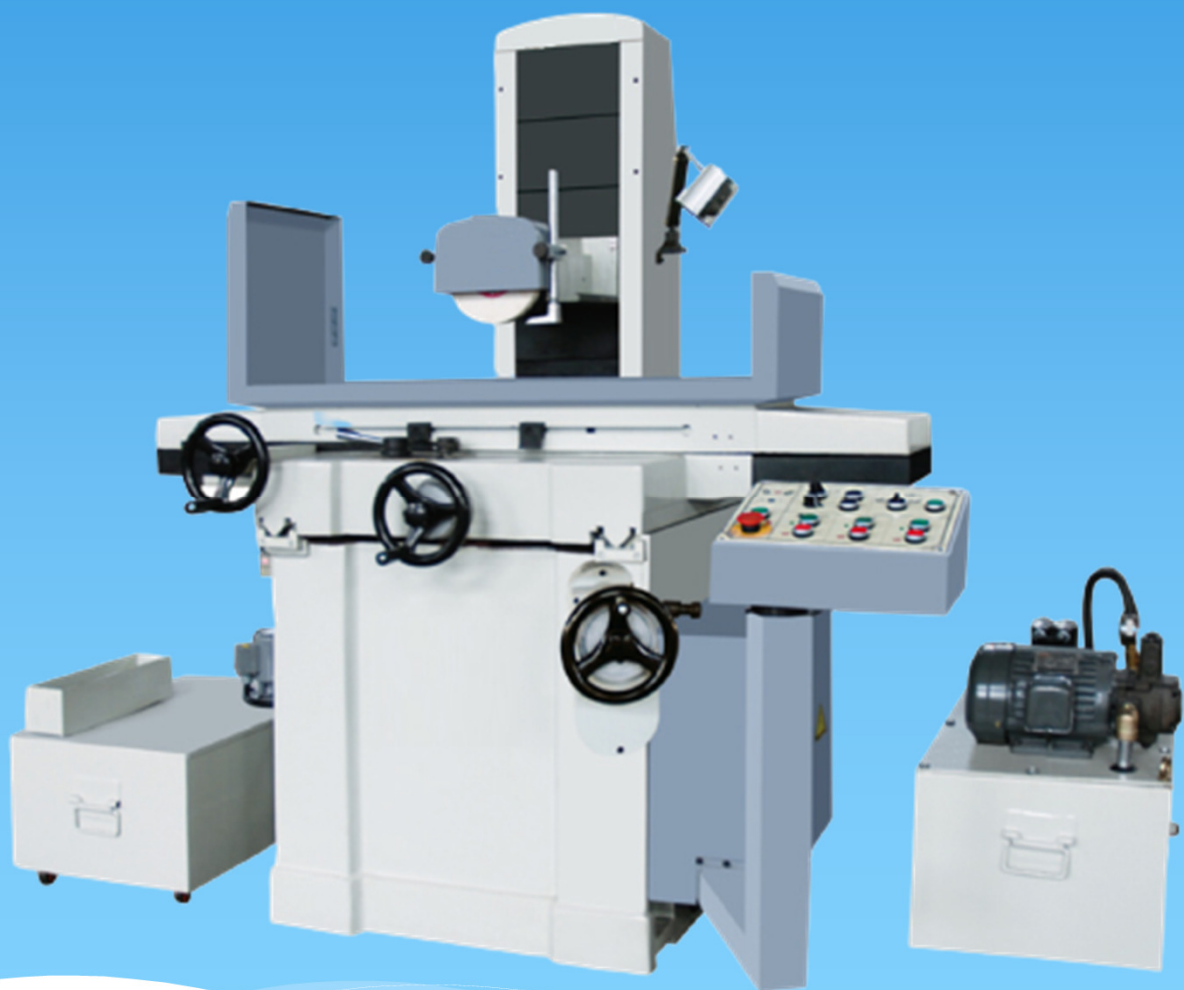


SURFACE GRINDER MACHINE MANUAL



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CHAPTER 1: SAFETY PRECAUTIONS

SAFETY PRECAUTIONS

Safety first!

We're glad to provide the information for using machines safely, to assist and keep safety while you're working, and to help avoiding any damage to the machine. We have two different kinds of manuals:

1)) OPERATIONAL MANUAL

2)) ELECTRICAL MANUAL

Please check if there's any pages missing in your manual as soon as you receive the machine. Let us or the agent nearby know if there's any insufficiency.

Put your manual near the machine in case you want to read it. Also keep the manual carefully so that you will be able to read it any time you wish.

Please use your experience and the information from this manual to get the safest working circumstance.

1. General operating safety precautions:

1. 1 : Machine usage: Obey every message from the manuals.
2. : Only an operator who is well trained for grinding machines should operate and maintain the machine.
3. 3 : Please read and understand the manuals before using the machine.
- 4.4 : Keep the work area clean, and leave no oil spot.
- 1.5 : Do not wear gloves while operating machines.
6. : Please wear suitable outfit while operating machines. Tie up your sleeve links and don't wear any necktie.
- 7. : *Do not touch any moving or rotating parts of machine.***
8. : Do not touch or open the parts where we have the electric sign on them, such as electrical box.
9. 9 : Turn off the power before maintenance or leaving the machine unattended.
10. 0: Make sure you have enough light in your working area.
11. : Propose non-electric-conductor fire extinguisher (dry powder) for preparation.
- 12. : *Stop machine immediately if anything unexpected happens.***

2. Safety precautions for operating machine

For using this machine safely, please ask every operator, maintenance man, or any other persons to obey the safety precaution. To obey the safety precautions below will reduce the danger of any possible damage.

1. : ***This machine can only grind metallic work piece. But do not grind magnesium or magnesium alloy.***
2. : This machine cannot be used in a place where there is gas which is easy to burn or explode.
3. 3 : Do not disassemble any protective guard before use.
4. 4 : Please read and understand your manual before operation.
5. : ***Check the position of emergency stop buttons and other stop button before operation.***
- 6.6 : Confirm the function of the buttons before operation.
- 2.7 : Wear safety glasses.
7. : Make sure every switch is in the position of "OFF" before operation.
9. : ***Require people with experiences to balance and install the grinding wheel.***
10. 0: Check the running direction of the grinding wheel before operating.
11. : Turn on the power to make the grinding wheel for run about five minutes at least, then start to work.
12. : Check if the work piece is secured on the table or magnetic chuck and is very steady before operation.
13. : Stop the movement of the table before adjusting the travel of cross or longitudinal movement.
- 14.: Before changing the procedure of grinding, make sure the machine has stopped totally first.
- 2.15: Never use any coolant liquid that is easy to burn or poisonous.
16. : The grinding wheel of this machine should be able to handle at least 2000M/min speed.
- 17.: Do not grind on the side of the grinding wheel.
- 2.18: Obey precautions as other chapters described.
- 2.19: Please wait until machine has stopped to clean and set-up.
- 2.20: Do not change any electrics or parts of machines.
21. : Require a qualified person to maintain the electric parts of machines.
22. : Do not tear the warning signs on the machines. If they are not clear, please contact your agent or our sales department for your replacement.
- 23.: Never mount a work-piece too large for the machine.
- 2.24: Use the correct lifting equipment for handling .

25. : Never use excessive depth of grinding or feed rate.

26. : Do not run the machine unattended.

27.: No person shall mount any grinding wheel unless he has been TRAINED.

2.28: Do turn off coolant before stopping wheel.

2.29: Do not grind material for which the wheel is not designed.

2.30: Do dress the wheel regularly to avoid loading.

CHAPTER 2: GRINDER DESCRIPTION

GRINDER DESCRIPTION

2.1: Introduction to the 3A and ASD surface grinding machine :

The X axis of the grinder (moves from left to right) can be driven hydraulically or manually. The Y axis (up and down) can use a power elevation motor, up/down automatic feed or manual feed. The front or rear (Z axis), cross-feeding is done automatically by the AC motor.

1. . COLUMN:

Enlarged, honeycomb-ribbed column especially suitable for heavy duty grinding.

2. . CONSTRUCTION:

Construction of table, saddle and base is casted with high grade casting iron, strongly ribbed.

3. SPINDLE:

Enlarged spindle set is supported by 4 pieces of pre-loaded precision angular contact ball heavy duty.

4. . SLIDE-WAY

Vertical, cross double vees and longitudinal one vee & one flat slide -ways are coated with Turcite-B, provide stable movement and durable accuracy.

5. . AUTOMATIC CONTINUOUS LUBRICATION SYSTEM:

All slide-ways and screws are fully oiled by automatic continuous lubrication system to eliminate slide-ways & screws.

6. . CROSS FEED:

Ball screw for cross travel, powered by AC motor.

7. . HYDRAULIC TABLE:

Table speed ranges 50Hz,5-28m/min(60Hz,5-23m/min). With rack and pinion table drive for hand operation.

8. . PROXIMITY SWITCH:

Provide built-in-type (hidden) proximity switch, easy operation.

9. TABLE SPEED CONTROL:

Presentable hydraulic table speed control allows operator to pre - set speed rate, enable to get same when engaging hydraulic table every time.

10. HAND WHEELS:

Zero-setting slip-rings with vernier on vertical hand-wheel, and vernier on cross-feed hand-wheel .

11. The following are workpiece materials which can be used on the grinders: STEELS [carbon steel, alloy steel], stainless steel, cast iron,

copper, aluminium. **DONOT** grinding magnesium. Do not dry grinding and do not grind non-magnetic material on the magnetic chuck.

12. Operator must have undergone training.

Note: ASD means grinder with auto downfeed, table movement by hydraulic and motorized cross-feed. 3A means grinder with motorized elevation, table movement by hydraulic and motorized cross-feed.

2.2 : Noise level and operator position

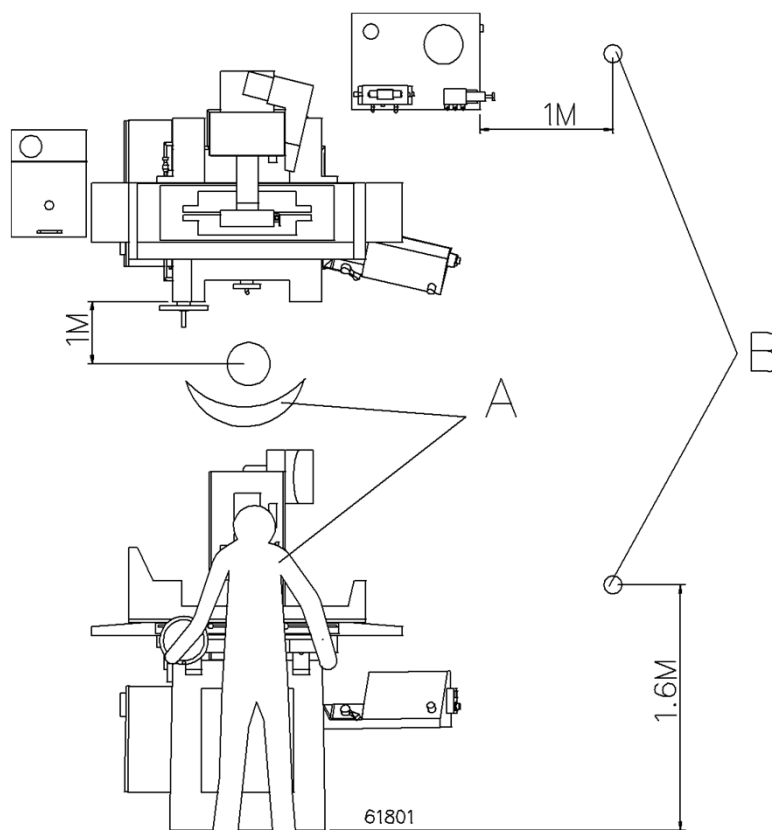
The noise level of this machine is under 75dB. To test noise level:

(1) Background noise: under 60 dB.

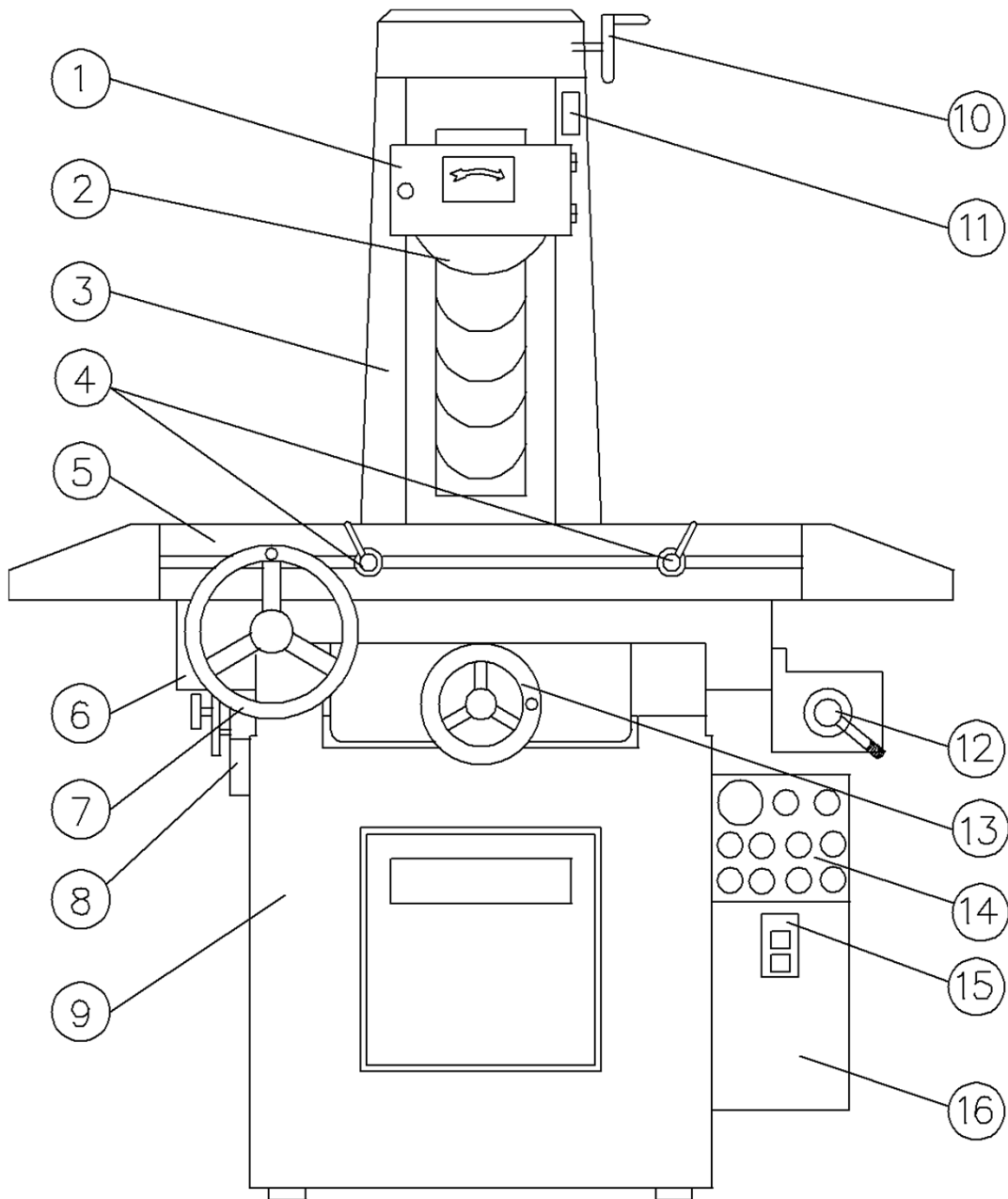
(2)) To test the status of your machine: At a distance of 1 meter from the surface of grinder and at a height of 1.6 meter from the floor.

