

HYDRAULIC CYLINDRICAL GRINDER

OPERATION MANUAL

MODEL : OD-816-NC SERIES

MAKE NO:

MACHINE NO :

MAKE DATE:

Catalogue

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Safe regulation

When you operate this m/c , please observe the safe regulation as below :

If you don't observe the regulation , it could be caused an accident on it. Please attention it again.

(a) Installation m/c

Please according the installation drawing to install the m/c. It can make sure the travel of G.W. slide on all travels. It can avoid to collide with other m/c. We have show all the max travel of the m/c , please observe it. Don't put other m/c within this m/c.

When you select a good grinding wheel , please refer the information as below :

1. Manufacturer
2. Shape
3. Size
4. G.W. MAX SPEED (R.P.M.)

It's used in our m/c , the speed of grinding wheel is 35 m/sec.

(b) G.W. Store

Please store G.W. in dry environment at constant temperature. If the temperature has difference change , G.W. will be change original shape on it. It's easy to chap , please take care of it. The grinding wheel can't contact with oil. If the grinding wheel is included with oil , it can't grinding and use. The best method of store G.W. is used in a wooden case. When you move it , please take care of it.

(c) Voice test

Please check the new grinding wheel before you install on the G.W. spindle. The test method is use a stick to knock it , the voice should be clear and melodious.

(d) Grinding wheel installation

Before installation, release Grinding wheel, listen to its sound by softly clicking it to check if any crack; if sound is clear and good, that's good Grinding wheel, and Never use any Grinding wheel that is not good; softly push Grinding wheel onto the flange, do not apply large force to forcibly push it in, and elastic washer (if possible, rubber only) shall be placed between the contact sides of Grinding wheel and flange, Do not use paper for fixing the sides of Grinding wheel for wet grinding will cause it rolling which, when getting dry, will cause Grinding wheel loose; retaining nut should be tightened up to ensure Grinding wheel is secured firmly but excessive tightening is not recommended. Never apply a hammer to tightening which will cause Grinding wheel breakage.

(e) Grinding wheel balance

In order to achieve high precision and fine finish, Grinding wheel shall require total balance.

Delivered with M/C, Grinding wheel and its fastener all have been conducted dynamic and static balance. However, check often is required due to G.W. wearing. Adjust standard width of balance (50mm) when necessary. New Grinding wheel is normally mounted on balance shaft, then placed on

balance stand to Calibrate its static balance. Therefore, on the flange there has three Adjust balance Weighing, and after balance Calibrated, place Grinding wheel with its flange on the shaft and dress it

with Dresser which may be on shaft slide table or Work Table; if mounted on Work Table, lock up work longitudinal shift, move Work Table horizontally with Manual Wheel, and Dressing till Grinding wheel running is genuinely circular movement, and total balance will be achieved; if after Dressing, total balance remains not achieved, then O.D. Grinding wheel should have to be removed from the shaft, and carefully Calibrate balance again, and then mount it on the shaft again and that's all set.

(f) Test run

For safety purposes, the use of each G.W., test run for 5 minutes within the range of designated speed

is always required and during test run no one shall be allowed to stand within the hazardous area.

Never use until test run says OK!

