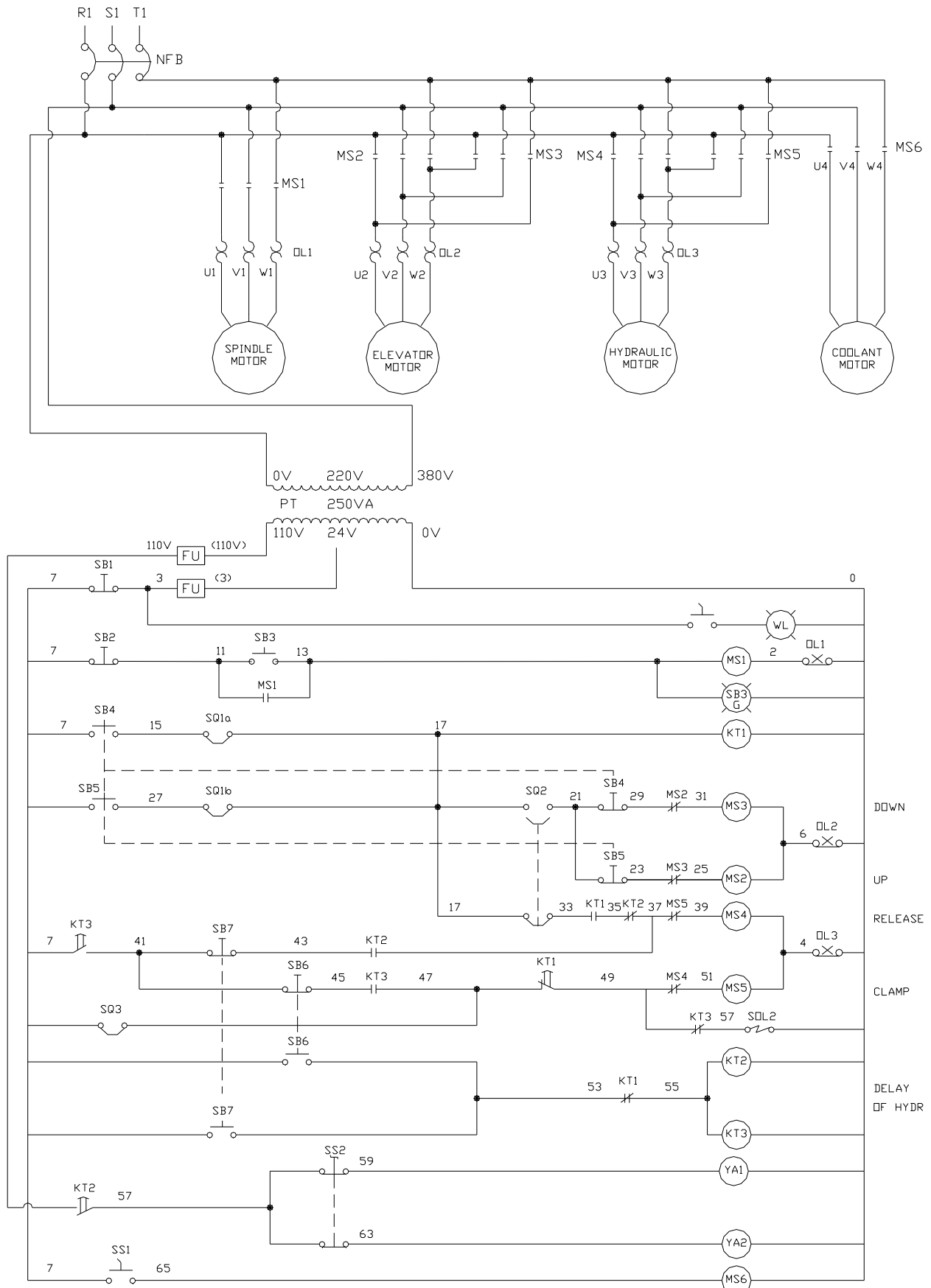
8.5 How if a person is entangled?