(3) Apparatus: Qualified for IEC 651, noise meter for TYPE 1.

Set in : FAST .

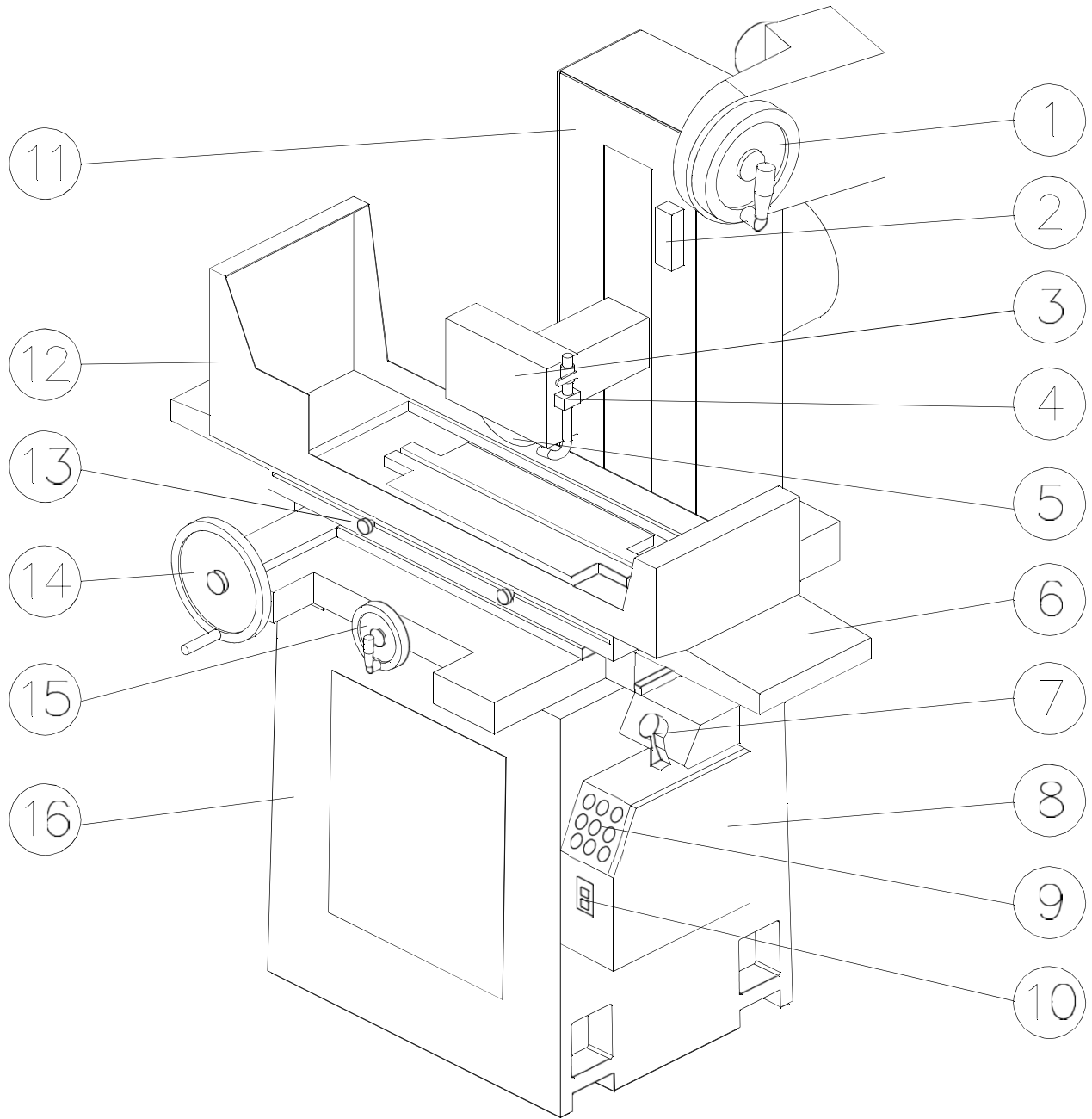


2.3 : The main parts of machine, and the position of operator



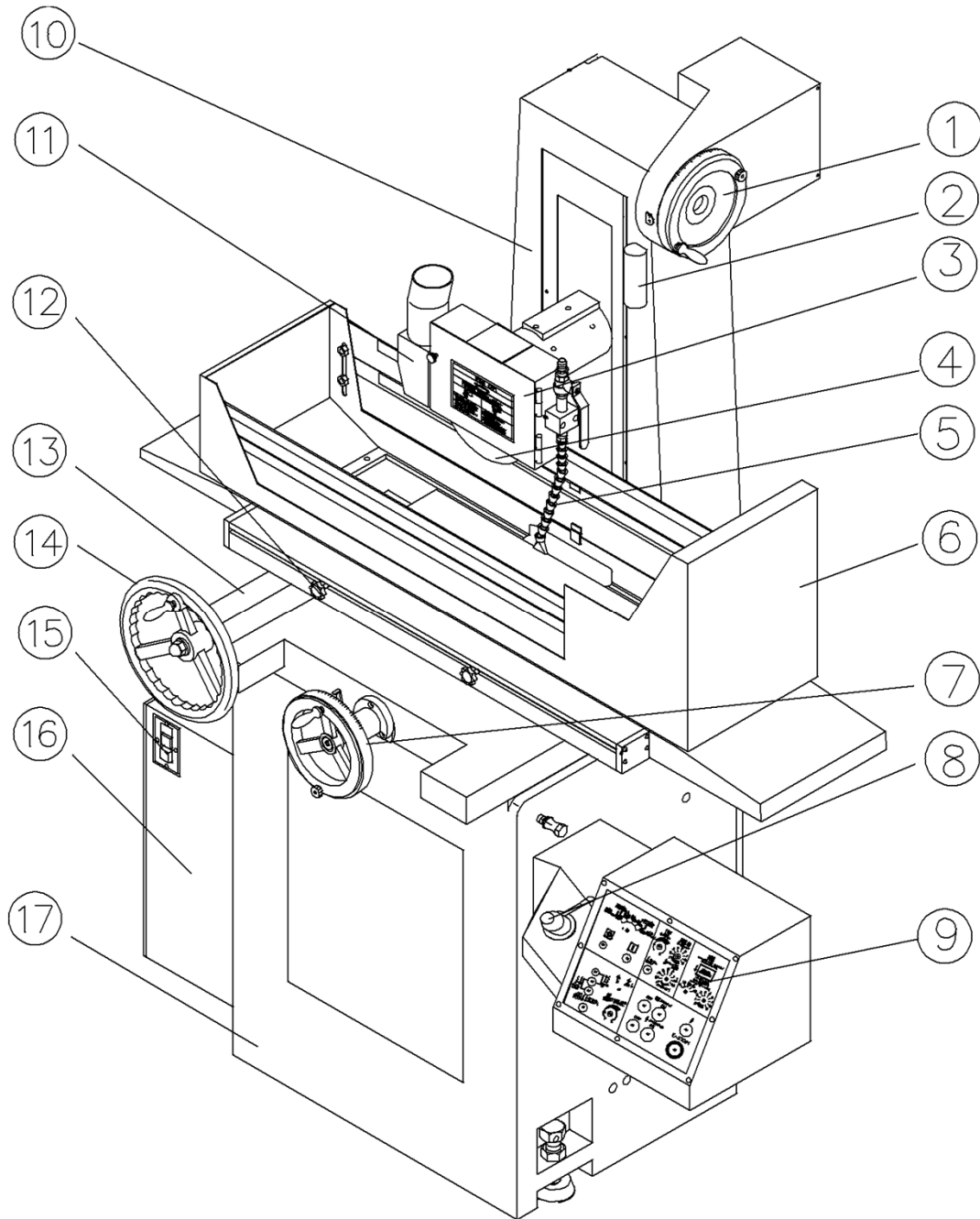
NO	UNIT NAME	NO	UNIT NAME
1.	Wheel guard & spindle	9.	Base
2.	Grinding wheel	10.	Downfeed handwheel
3.	Column	11.	Tool cabinet
4.	Cross travel adjuster	12.	Cross speed control
5.	Table	13.	Cross handwheel
6.	Saddle	14.	Control panel
7.	Cross handwheel	15.	Coolant & dust switch
8.	Longitudinal travel adjuster	16.	Electrical panel

2.3.1 : The main parts of machine, and the position of operator



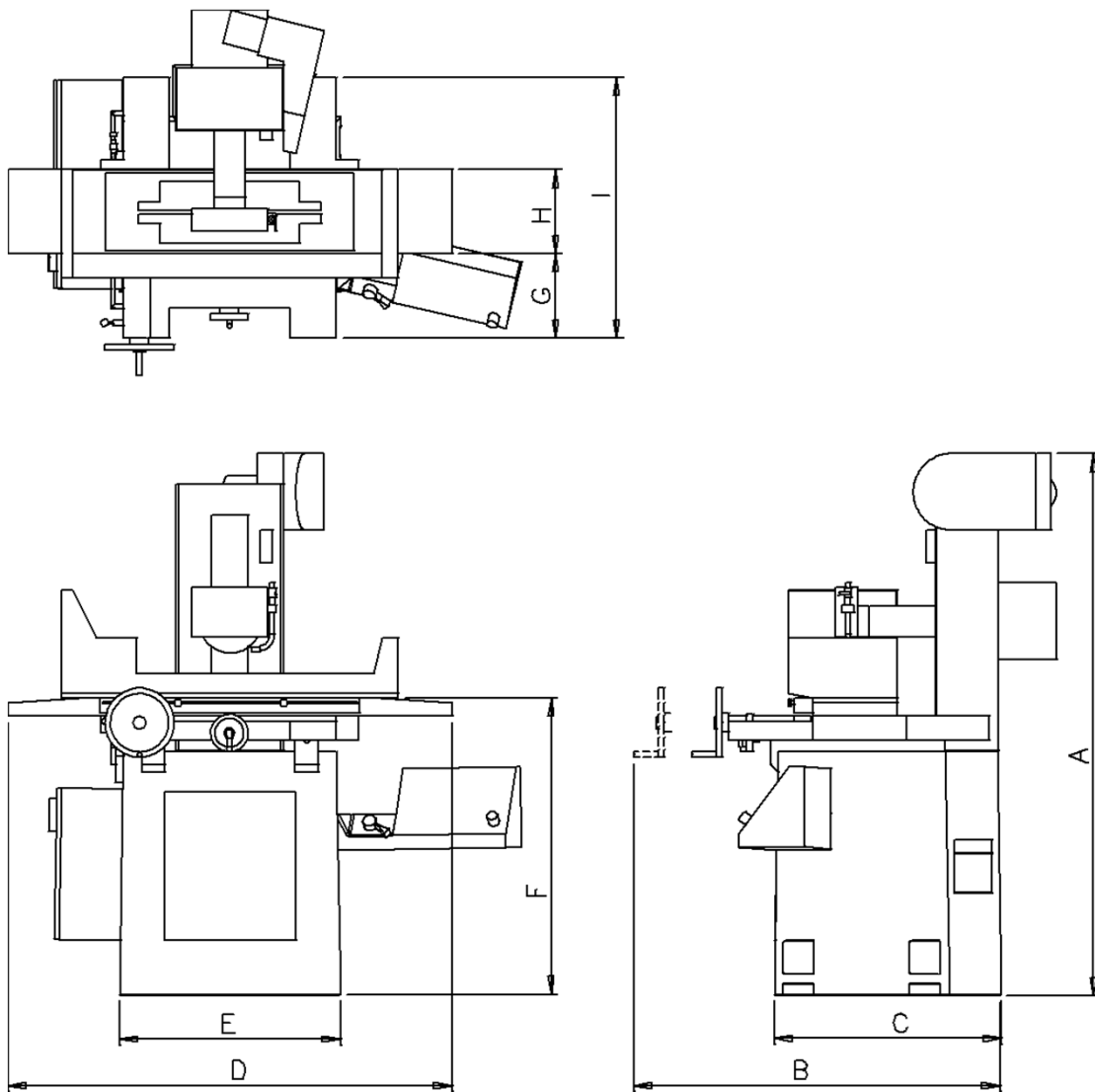
NO	UNIT NAME	NO	UNIT NAME
1.	Vertical feed handwheel	9.	Control panel
2.	Tool cabinet	10.	Coolant/Dust system on/off
3.	Wheel guard & Spindle	11.	Column
4.	Coolant nizzle	12.	Splash guard
5.	Grinding wheel	13.	Hydr. Table travel adjust
6.	Table	14.	Cross handwheel
7.	Table speed control unit	15.	Cross handwheel
8.	Electric box	16.	Base

2.3.2 : The main parts of machine, and the position of operator



NO	UNIT NAME	NO	UNIT NAME
1.	Vertical feed handwheel	10.	Column
2.	Tool cabinet	11.	Dust collecting nozzle
3.	Wheel guard & Spindle	12.	Hydr. Table travel adjust
4.	Grinding wheel	13.	Saddle
5.	Coolant nizzle	14.	Cross handwheel
6.	Splash guard	15.	Coolant/Dust system on/off
7.	Cross handwheel	16.	Electric box
8.	Table speed control unit	17.	Base
9.	Control panel		

2.4. : Dimensions and floor requirement



UNIT=MM


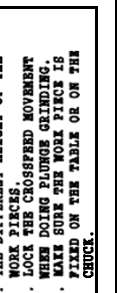
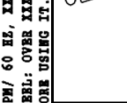
SERIES	A	B	C	D	E	F	G	H	I
618	1930	1105	645	1308	635	1010	230	280	695
818	1930	1305	720	1408	700	1020	270	280	860

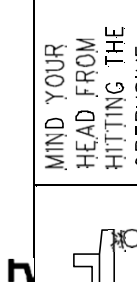
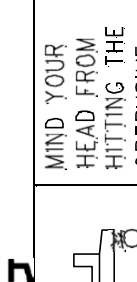
UNIT=INCH



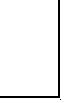

SERIES	A	B	C	D	E	F	G	H	I
618	76"	43.5"	25.4"	51.5"	25"	39.8"	9.1"	11"	27.4"
818	76"	51.4"	28.3"	55.4"	27.6"	40.2"	10.6"	11"	33.8"

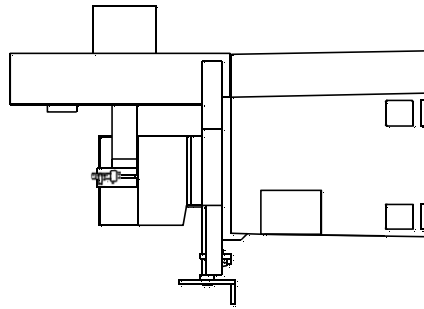
2.5 : The warning signs

There are warning signs on this machine to warn you of every possible danger and to keep your safety. Please read and fully understand the warning signs before operating.




⚠ WARNING	
	
<ol style="list-style-type: none"> 1. ROTATION DIRECTION OF SPINDLE IS COUNTERCLOCKWISE, MAX WHEEL SIZE: XXXX MM. 2. SPINDLE SPEED: XXXX RPM/ 60 HL, XXX RPM/ 50 HZ 3. OPERATING SPEED OF WHEEL: OVER XXXX M/MIN. 4. BALANCE THE WHEEL BEFORE USING IT. 	<p>KEEP YOUR HANDS AWAY FROM THE WORKING AREA UNTIL THE WHEEL STOP.</p> <ol style="list-style-type: none"> 1. TURN OFF THE POWER SUPPLY & THE EMERGENCY SWITCH BEFORE OPENING THE WHEEL GUARD OR CHANGING THE WHEEL.
<p>KEEP CLEAN POSSIBLES DANGER FROM FLYING PARTS.</p> <p>ALLOUM FOR :</p> <ol style="list-style-type: none"> 1. THE DIFFERENT HEIGHT OF THE WORK PIECES. 2. LOCK THE CROSSFEED MOVEMENT WHEN DOING PLUNGE GRINDING. 3. MAKE SURE THE WORK PIECE IS FIXED ON THE TABLE OR ON THE CRUICE. 	

⚠ WARNING	
	
<p>MIND YOUR HEAD DANGEROUS MOVING PARTS.</p>	<p>MIND YOUR HEAD FROM HITTING THE OBTRUSIVE ANGLE.</p>

⚠ WARNING			
			
<p>MIND YOUR HAND WHILE OPERATING.</p>	<p>KEEP CLEAR. DANGEROUS MOVING PARTS.</p>	<p>MIND YOUR HEAD FROM HITTING THE OBTRUSIVE ANGLE.</p>	<p>MIND YOUR HEAD FROM HITTING THE OBTRUSIVE ANGLE.</p>

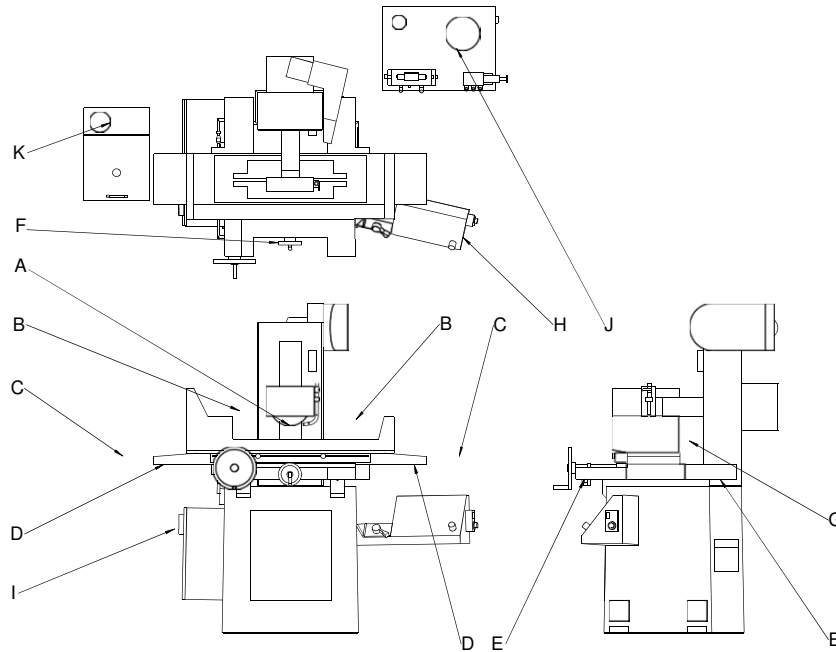


6180M03

⚠ DANGER	
	
<p>ELECTRIC SHOCK DANGER</p> <ol style="list-style-type: none"> 1. CONTROL PANEL BOX 2. ELECTRIC BOX 3. HYDRAULIC SYSTEM (WIRING BOX OF SOLENOID AND MOTOR) 4. COOLANT SYSTEM (WIRING BOX OF PUMP) 5. SPINDLE MOTOR 6. MOTOR FOR DOWNFEED MOVEMENT (INSIDE THE BASE) 7. LUBRICATION PUMP (INSIDE THE BASE) 8. MOTOR FOR CROSSFEED MOVEMENT 	

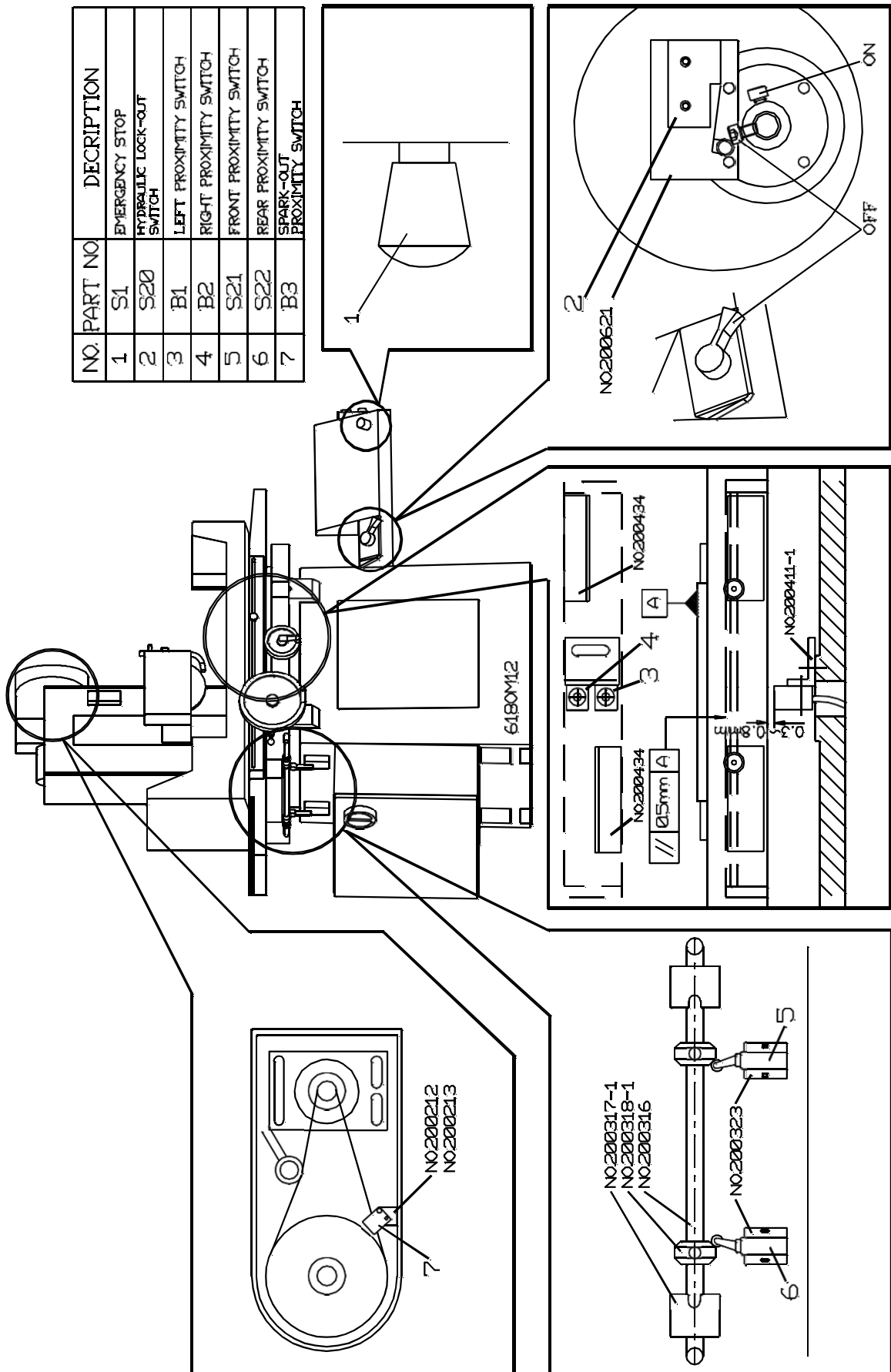
2.6 : Potential hazards area

This machine is designed for grinding metallic work piece; therefore, there are many electric devices and equipments in this machine. Don't open them on purpose or go near these dangerous area while operating or during maintenance.

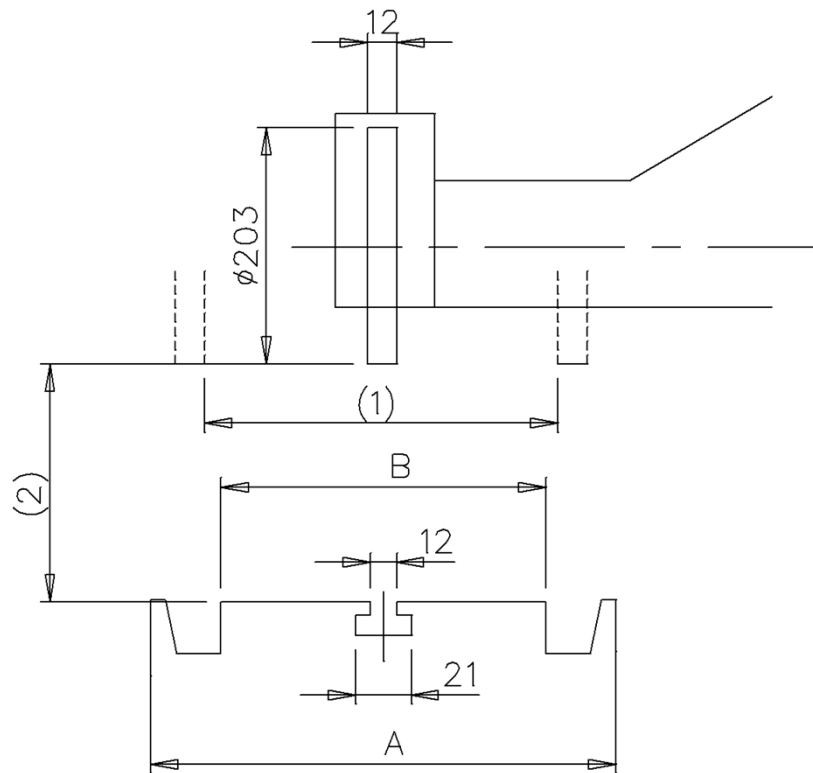


DANGER ZONE	DESCRIPTION
A	CUTTING DANGER: PUT HAND IN THE WORKING AREA OF RUNNING SPINDLE WHEEL
B	HITTING DANGER: PUT HEAD INTO THE WORKING AREA OF TABLE TO CHECK
C	SQUEEZING DANGER: PASSING THROUGH THE WORKING OF TABLE
D	SQUEEZING DANGER: PUT HAND INTO THE WORKING AREA OF TABLE
E	SQUEEZING DANGER: PUT HAND INTO THE WORKING AREA OF SADDLE
F	TANGLE DANGER: WEARING LOOSEN OR WIDE CLOTHE BENEATH THE WORKING AREA OF SADDLE
G	SQUEEZING DANGER: OTHERS START THE SADDLE WHILE DOING NAINTANANCE
H	ELECTRIC SHOCK DANGER: PEOPLE WITHOUT PROFESSIONAL KNOWLEDGE TO OPEN THE CONTROL BOX
I	ELECTRIC SHOCK DANGER: PEOPLE WITHOUT PROFESSIONAL KNOWLEDGE TO OPEN THE ELECTRICAL BOX
J	ELECTRIC SHOCK DANGER: PEOPLE WITHOUT PROFESSIONAL KNOWLEDGE TO OPEN THE MOTOR COVER OR THE WIRE CONNECTING COVER OF SOLENOID FROM THE OIL TANK
K	ELECTRIC SHOCK DANGER: PEOPLE WITHOUT PROFESSIONAL KNOLEDGE TO OPEN THE WIRE CONNECTING BOX FROM THE COOLANT TANK

2.7 : The position of Safety limit switch on grinder(ASD)



2.8: Working area



NOTE: THE TABLE LOAD IS NOT INCLUDED THE WEIGHT OF CHUCK.