- a. Press down the emergent stop button.**
- b. Power off.**
- c. Switch the speed change lever to the highest gear.**
- d. Rotate the spindle with hands counter clockwise (if the spindle moved clockwise before, then its reverse direction is counter clockwise now) till that the person is free from the machine.**

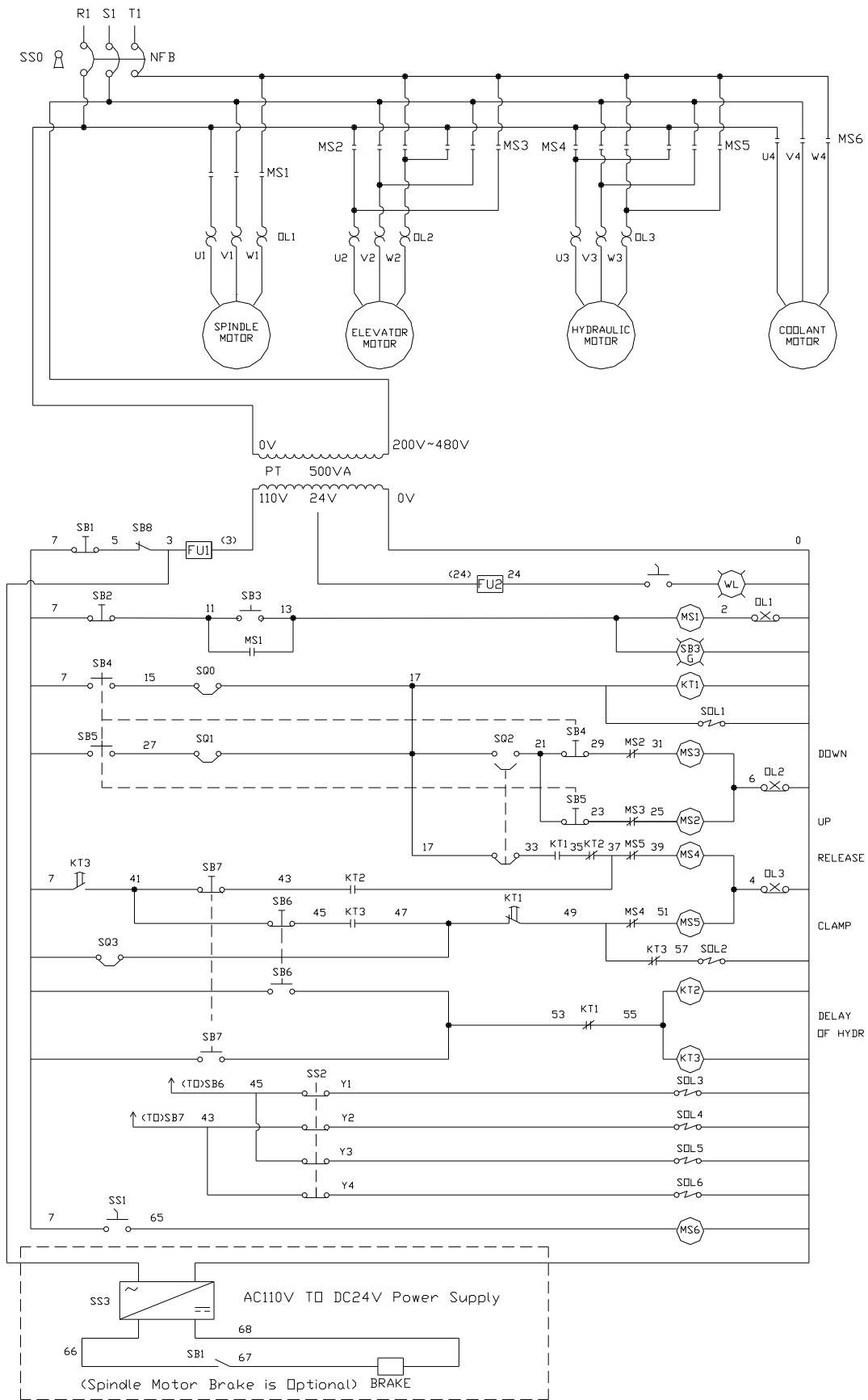
Annex1 Electrical circuit diagram (TPR-C1250A,TPR-C1600 Standard) for 110V



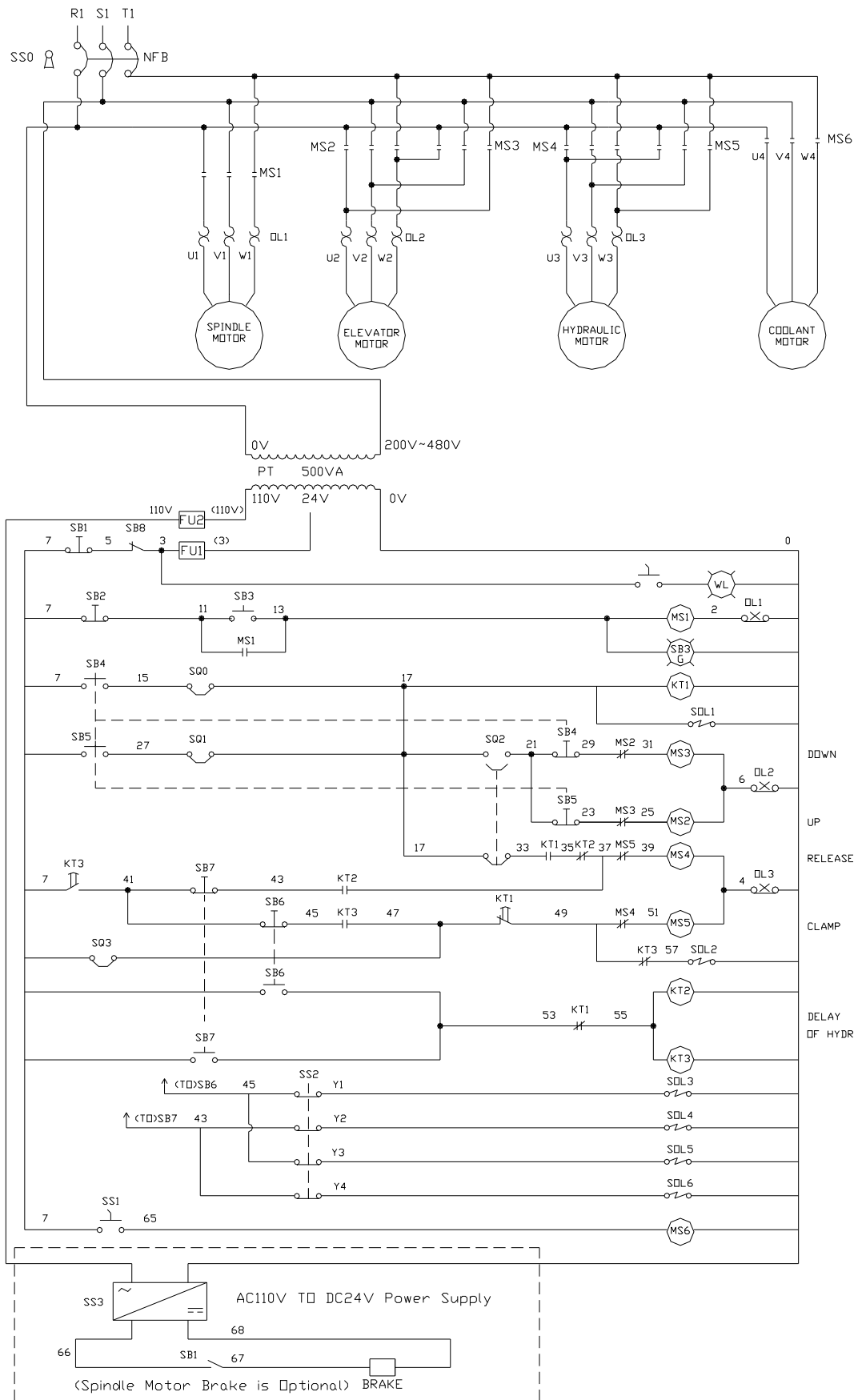
Annex1 Electrical circuit diagram (TPR-C1250A,TPR-C1600 Standard) for 24V



Annex1 Electrical circuit diagram (TPR-C2500 Standard) for 110V



Annex1 Electrical circuit diagram (TPR-C2500 Standard) for 24V



Annex2 Electrical Main Parts list (TPR-C1250A,TPR-C1600)