UNIT:MM/INCHES		
1. OVERALL GRINDING WIDTH	168/6.63"	228/11"
2. OVERALL GRINDING HEIGHT	208/	208/"
3. OVERALL GRINDING LENGTH	480/19"	480/19"
4. TABLE LOAD	45KG	70KG
5. TABLE SPEED	528M/MIN(60HZ) 523M/MIN(50HZ)	528M/MIN(60HZ) 523M/MIN(50HZ)
6. SIZE OF CHUCK (CHUCK IS OPRION)	150x450(6"x18")	250x450(8"x18")
A.	210	275
B.	154	212

2.9 : Assembly drawing of wheel flange and spindle

(1)) Specification of wheel flange:

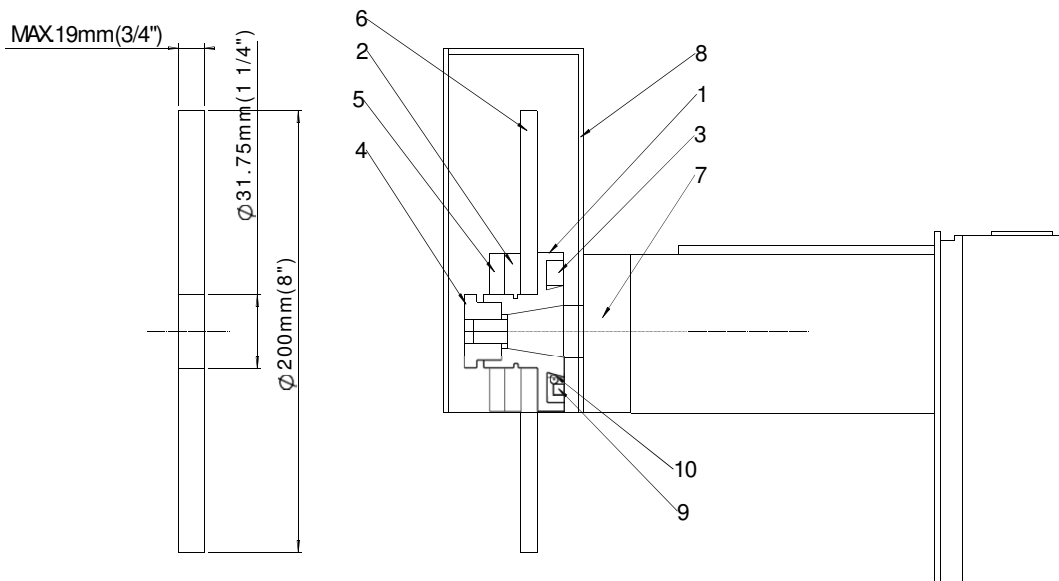
Outer diameter: $\phi 203$ mm. Inner diameter: $\phi 31.75$ mm

Width: 12 mm—19 mm

The flange must be able to handle wheel speed about 2200 m/min.

(2) Flange is equivalent to ISO-R666.

NO.	Parts	Parts no.	Q'TY	Remark
1	Flange	NO.100114	1	
2	Flange block	NO.100116-1	1	
3	Balance block	NO.100119	3	
4	Flange nut	NO.100115-2	1	1/2"x12NC,Left-hand
5	Wheel tighten screw	NO.100117-1	1	
6	Grinding wheel		1	200/12/31.75
7	Spindle	NO.1011	1	
8	Wheel cover	NO.1012	1	Guard, 3mm thickness
9	Screw		3	M4x0.7Px4L(mm)
10	Steel ball		3	Hardness: 60 HRc,4mm



2.10: Standard accessories and optional accessories

Standard accessories:

- (1) Tool box with tools1 SET
- (2) Wheel extract screw & nut1 PCS
- (3) Wheel balancing arbor1 PCS
- (4) Leveling screw with blocks1 SET
- (5) Grinding wheel.....1 PCS
- (6) Wheel flange..... 1 PCS
- (7) Touch-up paint.....1 CAN
- (8) Auto. lubrication equipment (fitted with the grinder)
- (9) Diamond dresser1 PCS
- (10) Encoder, digital display 1 PCS

Optional accessories:

- C0105 Electric magnetic chuck 150x450MM
- C0105A Electric magnetic chuck 200x450Mm
- C1001 Chuck control with demagnetizer
- C0201 Coolant and dust unit
- C0207 Coolant system with magnetic separator
- C0202 Coolant system
- C0203 Dust collector
- C0301 Balancing stand
- C0502 Splash guard
- C0601 Spare wheel flange

- C1101RA12 Spare grinding wheel
- C0701 Manual parallel dressing attachment
- 203SN Micro cross feed

CHAPTER 3: REQUIREMENT OF MACHINE

REQUIREMENT OF MACHINE

3.1 : Space requirement

The minimum space for machine:

For your convenience to operate, please take the walkway into consideration. Therefore, the ideal space for machine should be:

Length	1810mm(71")	1810mm(71")
Width	1133mm(45")	1285mm(50.5")
Height	1660mm(65")	1680mm(66")

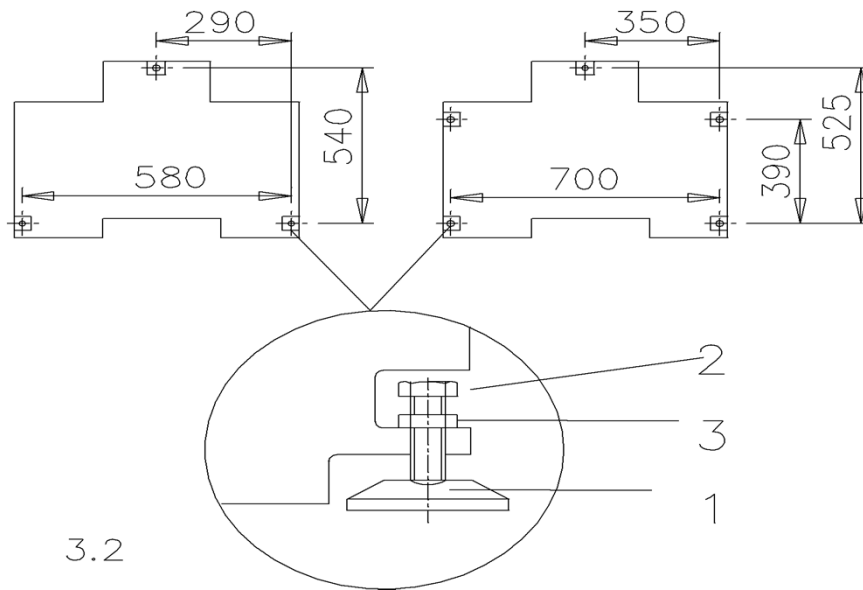
Note: TO KEEP THE MACHINE FROM THE ENVIRONMENT WHICH MIGHT CAUSE ANY EXPLOSION.

2. : Requirement of the ground

Firm, steady, good constructed ground, and leveling of the machine are the essential conditions for precision grinding. The heat from sunshine, and vibration might also influence precision grinding.

The foundation for the machine needs:

- (1)) The bearing strength for machine should be more than 2 TONS/M².
- (2) Avoid letting the sun shine directly on the grinder.
- (3) Avoid locating machine near other machines, such as press.
- (4)) Good ventilation.
- (5)) Please install your machine base on the foundation plan.
- (6) Foundation drawing refer to the following:



	Part name	Part no.	Q,TY (618)	Q,TY (818)
1	Leveling block	100506-1	3	5
2	Leveling screw	100505	3	5
3	NUT	M22*2.5P	3	5

Note: The grinder should be properly adjusted as levelness within 0.02mm/M.

3. : Requirement of the environment

As there is no anti-explosion electrical device, this machine cannot be used in a potentially explosive environment. The requirement of the environment for this machine are as below:

- (1)) Temperature: 5 —40°; however, if you are doing very precise grinding, please keep the temperature near 20°.
- (2)) Relative Humidity: 30%--95%, no dew allowed.
- (3)) The height of sea level: please contact the manufacturer.
- (4) Atmosphere: don't allow dust, corrosive fumes, salt, or acidic air in the neighbourhood. (
- 5) Avoid any vibrations environment.
- (6) Avoid letting sun shine directly on the machine.
- (7) Avoid the disturbance from electromagnetism.
- (8) Light level: above 300 Lux.

4. : *Requirement of the electricity*

- (1) Voltage: 3 Phases, AC voltage which is decided by customers, rated voltage: 0.9--1.1.
- (2)) Frequency: 50/60 HZ, 0.99--1.01 rated frequency.
- (3) Voltage for electromagnetic chuck: MAX. DC 110V(optional parts).
- (4)) Electricity consumption: 3 KVA
- (5)) Connecting wire: 3.5m m² (L1, L2, L3, PE).

5. : *The specification of coolant water, hydraulic oil, and lubrication oil:*

- (1)) Coolant water: Depends what the customer chooses.
Don't choose any low point combustion liquid or any harmful liquid.

Capacity for coolant water: _40 _Liters .

Please exchange the coolant water every month.

- (2) Hydraulic oil: ISO CB32 or HL32.

Capacity : 72 litres. Please exchange every six months. Also please check the level of the oil gauge every day.

- (3) Lubrication oil: ISO G68.

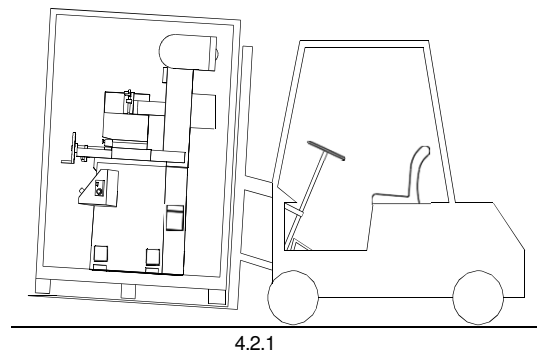
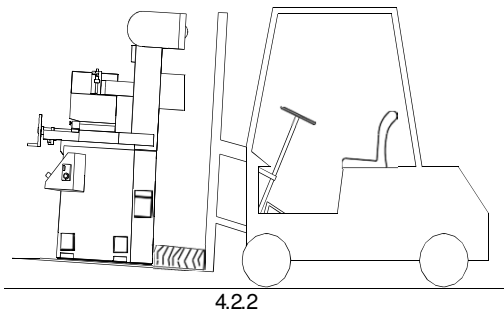
Capacity : 2 litres. Please check the level of the oil gauge every day.

Note: Diseases of the skin may be produced by continuous contact with oil particularly with neat oil ,and also with soluble oil. The following precautions should be taken:

- 1: Avoid unnecessary contact with the oil.
- 2: Wear protective clothing.
- 3: Use protective shields .
- 4: Do not wear oil soaked or contaminated clothing.
- 5: After work thoroughly wash all parts of the body that have come into contact with oil.
- 6: Change the oil regularly.
- 7: Dispose of the oil correctly.

Chapter 4 : Lifting

(4) Operator should be qualified.

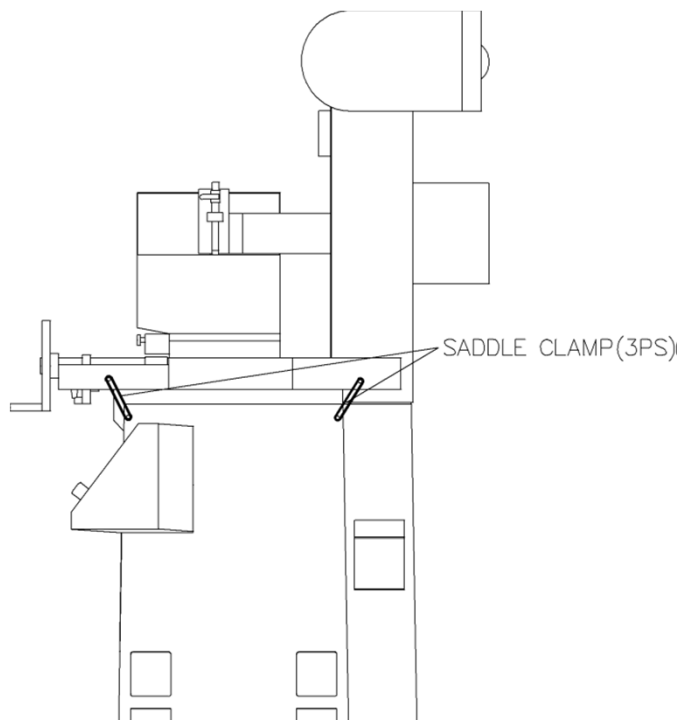


4.1 : Clamping for machine

Before moving the machine, all the clamps must be screwed up on the machine to make the machine steady.

As the drawing below shows, the screw for the clamps is M8*1.25 P.

Keep the clamps in order to make it easy to move the machine at a later day.



4. : *Installation of machine*

1. .1 : *Environment for installation*

The environment of installation will affect the precision of grinding machines. Since the purpose of grinding machines is to have precise working result, you have to be careful on the environment of installation. Basically, you have to take vibration, temperature into consideration. And if you want to grind the precision parts, you have to control the temperature. We would like to suggest the temperature for $20^{\circ}\text{C} \pm 2^{\circ}\text{C}$.