Part No.	Symbol	Name	Specification	Q'ty	Remark
E0403003	NFB	Circuit breaker	3P. 30A	1	For 200~240V
E0403004	NFB	Circuit breaker	3P. 20A	1	For 380~480V
E0701021	MS1	Magnetic Contact	CU18 3a1a1b AC110V	1	
E0701020	MS2	Magnetic Contact	CU11 3a1b 110V	1	
E0701020	MS3	Magnetic Contact	CU11 3a1b 110V	1	
E0701020	MS4	Magnetic Contact	CU11 3a1b 110V	1	
E0701020	MS5	Magnetic Contact	CU11 3a1b 110V	1	
E0701020	MS6	Magnetic Contact	CU11 3a1b 110V	1	
E0207057	OL1	Over load relay	RHU 10/11.3~16	1	For 200~240V
E0207055	OL2	Over load relay	RHU 10/15.5~7.5	1	For 200~240V
E0207054	OL3	Over load relay	RHU 10/3.5~4.8	1	For 200~240V
E0207056	OL1	Over load relay	RHU 10/9~12.5	1	For 380~480V
E0207054	OL2	Over load relay	RHU 10/3.5~4.8	1	For 380~480V
E0207053	OL3	Over load relay	RHU 10/1.8~2.5	1	For 380~480V
	PT	Transformer	250VA 1:0,220,380,415,440V 2:0,24,110V	1	Optional
E3101009	Fu	Fuse	E16	2	
E3101013	Fu	Fuse	E16 6A	2	
E0701016 E0209001	KT1	Timer Relay	LC1D09F7 110V+LA3DR0	1	0.1~3 sec
E0701016 E0209001	KT2	Timer Relay	LC1D09F7 110V+LA3DR0	1	0.1~3 sec
E0701016 E0210001	KT3	Timer Relay	LC1D09F7 110V+LA2DT2	1	0.1~3 sec
E1618002	SB1	Emg. Rush Button	XB4-BS542	1	
E1202019 E1202025	SB2	Push Button	ZB4-BA1+ZB4-BZ102	1	
E1202003	SB3	Push Button	YK22Φ 110V green	1	
E1202022 E1202020	SB4	Push Button	ZB4-BA2+ZB4-BZ105	1	
E1202022 E1202020	SB5	Push Button	ZB4-BA2+ZB4-BZ105	1	
E1202022 E1202020	SB6	Push Button	ZB4-BA2+ZB4-BZ105	1	
E1202022 E1202020	SB7	Push Button	ZB4-BA2+ZB4-BZ105	1	

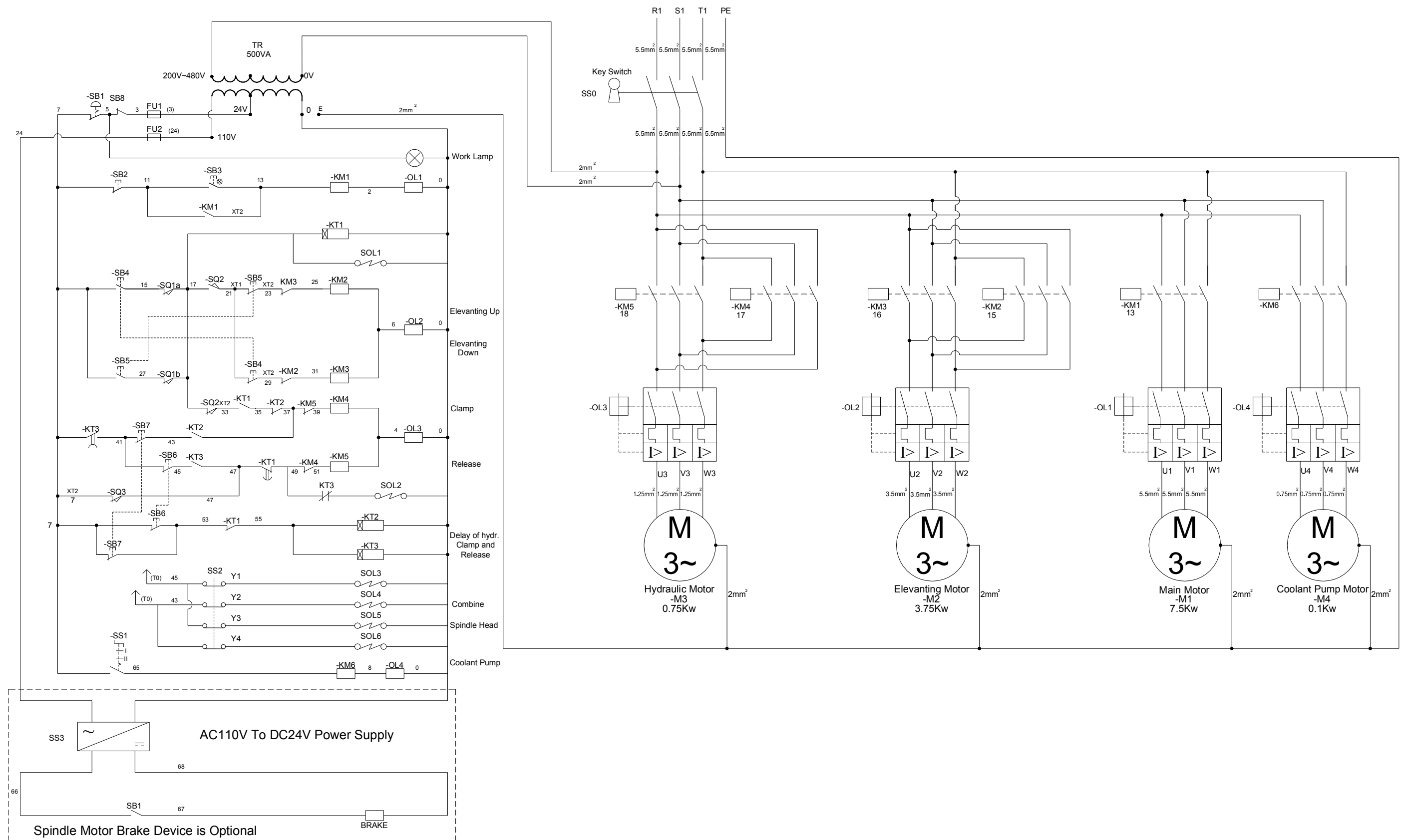
Part No.	Symbol	Name	Specification	Q'ty	Remark
E1302004	SS1	Selector switch	YK22Φ 1A1B (B)	1	
E1302022 E1302023	SS2	Selector switch	ZB4-BD3+ZB4-BZ104	1	
		Spindle Motor	vertical 5HP 4P 3PH	1	
		Ascending/ Descending Motor	vertical 2HP 4P 3PH	1	
		Cooling Motor	1/4HP 2P	1	
E0303015		Terminal block	Ta020*45P	1	
M0302014	YA1	Solenoid	MFJ 1-3 110V	1	
M0302014	YA2	Solenoid	MFJ 1-3 110V	1	
E1617001	SQ1	Travel Switch	HZ4-22	1	
E0901007	SQ2	Limit Switch	1704	1	
E0901007	SQ3	Limit Switch	1704	1	
E1701001	WL	Work Lamp	A-L301C 24V/20W	1	

Annex3 Electrical Main Parts list (TPR-C2500)

Part No.	Symbol	Name	Specification	Q'ty	Remark
E1401020 E0403029	SS0	Key Switch	EZAROTE 3P30A100B	1	For 380~480V Optional CE
E1401020 E0403011	SS0	Key Switch	EZAROTE 3P50A100B	1	For 200~240V Optional CE
E0403003	NFB	Circuit breaker	3P. 30A	1	For 380~480V
E0403009	NFB	Circuit breaker	3P. 50A	1	For 200~240V
E0701022	MS1	Magnetic Contact	CU27 3a1a1b AC110V	1	
E0701021	MS2	Magnetic Contact	CU11 3a1a1b AC110V	1	
E0701021	MS3	Magnetic Contact	CU11 3a1a1b AC110V	1	
E0701020	MS4	Magnetic Contact	CU11 3a1b AC110V	1	
E0701020	MS5	Magnetic Contact	CU11 3a1b AC110V	1	
E0701020	MS6	Magnetic Contact	CU11 3a1b AC110V	1	
E0703006	MS1	Magnetic Contact	CU27 3a1a1b AC24V	1	Optional
E0703005	MS2	Magnetic Contact	CU18 3a1a1b AC24V	1	Optional
E0703005	MS3	Magnetic Contact	CU18 3a1a1b AC24V	1	Optional
E0703004	MS4	Magnetic Contact	CU11 3a1b AC24V	1	Optional
E0703004	MS5	Magnetic Contact	CU11 3a1b AC24V	1	Optional
E0703004	MS6	Magnetic Contact	CU11 3a1b AC24V	1	Optional
E0207061	OL1	Over load relay	RHU 80/24.5~36A4	1	For 200~240V
E0207057	OL2	Over load relay	RHU 10/11.36~16	1	For 200~240V
E0207054	OL3	Over load relay	RHU 10/3.5~4.8	1	For 200~240V
E0207059	OL1	Over load relay	RHU 80/17~25A4	1	For 380~480V
E0207056	OL2	Over load relay	RHU 10/9~12.5	1	For 380~480V
E0207053	OL3	Over load relay	RHU 10/1.8~2.5	1	For 380~480V
	PT	Transformer	500VA 1:0,200V~480V 2:0,24,110V	1	Optional
E3101009	Fu	Fuse seat	10*38	2	
E3101025	FU	Fuse	10*38*6A	2	
E0701016 E0209001	KT1	Timer Relay	LC1D09F7 110V 4A+LA3DRO	1	0.1~3 sec
E0701016	KT2	Magnetic Contact	LC1D09F7 110V 4A	1	
E0701016 E0210001	KT3	Timer Relay	LC1D09F7 110V 4A+LA2DTO	1	0.1~3 sec