2. : *Installation*

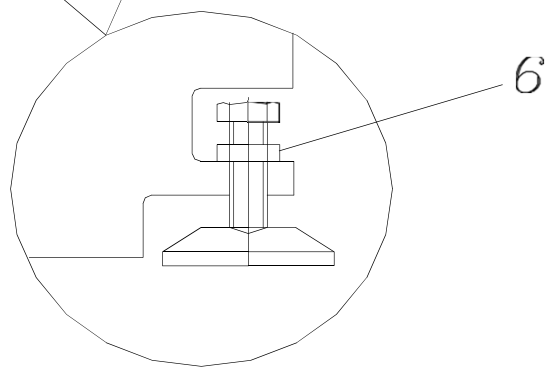
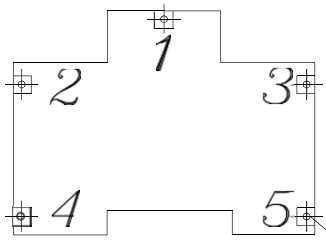
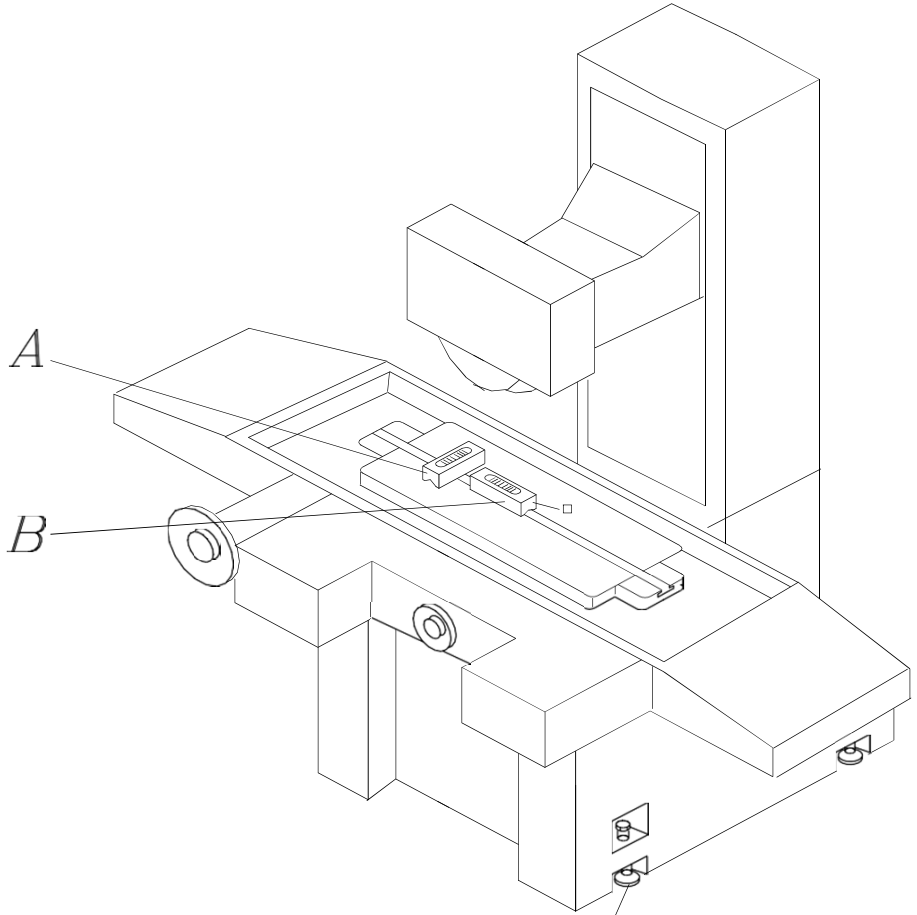
Place the machine on the ground which is more than 2 TON/M².and screw up the fixing bolt. Please refereed to the drawing 3.2 . Please use hammer to tap every leveling block to check if they are supporting the machine.

4.3 : *Adjust the levelling of machines*

Please adjust the levelling very carefully because the first installation will affect the precision and the life of machine , and will surely affect the precision of your work piece.

The accuracy of the level gauge is 0.02mm/M, and please adjust the level of the machine to within 0.02mm/M.The procedure of adjustment is as below:

- (1) : As the drawing below, put the leveling gauge on the table. Make sure the table is in the center of machine, place level gauge (A) in crosswise direction, and put the level gauge in the longitudinal direction.
- (2) : Check the chapter 4.4.2, adjust the fixing bolts NO. 4,5, until the bubble of level gauge (B) comes to the center , then adjust the fixing bolt (1) until the bubble of level gauge (A) comes to the center on the level gauge.
- (3) : Screw up the fixing nuts (NO. 6) on the fixing bolts O.1,4,5.
- (4) : Screw up the fixing bolts NO. 2,3. Make sure they had touched leveling block, and the bubble of the level gage on the machine doesn't move, then screw up the nut NO. 6.
- (5) : Turn the hand wheel of table, make the table to left or right , then check if the bubble of level gauge (B) is changing within 0.02mm/M.
- (6) : Turn the hand wheel of saddle, check the bubble in level gauge (A), see if it is changing within 0.02mm/M.
- (7) : If the bubble of level gauge in procedure (5) & (6) is over0.02mm/M, please adjust according to procedure (1), (2),(3), &(4).
- (8) : Please use hammer to tap the flat-regulating cushion again after the procedure is finished.



CHAPTER 5: PREPARTION BEFORE OPERATING MACHINE

PREPARATION BEFORE OPERATING MACHINE

1. : To remove desiccant and clean the anti-rust oil:

The machine has been coated with anti-rust oil and hanged desiccant to prevent rusting. The brown film on the surface of machine is anti-rust oil. We coat the anti-rust oil on the table, nose of spindle etc., and the desiccant will be put inside the electrical box, or hang on the table etc. After installation, please take off the desiccant and use cleaning rag with diesel to wipe the anti-rust oil. Do not use any liquid that might corrode metal to wipe anti-rust oil. Note: Do not eat desiccant which is silica gel.

2. : Remove the clamp

Take ch. 4.3 for your reference, please remove the clamp after installation, then turn on the machine. Do not cast away the lamp for the use of next transportation.

3. : Fill the lubrication oil

Fill the lubrication oil before use. Suggested lubrication oil is as below:

MOBIL: VACTRA,1.

GULF: slide-way 32.

ESSO: FEBIS, K32.

CASTROL: Magna BD 32.

SHELL: TONNA, T32.

The capacity of oil tank is 2 litre.

5.4 : Installation of hydraulic system

Please check the drawing below about the oil inlet and outlet of hydraulic system. First, please place the hydraulic tank in the right and beside the machine. Second, connect the hydraulic pipes according to the drawing below. Pipe A is for oil outlet , and pipe B is for oil inlet. As the hydraulic tank is empty, please fill the hydraulic oil. The capacity of hydraulic tank is 72 gallon, please fill about 60 litres to make the scale of oil level gage D achieve 4/5 scale. Suggested hydraulic oil:

ESSO: UNIVIS 32

BP:ENERGO SHF32

SHELL: TELUS 32

TOTAL: EQUIVIS ZS32

MOBIL:D.T.E. 24

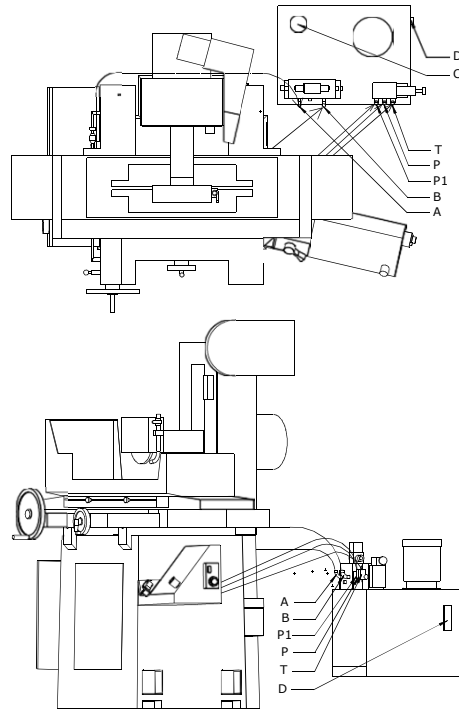
SHOWA: A-R32

CASTROL: HYSPIIN, AWH32

To ensure the performance of hydraulic system, please obey bellows:

- (1) First-time oil replacement should be done after 3 months operation.
- (2) Replace oil at a interval of 6 months after the first replacement.
- (3)) Check the pressure of pump within 16 Kg/cm².
- (4)) Clean the filter of hydraulic tank every six months.

Please discard the waste material according to the government sanitation or environment law.



5. : *Coolant system connection*

1. . Place coolant system at the left side of the machine, connect (A, B) pipe to the machine as below drawing shows.
2. . Coolant fluid:
 - a. Please select the one which meets the government sanitation law, and no harm for human body.
 - b. Consult with local oil products suppliers about proper coolant by specifying material of work-piece, grinding wheel.
 - c. For combination percentage of water and coolant, read the direction first, or consult with the supplier. (common percentage for combination of water and coolant is 15 -25:1).
 - d. Always fill properly-mixed coolant into coolant tank, instead of adding water, or coolant respectively.
 - e. Replace all the coolant liquid in coolant tank every month, it is very important for grinding to keep coolant clean.

f. Recommended brands of coolant(soluble water coolant):
SUN, SHOWA, ESSO, BP, SHELL, MOBIL, CASTROL, ARAL, Such as CASTROL
SYNTILO,R coolant or MOBIL SOLVAC 1535 coolant for ferrous metal grinding.

3. . Capacity of coolant system:

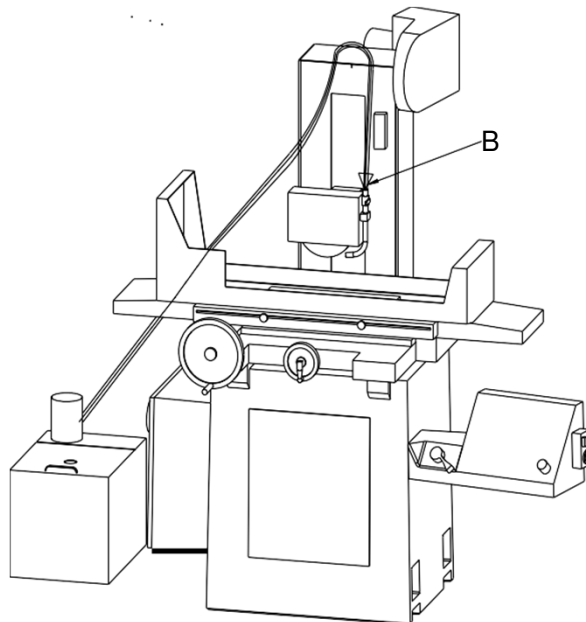
C0201 Coolant and dust unit: 40 litres.

C0207 Coolant system with magnetic separator: 40 litres.

C0202 Coolant system: 40 litres.

4. . Please cast the waste oil away according to the government sanitation law.

5. When you replace old coolant on the coolant tank, please start the coolant pump and drain to the other tank by hose B.



5.6 : Power connection

Please check voltage & frequency according to chapter 3.2 for the reference of power source. Also please connect the power of hydraulic system, coolant system, electromagnetic system.

The total power consumption is 3 KVA. Please use the formula below to calculate the electric current:

$$A = \frac{KVA \times 1000}{V \times \sqrt{3}}$$

A = ----- (AMPERE)

V x $\sqrt{3}$

A : Electric current

V : Voltage

KVA: Total power consumption

Below is the relationship of voltage, total power consumption and the electric current.

	220v	230V	340V	380V	415V	440V	460V	575V
KVA	15A		10A					

Please check the local law about the size of electric power line. If there's no PE line in the power system, please use grounding copper bar. The grounding resistance should be 100 OHMS. Please check the drawing below to connect the power.

1.. Connect cord of coolant system (cord A), plug into the socket which labeled __A__.

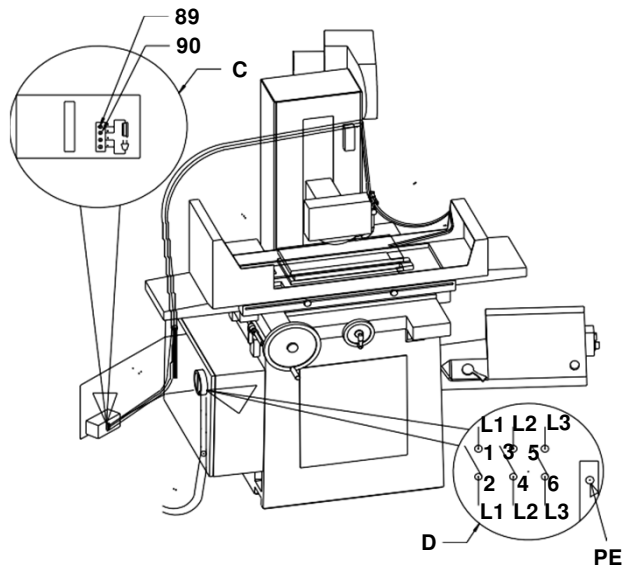
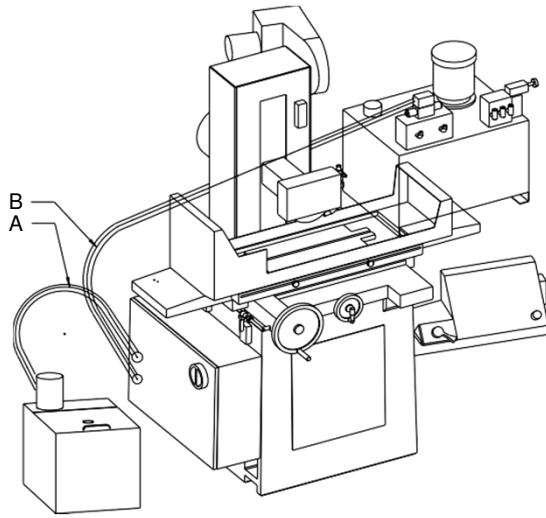
2. Connect cord of hydraulic system (cord B), plug into the socket which labelled __B__.

3 . Connect cord of electromagnetic chuck (cord C), connect to terminals (89),(90) inside the electric box, the voltage is DC 110 Volt.

4. . Connect cord of the external power (cord D) to the terminals L1, L2, L3, PE. Do not connect neutral line to PE terminal. If you don't have the PE line, please set grounding copper bar instead.

5. . Phase examination: The spindle will run clockwise when you push the button for spindle motor, or if you push the button of coolant system, the coolant will come out, .etc., they are all the signs of correct phase .If the phase is not correct, please push

POWER OFF immediately, also turn off the main power switch. Then change respectively the position of power line L1, L3.



7. : *Re-check before operation*

For your safety's sake, please check the following steps before starting to operate in the first time.

- (1) Fill enough lubrication oil into the lubrication tank.
- (2) Fill enough hydraulic oil into the hydraulic tank.
- (3) Fill enough coolant liquid into the coolant tank.
- (4) Take off the clamp on the machine.
- (5) Remove all the anti-rust oil from the machine.
- (6) Take off the desiccant hung on the machine.
- (7) Connect the power-cords of hydraulic system and power to the machine.
- (8) Connect power-cords of coolant system and power to the machine.
- (9) Connect power of electromagnetic system to the machine.
- (10) Make sure the table speed control is in the OFF position.
- (11) Confirm the position of EMERGENCY STOP (E-STOP) button.
- (12) Confirm the installation of grinding wheel in the spindle.
- (13) Confirm the voltage and frequency.
- (14) Confirm the power-cords.
- (15)) Confirm the phase of the power.
- (16)) Confirm the fixing bolt is supporting the machine, and the levelness is within 0.02mm/M.
- (17)) Confirm the wheel guard which is closed.

5.7.1:Dismantling procedure of the machine

The dismantling procedure is the reversed procedure of the installation.

CHAPTER6: HOW TO OPERATE THE MACHINE

6. : *The operation of grinding machine*

It is the same for every kind of machine, you have to learn the steps of operation then start to use safely. Usually there would be an operating manual for grinder; therefore, please follow the steps to operate the machine. In the meantime, it would be much easier to operate if you memorize every parts for the machine.

1. : *Operating safety precautions*

- # Know how to stop the machine before starting it.
- # Stop the machine as soon as anything unexpected happens.
- # Never take depths of grind beyond the machines capacity.
- # Never attempt to grind on the wheel by hand.
- # Do not use the wheel flange without checking their compatibility with Huvema BV.
- # Keep all guards and covers in place and ensure cabinet doors are closed.
- # Do not reach over moving or rotating parts of the machine.
- # Isolate the machine when it is unattended.
- # Do not grind material for which the wheel is not designed.

Note: Unintended use,

Under no circumstances must the machine be used to grind the following materials as the process may generate highly toxic fumes or dust and potentially inflammable waste:

Carbon, Magnesium alloy, Plastics, Ceramic, Low flash point grinding fluids, Dry grinding process.

2. : *Precautions for use of the machine*

- (1) Please turn off the power before assemble or disassemble the wheel from the spindle.
- (2) Do not operate any grinder without wheel guard. Never open the wheel guard while operating.
- (3) Never put your hand in the table or try to take the work piece when the wheel is running.
- (4) Make sure the work-piece has stuck on the table very firmed.
- (5) Do not try to use your hand to take or feed the work-piece.
- (6) Make sure the width, length, and the weight will not overload the capacity of machine.
- (7) Use the correct condition and keep the wheel sharp.
- (8) Please keep your hands and clothes away from machine while operation.
- (9) Do not connect any power cord if you are not familiar with electric equipment in case of electric shock. And it also might damage the machine immediately or cause any incorrect movement.

- (10) Test the wheel for five minutes. Do not stand in the danger zone while testing. Use the wheel if test is OK.
- (11) DO NOT operate dry grinding.
- (12) Do not overpass the maximum allowance peripheral speed of wheel.
- (13) Confirm if the wheel guard door has really closed before running the wheel.
- (14) Don't set the volume of in-feed too high, it might cause the motor to reduce the rotation, and the work piece might too hot.
- (15) Remove the wheel from machine when you don't need to use it. And keep the wheel safely to protect and prolong the life of wheels.
- (16) Make sure the turning direction of wheel is as the direction shown on the label which is on the wheel guard.
- (17) Check every switches and buttons to see if they are all on the position of OFF before operation.
- (18) Operators should all wear glasses during operation.
- (19) Stop the longitudinal hydraulic device while adjust the travel of longitudinal movement.
- (20) Turn off the spindle power after finishing jobs and then start to clean the table.
- (21) Don't dress the side of wheel. (except for form grinding).

6.2 : Rotation test of wheel

If you want to change a new wheel, you have to do the rotation test on the new wheel to make sure the safety. The key of test as below:

(1) Confirm the status of wheel guard:
Make sure if the wheel guard is closed after the replacement of wheel, also it is very important to screw up the fixing bolt of wheel guard.

(2) Adjust and confirm the water nozzle:

Please confirm the position of water nozzle after the replacement of wheel. See if the coolant can water the wheel correctly. Also check if the fixing bolt of nozzle had screwed up to make sure there would be no danger during operation.

(3) Check before operation:

Use your hand to turn the grinding wheel before start to see if there's any run-out on the wheel.

(4) Make the rotation test of wheel:

Before turning on the switch, please check where the people stand. It is very dangerous to stand in the running direction of wheel since there is a possibility for a new wheel to break. Close and screw the wheel guard, and turn on the switch of wheel. However, please push the buttons of "ON" & "OFF" repetitious for the grinding wheel, then slowly speed up the wheel. Let the wheel rotation more than 3 minutes; in the meantime, please check if the grinder have the situation of vibration, abnormal noise or run- out on the wheel, and if there are any abnormal sign of electric current or hydraulic pressure.

(5) Dressing the wheel

If everything's correct in the test rotation test, then fix the wheel dresser on the grinder to proceed dressing. Relative references will be found in the following chapters.

(6) Checking the wheel

After dressing, stop the wheel, use your hand to turn the wheel and check if there's any damage or crack on the wheel. The rotation test above is what you must do. The safety of wheel can be strictly checked from its appearance or sound test; however ,it is necessary to check every steps above. Do not ignore them, or it might cause tremendous injury.

6.3 : Table movement (Longitudinal movement)

1. The table is driven by hydraulic system. The table moves stable and smoothly.
2. For safety reason there are two interlocks for hydraulic system start:

Interlock 1:

To start hydraulic system, power control for electric magnetic chuck must be switched to ON-position. otherwise ,to start hydraulic is prohibited by interlock 1.

This interlock can keep work-pices from slipping off from magnetic chuck when grindingprocess starts but the operator forgets to set electric magnetic chuck power on before grinding

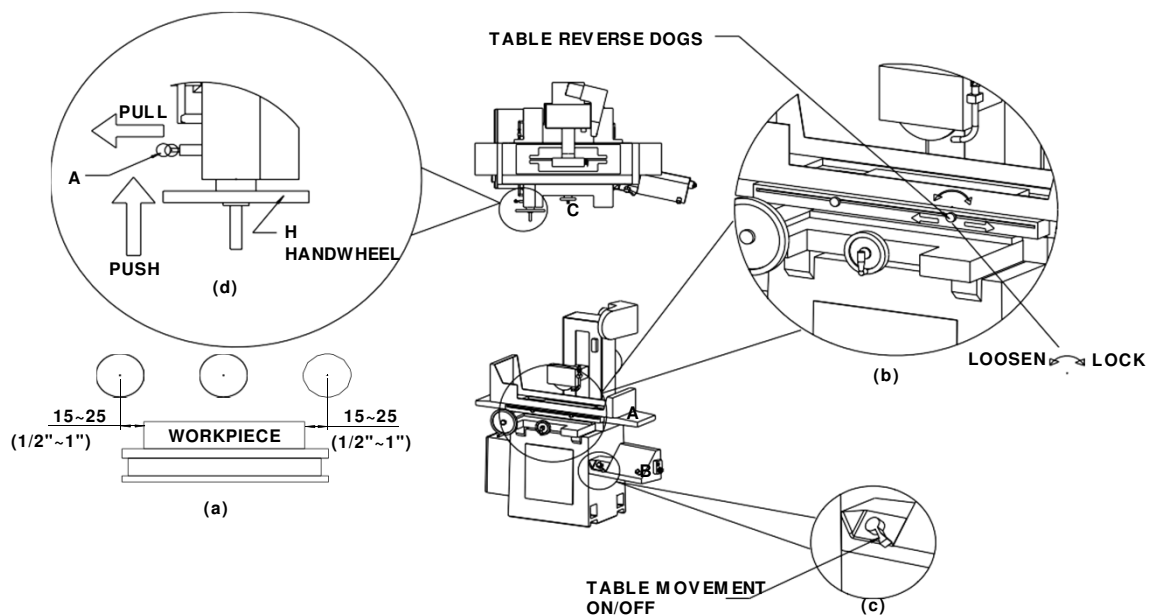
Interlock 2:

Turn hydraulic table speed control to OFF position, which makes the hydraulic system to be ready for start

3. The proper longitudinal travel for grinding process is limited within 15-25mm(1/2"-1") over work piece by grinding wheel as shown fig(a).

Longitudinal travel relates to the position of the two table reverse dogs (fig. (b)).

4. To move the table by handwheel, pull out A and hold it, push in handwheel (fig. (d)). To disengage handwheel, pull out handwheel. be sure to pull out hand wheel after using it.



6.4 : Saddle movement (cross movement)

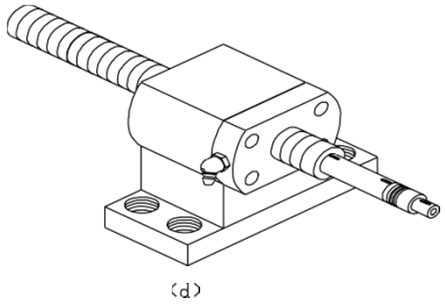
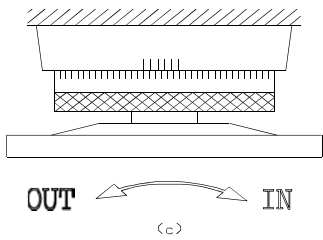
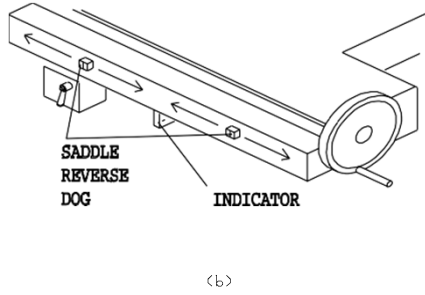
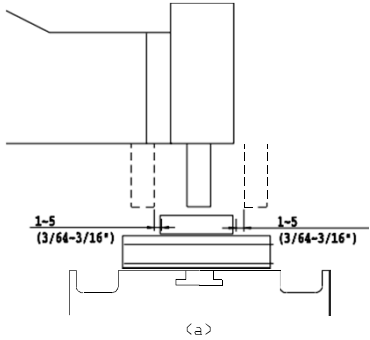
1. Saddle movement is driven by ball screw and DC motor, controlled by PC board, crossfeed movement can be driven by handwheel manually. Auto step infeed surface grinding mode and auto speed adjustable constant infeed grinding mode are available on the control panel.

2.a. For better finish (accuracy, flatness) it is essential for grinding wheel to grind over both ends of workpiece on cross movement, as shown in fig (a) the proper extra distance is 1-5mm (3/64-3/16")for both ends.

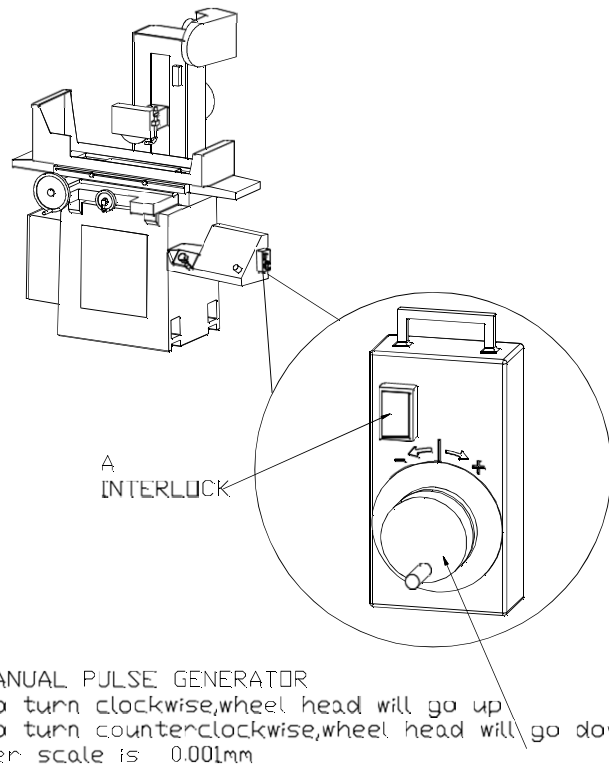
2.b. The required cross feed travel is set up by moving the two saddle reverse dogs as shown in fig (b).

2.c. To operation cross feed manually, disable automatic feed first, then use handwheel to feed the saddle (fig (c)). Automatic cross feed function only available when hydraulic table is active.

3. Every 3~6month, clean up the residual grease on the ball screw before filling in new grease from the filling hole(fig(d)).



6.5 :Manual pulse generator for vertical movement



Push “A” interlock when you use manual pulse generator, wheel head will start to work by this way.

※ The maximum speed is 60 RPM.

6.6 : Grinding wheel engaging/disengaging procedure

WARNING:

Isolate the machine before engaging or disengaging the wheel.