Part No.	Symbol	Name	Specification	Q'ty	Remark
E1202045	SB1	Emg. Rush Button	XB2BS544C-R-2B	1	
E1202046	SB2	Push Button	XB2BA23C-2A	1	
E1202003	SB3	Push Button	YK22ΦYK110V green 1A1B	1	
E1202001	SB3	Push Button	YK22Φ24V green 1A1B	1	Optional
E1202046	SB4	Push Button	XB2-BA23C-2A	1	
E1202046	SB5	Push Button	XB2-BA23C-2A	1	
E1202046	SB6	Push Button	XB2-BA23C-2A	1	
E1202046	SB7	Push Button	XB2-BA23C-2A	1	
E0901006	SB8	Micro Switch	1309	1	Optional
E1302004	SS1	Change Over Button	YK22Φ 1A1B (B)	1	
E1302035	SS2	Selector switch	SKB2+BD34	1	
E1202040	SS2	Selector switch	SKB2-BE102-1B	2	
E3501002	SS3	Power Supply	S-50-24	1	
E0303010	X1	Terminal block	4p 50A	1	
E0303015	X2	Terminal block	Ta020*40P	1	
M0302018	SOL1 ∙ SOL2	Solenoid Valve	DSG-02-3C2 110V	1	
M0302018	SOL3 ∙ SOL4	Solenoid Valve	DSG-02-3C2 110V	1	
M0302018	SOL5 ∙ SOL6	Solenoid Valve	DSG-02-3C2 110V	1	
M0302019	SOL1 ∙ SOL2	Solenoid Valve	DSG-02-3C2 24V	1	
M0302019	SOL3 ∙ SOL4	Solenoid Valve	DSG-02-3C2 24V	1	
M0302019	SOL5 ∙ SOL6	Solenoid Valve	DSG-02-3C2 24V	1	
E0901042	SQ0	Limit Switch	9208	1	
E0901042	SQ1	Limit Switch	9208	1	
E0901007	SQ2	Micro Switch	1704	1	
E0901007	SQ3	Micro Switch	1704	1	
E1701001	WL	Work Lamp	A-L301C 24V/20W	1	
E0703009 E0209001	KT1	Timer Relay	LC1D09B7 AC24V+LA3 DRO	1	
E0703009	KT2	Magnetic Contact	LC1D09B7 AC24V	1	
E0703009 E0210001	KT3	Timer Relay	LC1D09B7 AC24V+LA3 DTO	1	
		Spindle Motor	Vertical 10HP 4P 3PH	1	
		Ascending/ Descending Motor	Vertical 5HP 4P 3PH	1	
		Hydraulic Motor	Vertical 1HP 4P 3PH	1	
		Cooling Motor	1/4HP 2P	1	

Annex4 Electrical Main Parts list (for TPR-C2500 CE Standard)