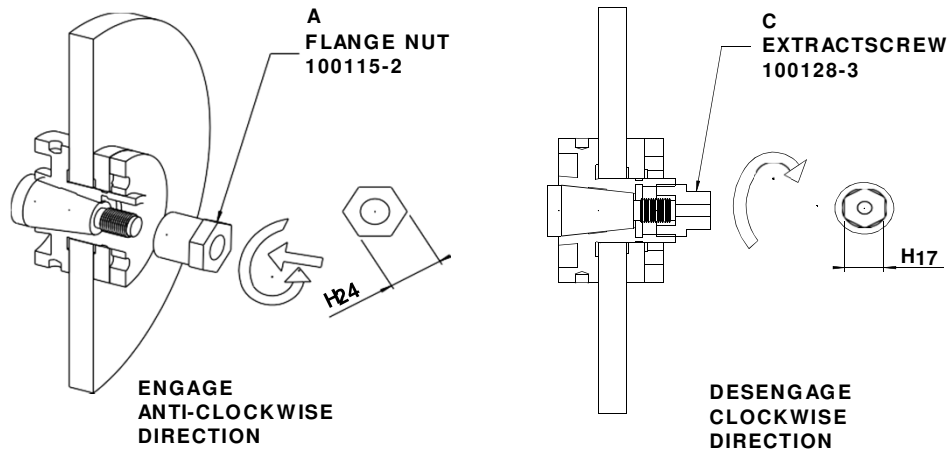
1. Engaging wheel and flange set

Clean surface of spindle taper and inner hole of wheel flange, then put wheel & flange set on spindle.

Screw up fixture screw A (anti-clockwise) to fasten wheel & flange set on spindle.

2. Disengaging wheel and flange set

First, screw out fixture screw (A), Then screw in extract screw (C) to draw out wheel & flange set from spindle. Use open wrench or hexagonal closed double head wrench and monkey wrench as tools.



ADX450PM 17

6.7 :Grinding wheel dressing procedure

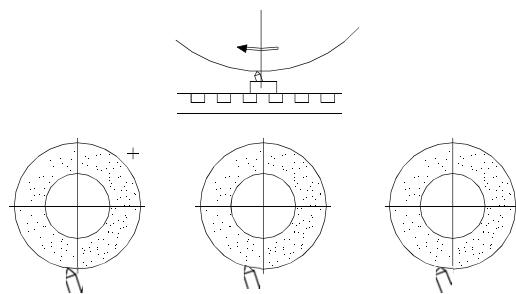
- Dress the wheel with diamond dresser when it is filled with chips or when a poor surface finish is obtained.
- The installation of a diamond dresser should be inclined it to an angle 5-10° from the wheel center line. When the diamond bit become dull, just turn the diamond collar to the required angle, shown in above drawing.
- Due to the hardness or weakness of the diamond, do not dress the wheel too deep at one time. The correct way to dress the wheel is to start from the center of the wheel.
- Recommended dressing speeds

$$F=2.5*1000/d*n$$

F:crossfeed speed(mm/min)

D: grind diameter (4)

N: R.P.M. of the



grain size	10	12	14	16	20	-	24	30	36	46	54	60	70	80	90	100	120	-	150	180	220
grain diameter (mm)	2.0	1.7	1.4	1.2	1.0	0.8	0.7	0.6	0.5	0.3	0.3	0.25	0.2	0.17	0.14	0.12	0.10	0.08	0.07	0.06	0.05

Example: grind wheel diameter 510 mm grain size 60, velocity 2000mm/mm

speed 124.8mm/min.(4.9 IPM)

$d = 0.25 \text{ mm} = 250$ (grain size 60, refer to the table,, $d=0.25$)

$$N = 1248 \text{ r.p.m (N = } \frac{\text{velocity of wheel}}{3.1416 \times D} \text{)}$$

$$(N = \frac{2000 \times 11000}{3.1416 \times 510})$$

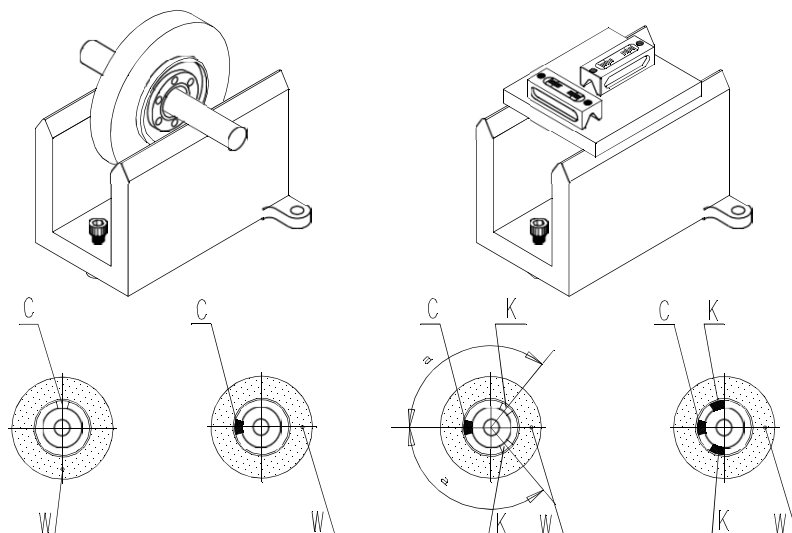
$$F = \frac{d \times N}{2.5 \times 1000} = \frac{250 \times 2118}{2.5 \times 1000} = 121.18 \text{ mm/min (4.9 ipm)}$$

6.8 : Balancing grinding wheel procedure

To obtain fine surface finish , the grinding wheel must be checked and rebalanced periodically. A standard and balanced grinding wheel is supplied with the grinder from manufacturer.

Please note the following procedures for balancing.

1. Let the wheel roll freely on the stand to find out it's gravity center "W" and mark it with a chalk.
2. Insert a balancing block on the opposite side "C" of "W", rotate the wheel 90 to find out "W" or "C" said is heavier.
3. Insert additional balancing block on heavier side "K" which are of the same arc from "C" point.
4. Turn the wheel 90 to check the balance of the wheel. if it is still out of balance, re-adjust 2 blocks "K" position until grinding Wheel is really balanced. When grinding a work piece with different materials, change the wheel together with its flange to save the time for balancing the wheel.



6.9 : Setting grinding wheel into flange

(1) Choosing grinding wheel and sound test

Decide which grinding wheel is suitable for your production, please check the below:

- a. Check if there's any crack, damage or notch in the wheel.
- b. See if there's any label or paper on the wheel.
- c. Check if there's anything between flange and wheel.
- d. See if the wheel had deformed.

To treat the wheel if (b), (c) situations happen. Abandon the wheel if (a), (d) situations happen. Finally, the sound test, check if the wheel is good or not. Tap the wheel with wooden hammer, listen if there's any metal sound, also change the place you tap to listen if there's any different sound. Crack of the wheel are revealed by the different sound.

(2) Setting flange

(a) Clean and check the flange

Confirm below points before using the flange.

- a. Is the outer diameter of flange bigger than the $\frac{1}{3}$ outer diameter of wheel?
- b. Is the material of flange made by steel alloy? Has it been through the mechanical treatment? Does it balance properly?
- c. Is the outer diameter of flange the same as inner diameter of grinding wheel?
- d. If you want to use the other brand's flange, please confirm with us about the size and specification.

After confirmed all above, please clean the flange as drawing 6.14.1: Check if there are parts such as balancing block, fixed bolt.

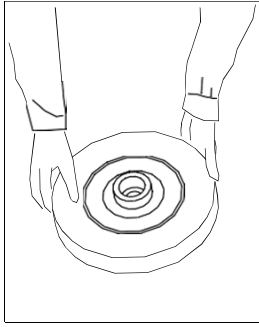
Confirm the pitch of setting bolt, bolt hole, contact area of flange, balance slot, and taper hole. If there's any abnormal situation, please change the flange.

(b) Set the wheel into flange

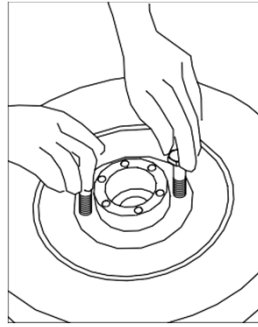
Confirm if there are any labels or papers on flanges, set the wheel into flange as drawing 6.14.2, Do not press the wheel into flange with too much force. Get rid of the burs on wheel hole so that you can put the wheel into flange smoothly.

(c) Set into the sliding pad

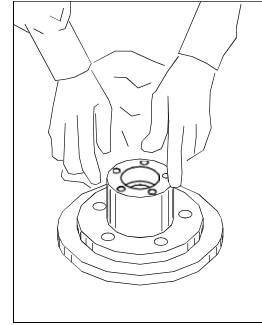
Make sure not to damage the fixed flange while putting into sliding pad. Confirm if you had adjusted the position of bolt and bolt assembling hole properly as drawing 6.14.3.



6.14.1



6.14.2



6.14.3

(d) Turn the sliding pad

Please try to turn the sliding pad (Drawing 6.13.4)

and see if it can move smoothly. Also check if the sliding pad is flatness inside and if the clearance between sliding pad and fixed flange is proper.

(e) Check the gap between wheel and flange

Remove the sliding pad, push the wheel to the side of the flange as drawing 6.14.5, and then use thickness gauge to test the gaps between wheel and flange as drawing 6.13.6.

f) Make the wheel have the same gaps everywhere

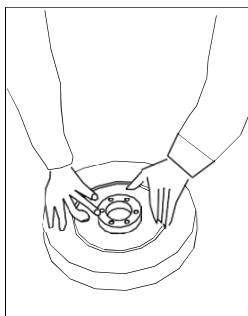


fig.6.11.4

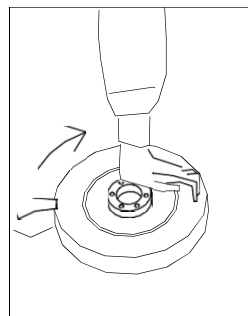


fig.6.11.5

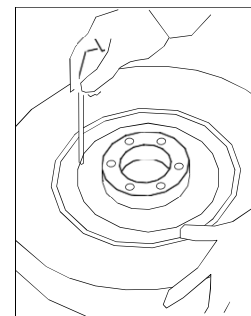


fig.6.11.6

Use the thickness gauge which had already setting on the gap of $1/2$ thickness to correct the installation position of wheel. So that all the gaps between wheel and flange are all the same. Which make the center of wheel match with the center of flange.

(g) Pre-lock the bolt

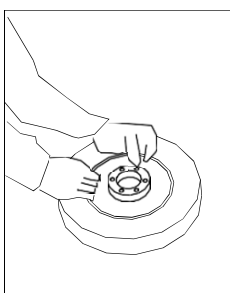


fig.6.11.7

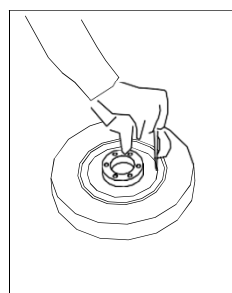


fig.6.11.8

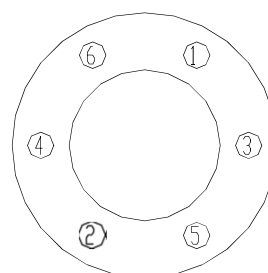


fig.6.11.9

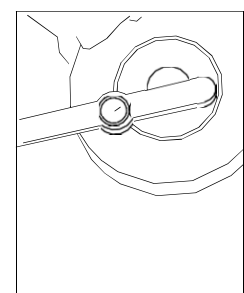


fig.6.11.10

Do as the drawing 6.11.7, install sliding pad, put the fixed bolt into the hole while they match. Then operate as drawing 6.11.8, use wrench to tighten the bolt a little bit. Please lock the bolt diagonally as the order of drawing 6.11.9.

(h) Locking the bolt

Do as the drawing 6.11.10, use the wrench with torsion meter to lock the bolt tightly.

Lock the bolt to torsion 2/3 degree in the first time, a little bit smaller torsion in the second time, and lock to the locking torsion in the third time.

The locking torsion is calculated according to the bolt diameter, the bolt numbers, and the contact area between grinding wheel and flange $A_f(\text{cm}^2)$ to change. Therefore, please calculate as the following formula:

$$M_o = \frac{0.2 \times d \times p \times A_f}{n}$$

$P(\text{Kg}/\text{cm}^2)$ is the contact pressure between grinding wheel and flange. This will be changed according to the types, shapes, sizes of the wheel and the types of flange.

Wheel Size(D)	P(Kg/cm ²)
305 mm below	0.05 D
305 mm over	0.035D or 40 Kg/cm ²

We suggest the contact pressure as the chart and contact with the wheel supplier.

The installation for wheel to put into flange is ok now, please practice over and over again to get used to it.

The key of this operation is as below:

1. Do not install flange in the wrong way as drawing 6.11.11.
2. Please check as chapter 6.11.(A) while the wheel is setting into the flange.

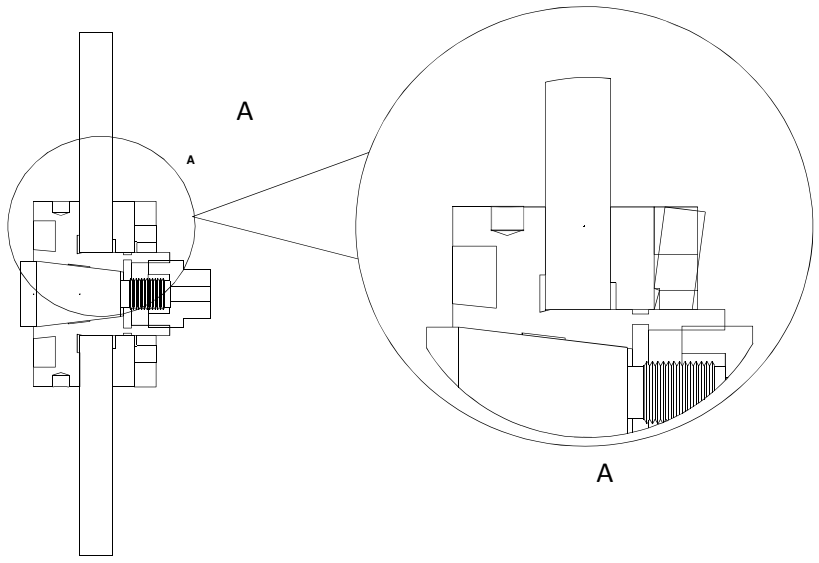


fig.6.11.11

3. Usually there would be clearances while putting the wheel into flange. Please adjust the clearances of circumference and make them even while fixing the wheel.