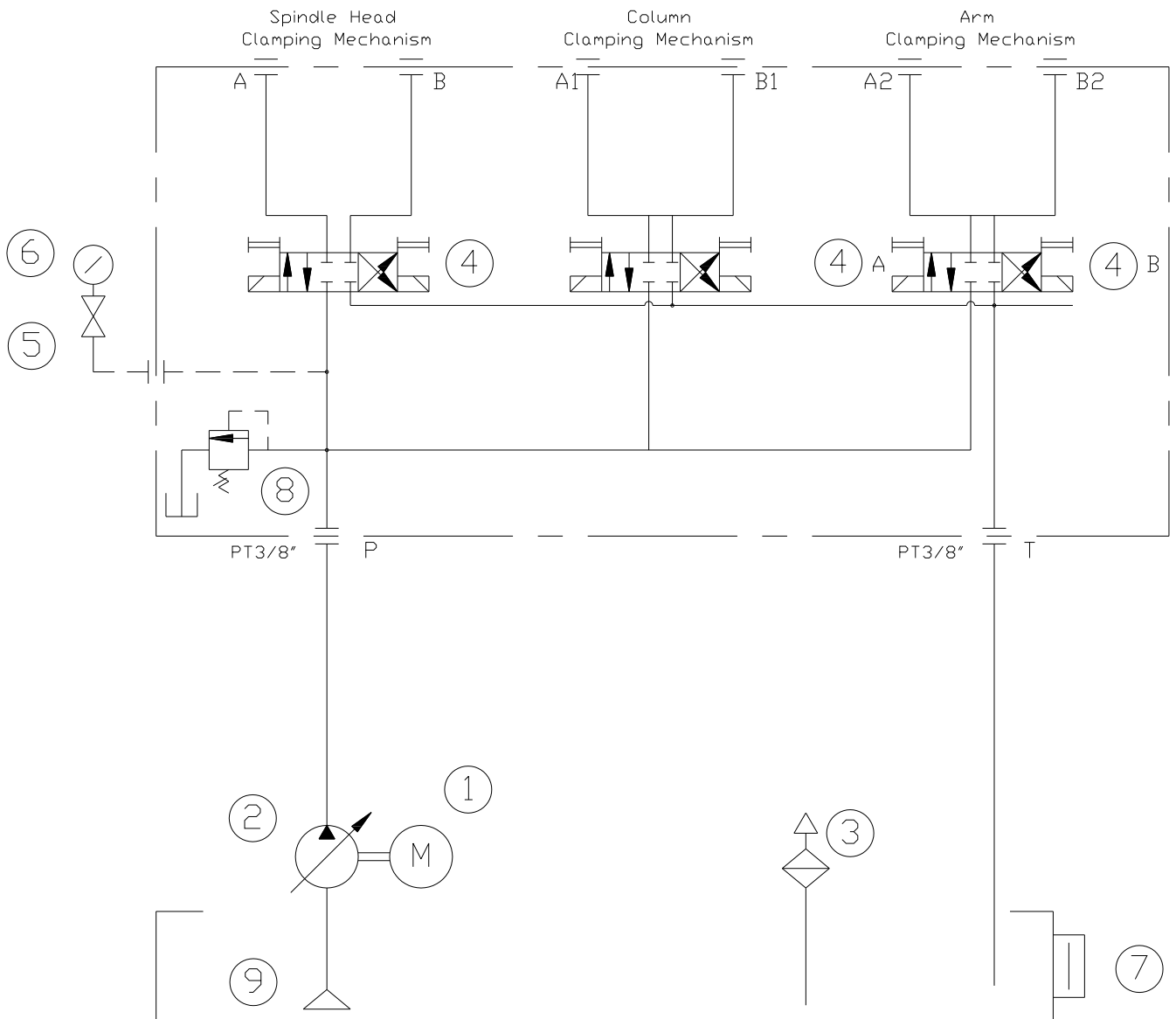


Annex5 Electrical Main Parts list (TPR-C2500 CE Standard)

Part No.	Symbol	Name	Specification	Q'ty	Remark
2E1625007 2E1630001 2E1630002	SS0	Key Switch	NZMB1-A32A NZM1*TVPNA NZM1/2-XV4	1	For 380~480V UL/CSA Optional
2E1625017 2E1630001 2E1630002	SS0	Key Switch	NZMB1-A50 NZM1*TVPNA NZM1/2-XV4	1	For 200~240V UL/CSA Optional
E0703006	MS1	Magnetic Contact	CU27 24V	1	
E0703005	MS2	Magnetic Contact	CU18 24V	1	
E0703005	MS3	Magnetic Contact	CU18 24V	1	
E0703004	MS4	Magnetic Contact	CU11 3a1b 24V	1	
E0703004	MS5	Magnetic Contact	CU11 3a1b 24V	1	
E0703004	MS6	Magnetic Contact	CU11 3a1b 24V	1	
E0207061	OL1	Over load relay	RHU-80Kz 24.5~36A	1	For 200~240V
E0207058	OL2	Over load relay	RHU-10 15~20A	1	For 200~240V
E0207054	OL3	Over load relay	RHU-10 3.5~4.8A	1	For 200~240V
E0207050	OL4	Over load relay	RHU-10/1.1~1.6		For 200~240V
E0207059	OL1	Over load relay	RHU-80Kz 17~25A	1	For 380~280V
E0207056	OL2	Over load relay	RHU-18 9~12.5A	1	For 380~480V
E0207053	OL3	Over load relay	RHU-10 1.8~2.5A	1	For 380~480V
E0207049	OL4	Over load relay	RHU-10/0.55~0.8	1	For 380~480V
	PT	Transformer	500VA 1:0,220,380,415,440V 2:0,24,110V	1	optional
E3101019	Fu1、Fu2	Fuse seat	10*38	2	UL/CSA optional
E2802109	Fu1、Fu2	Fuse seat	10*38	2	
E3101043	Fu1	Fuse	10*38*6A	1	UL/CSA optional
E3101039	Fu2	Fuse	10*38*2A	1	UL/CSA optional
E3101025	Fu1	Fuse	10*38*6A	1	
E3101022	Fu2	Fuse	10*38*2A	1	
E0703009 E0209001	KT1	Timer Relay	LC1D09B7 24V+LA3DRO	1	0.1~3 sec
E0703009	KT2	Timer Relay	LC1D09B7 24V	1	
E0703009 E0210001	KT3	Timer Relay	LC1D09B7 24V+LA2DTO	1	0.1~3 sec
E1618002	SB1	Emg. Rush Button	XB4-BS542	1	UL/CSA optional
E1202019 E1202025	SB2	Push Button	ZB4-BA1+ZB4-BZ102	1	UL/CSA optional
E1202001	SB3	Push Button	YK22Φ 24V green	1	
E1202022 E1202020	SB4	Push Button	ZB4-BA2+ZB4-BZ105	1	UL/CSA optional
E1202022 E1202020	SB5	Push Button	ZB4-BA2+ZB4-BZ105	1	UL/CSA optional