4. Use the wrench with torsion meter to lock to the level of locking torsion step by step while tighten the bolts of the flange.

5. If the locking power is too small, the wheel might resist and slide which might cause the damage of wheel.

6. If the locking power is too big, as the drawing 6.11 .12, the flange will become deformed, making the wheel unable to be tightened, and that's the reason to make the wheel broken.

7. The labels of wheels would become wet and loosen by pouring coolant water after a period of time. So, please tighten the wheel again after using the wheel about 1-2 days. If not to do it, please remove the labels.

WARNING:

THE TWO SURFACE OF THE WHEEL HAVE TWO SHEETS OF ABSORBENT PAPER USED AS A FLEXIBLE PAD BETWEEN THE WHEEL AND FLANGE.

6.15 : Lubrication system:

A: Elevation leadscrew & slideways

B: Cross leadscrew

C: Longitudinal & cross slideways

D: Oil draining valve

E : Oil distributor

CHAPTER 7: MAINTENANCE

MAINTENANCE

7.1 : Daily maintenance for the operator

WHEN	NO	POINTS	METHOD	MAINTENANCE METHOD
BEFORE OPERATION	1	Are every parts of the machine clean ?	View	Clean
	2	Is the wheel guard complete ?	View	Complete
	3	Are all these switches normal ?	Press	Normal, please check ch. 6.
	4	Grinding wheel	View	No damage, 3 cm away from the workpiece.
	5	Is the lubrication condition on the slideway good ?	View	there's lubrication oil on the slideway.
	6	Is the coolant water enough ?	View	Above the lower limit.
	7	Is the workpiece steady ?	Push	Workpiece is very steady.
During operation	1	Is the value normal on the electric current meter ?	View	
	2	Is there any abnormal sound in the wheel and bearings ?	Listen	Judge by experience
	3	Is there any abnormal vibration in every part of machine ?	Touch	Judge by experience
	4	Are the sparks normal when grinding work piece ?	View	Judge by experience
	5	Is the magnetic chuck power normal when grinding ?	View	Judge by experience

WHEN	NO	POINTS	METHOD	MAINTENANCE METHOD
After Operation	1	The lubrication oil level.	View	Above the lower limit of oil gauge.
	2	Position of every switches.	View	In the position of "off".
	3	Spindle wheel	View	No damages, 3 cm away from the workpiece.
	4	Coolant water level .	View	Above the lower limit of indicator.
	5	Clean every parts of machine.	View	Turn off the power, clean the table --.
	6	Position of main power.	View	On the position of "off".

REMARK: If there's any abnormal signs during operation, please stop to check immediately.

7.2 Monthly maintenance

Area	Key point	REMARKS
Appearance	(1) Is the wheel balanced?	If the wire protector (3) had broken, please check inside. Check if oil wiper sheet (5) had some spots? * If (7) had any bulgy part on table or chuck, please grind evenly.
	(2) Is there any rust or damage in the grinding spindle taper?	
	(3) Is the electric wire complete?	
	(4) Is there any rust or damage in the guide-way?	
	(5) Is there any consumption or shortage for the oil wipers sheet?	
	(6) Is there any rust or damage on the flange?	
	(7) Is there any bulgy part on the surface of the table or magnetic chuck?	
	(8) Are the warning labels or other labels clear?	

<p>electric parts</p>	<p>(1) Is the cover of switch complete? (2)Is there coolant water or dust inside the electric box? (3)Is the connectors of the switches damaged? (4)Are there specified fuses in the control box? (5) Is ground copper bar installed? (when the power line is not used PE line). (6)Is the insulation of motor or wire become degradation? (7) Are the connecting wires loosen? (including grounding wires). (8) Are any fuses burned out? (9) Are all the switches normal? (10) Is every lamp normal? (11) Is there any abnormal sign with the electric current meter & volt meter? (12)Is there any abnormal sound or heat on motor? (13)Is the magnetic chuck normal? (14) Will the lamp be lighted?</p>	<p>* Please check item (1) to (8) with power off. * If item (3) damaged slightly ,please grind gently. *write down the capacity of fuses in the electric box while check item (4). * Make sure the ground resistance of copper bar is under 100 ohms in item (5). *every terminators in item (6) should take the ohms value to know the insulation value which should be over 1 M ohms . *The loosen connection wire of item (7) are usually the reason to become exothermic. *Switches contain push bottom *Check item (13) by the demagnetized device.</p>
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<p>Lubricating oil</p>	<p>(1) Does the lubrication oil tank contain enough oil? (2) Does lubrication oil become degrading? (3)Is the oil supply enough for the place that should be lubricated ? (4) Is the lubrication oil condition good for the slide-way and screws? (5) Is the oil inlet blocked? (6)Is the pressure of hydraulic oil normal? (7)Does the oil leak from the joining of oil tube ? (8)Does it block in the filter? (9) Do you change the coolant water regularly? Does it degrade?</p>	<p>* Check the place of oil inlet in item (1) where there are suitable oil, suitable volume of oil, & the time for exchange. Also please check the oil gauge. *Notice the oil color from oil tank. *Check the oil gauge to see if the lubrication oil is flowing normally? * Notice the decrement situation of item (5) from lubrication oil inlet. * Check if there is any strange sound or vibration near the pump.</p>
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7.3 : Hydraulic oil pressure adjustment

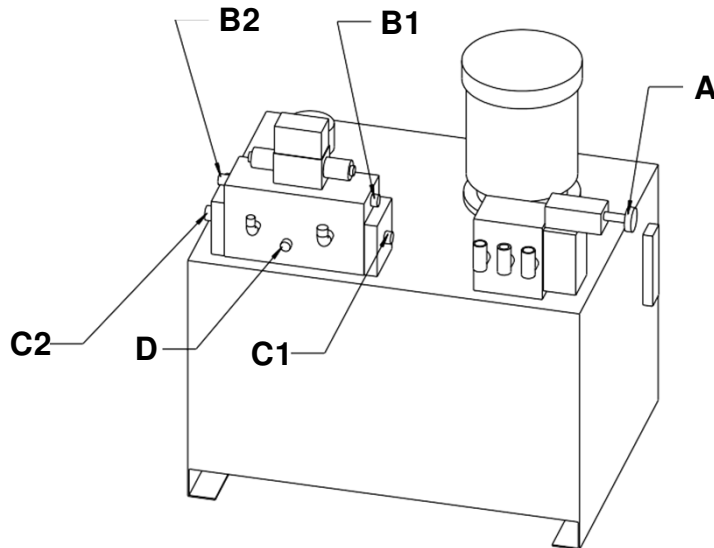
Parts Name:

A: OIL Pressure adjust valve

B1, B2: Table reversing pressure adjust valve for single side (speed-up time).

C1, C2 : Valve to adjust the length of table transverse (braking distance).

D: Table reversing pressure adjust (effect both sides together).



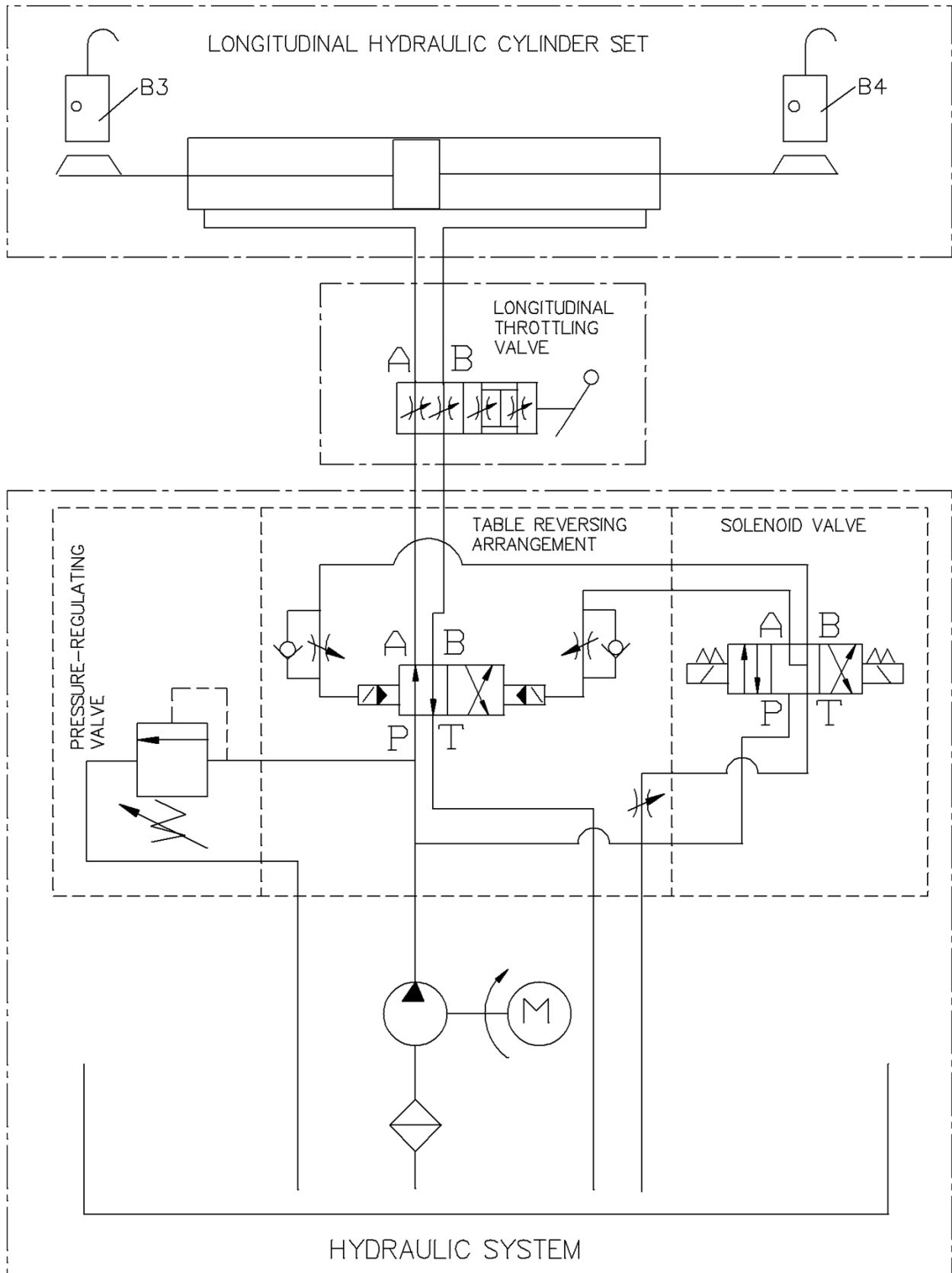
1. A valve is properly-adjusted before shipment. Unless it is necessary, please don't re-adjust this valve. To increase the pressure, screw in ;To decrease the pressure, screw out.

Table speed limit: 28 meters/per minute (power supply: 60 Hz)

23 meters/per minute (power supply: 50Hz)

2. B1, B2 valve, use these to valves to the same reversing pressure at table-direction-reversing action, to ensure smooth table movement. Please note that not to adjust any of the two valves unless obvious difference occurs on reversing.
3. C1,C2 valves are braking length of table transverse. Only when the length of both sides are different, it's necessary to adjust. To adjust clockwise will shorten the distance; to adjust counter-clockwise will enlarge the distance. We've adjusted the distance within 35 ~ 65mm in factory.
4. D valve is to adjust the impulse force. This valve should only be adjusted when all above valves are adjusted well. To adjust D valve clockwise will make the impluse force smaller; to adjust counter-clockwise will make the force larger. Please note to adjust D valve will affect the impluse force immediately.

7.4 : Piping of hydraulic system



7.5 : Trouble shootings when grinding work piece

PROBLEM	CAUSE	REMEDY
Frequent wave on the surface of the work-piece	Vibration of the machine	<ol style="list-style-type: none"> 1. Check the level of the machine and the sturdiness of the floor. 2. Check the spindle.
	Grinding wheel is unbalanced.	<ol style="list-style-type: none"> 1. Dress the wheel again. 2. Balance the wheel.
	Wheel is too hard	<ol style="list-style-type: none"> 1. Use a soft wheel. 2. Use a rough wheel. 3. Reduce the feed amount.
Minor scratch on the surface	Improper operation	<ol style="list-style-type: none"> 1. Dress the wheel. And make sure that the wheel is parallel with work piece. if not, adjust the parallel dresser. 2. Slow the crossfeed speed. 3. Block in the work piece to prevent from slipping.
	Improper dressing the wheel	<ol style="list-style-type: none"> 1. Slow the dressing speed. 2. Tighten the dresser well. 3. Use the proper dressing speed. 4. Don't dress too deep at a time.
Burning spots and cracks	Improper operation	<ol style="list-style-type: none"> 1. Reduce the feeding amount. 2. Use the proper crossfeed speed.
	Improper heat treatment	Re-heat treat
	Unsuitable grinding wheel	<ol style="list-style-type: none"> 1. Dress the wheel finely and frequently. 2. Use a softer and rougher wheel.
Poor grinding ability, and wheel clogs and workpiece shown burn	Wheel is too hard	<ol style="list-style-type: none"> 1. Increase the table speed and crossfeed speed. 2. Slow the wheel revolution, (reduce the wheel diameter or width). 3. Use the sharp diamond to dress the wheel. 4. Chose a rougher wheel.
Wheel dulls and the grit talks off	Wheel is too soft	<ol style="list-style-type: none"> 1. Reduce the table speed and crossfeed speed. 2. Increase the wheel revolution speed. or enlarge the wheel diameter, if possible. 3. Dress the wheel grit and .