Part No.	Symbol	Name	Specification	Q'ty	Remark
E1202022 E1202020	SB6	Push Button	ZB4-BA2+ZB4-BZ105	1	UL/CSA optional
E1202022 E1202020	SB7	Push Button	ZB4-BA2+ZB4-BZ105	1	UL/CSA optional
E0901006	SB8	Limit Switch	1309	1	Optional
E1401020 E0403029	SS0	Key Switch	EZAROTE 3P30A100B	1	For 380~480V Optional CE
E1401020 E0403011	SS0	Key Switch	EZAROTE 3P50A100B	1	For 200~240V Optional CE
E1302004	SS1	Selector switch	YK22Φ 1A1B(B)	1	
E1302022 E1302023	SS2	Selector switch	ZB4-BD3+ZB4-BZ104	1	UL/CSA optional
E1202024	SS2	Selector switch	ZBE-102	2	UL/CSA optional
E3501002	SS3	Power supply	S-50-24	1	Optional
		Spindle Motor	Vertical 10HP 4P 3PH	1	
		Ascending/ Descending Motor	Vertical 5HP 4P 3PH	1	
		Hydraulic Motor	Vertical 1HP 4P 3PH	1	
		Cooling Motor	1/4HP 2P	1	
E0303017	X1	Terminal block	AVK-16 * 3P	1	
E0303018	X1	Terminal block	AVK-35*1P	1	
E0301003	X2	Terminal block	WG260 -311*18P	1	
E0301001	X2	Terminal block	WG260 -346*13P	1	
E0301039	X3	Terminal block	AKV6*3P	1	
E0301034	X3	Terminal block	AKV4*9P	1	
E0901042	SQ0	Limit Switch	9208	1	
E0901042	SQ1	Limit Switch	9208	1	
E0901007	SQ2	Micro Switch	1704	1	
E0901007	SQ3	Micro Switch	1704	2	
E1701001	WL	Work Lamp	A-L301C 24V/20W	1	
M0302019	SOL1、SOL2	Solenoid Valve	DSG-02-3C2 24V	1	
M0302019	SOL3、SOL4	Solenoid Valve	DSG-02-3C2 24V	1	
M0302019	SOL5、SOL6	Solenoid Valve	DSG-02-3C2 24V	1	
E1202045	SB1	Emg. Rush Button	XB2BS544C-R-2B	1	
E1202046	SB2	Push Button	XB2BA23C-2A	1	
E1202046	SB4	Push Button	XB2BA23C-2A	1	
E1202046	SB5	Push Button	XB2BA23C-2A	1	
E1202046	SB6	Push Button	XB2BA23C-2A	1	
E1202046	SB7	Push Button	XB2BA23C-2A	1	
E1302035	SS2	Selector switch	SKB2+BD34	1	
E1202040	SS2	Selector switch	SKB2-BE102-1B	2	
E0901006	SB7	Micro Switch	1309	1	Optional

Annex 6 Hydraulic circuit diagram



Annex 7 Hydraulic main parts list

No.	Name	Specification	Q'ty	Remark
1	Motor	1HP*4P	1	
2	Pump	HGP-1A-F6	1	
3	Oil ejector	OIL	1	
4	Solenoid Valve	DSG-01-3C2-D24	3	
5	Anti-fluctuator	SB-02	1	
6	Pressure gauge	AT1/4"*63*100K	1	
7	Oil-levelgauge	LS-3"	1	
8	Overflow Valve	DG-02B	1	
9	Fuelfilter screen	MF-04	1	
10	Oiling diagram	2"3Way	1	
11	Assembling gasoline tank	10L Gasoline tank	1	