(g) Dressing

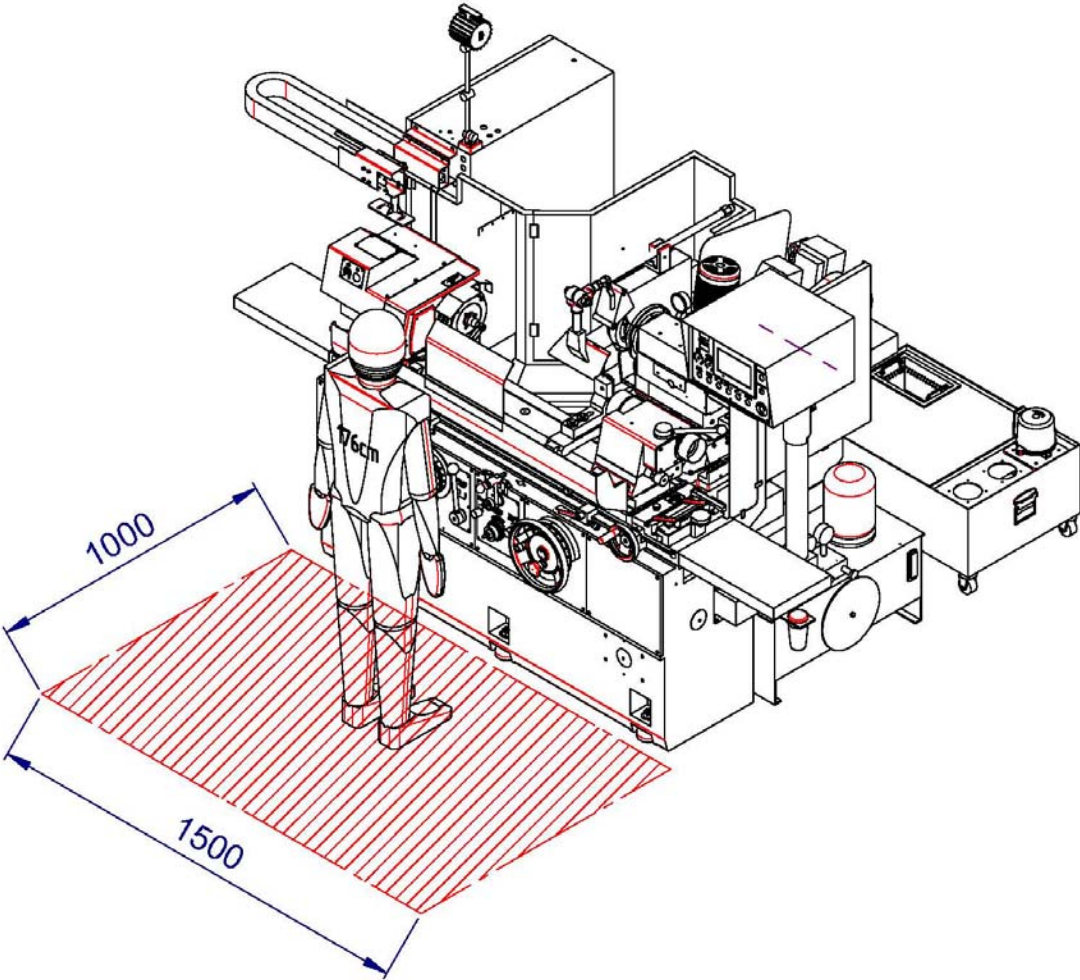
After a period of time, diamond shall be replaced or it could damage to diamond fastening arm as a result abrasive wearing which might cause diamond being thrown out or getting loosed. Further, as diamond gets smaller, it's too small to setting and cost time.

(h) Grinding type : Dry grinding

If you grinding the components are belonged to dry grinding , please wear a glasses to do it.

Please clean it after running such a long time. To avoid a danger condition to happen.

Operator Position Drawing



Outstanding features

(a) Stable and Rigid Spindle Head

The spindle runs on precision bearings, assuring maximum spindle stability. It guarantees outstanding accuracy for external and internal diameter grinding and face grinding.

The spindle head swivels $+90^{\circ} \sim -30^{\circ}$.

The spindle head on the 20 series machines provides variable speed changed by frequency inverter.

The spindle head on the 32 series and 42 series is driven by servomotor, providing variable speed.

(b) Precision Wheel head

The grinding wheel spindle is precision machined from high quality alloy steel SNCM-220, normalized, tempered, carburized and sub-zero treated, precision ground and mirror-effect treated. Hardness reaches to over HRC 62°. No deformation, maximum wear resistance and lifetime accuracy are assured.

(c) Special Hydrostatic Bearing

The wheel spindle runs by using a special hydrostatic bearing and is especially ideal for precision grinding work. It features high speed, no friction between metals, no heat generation, deformation-free, extra high accuracy and continual use.

(d) Advanced Hydrostatic Lubrication System

The slide ways of the table and the wheel head are lubricated by an advanced automatic hydrostatic lubrication system. This provides various features, such as extremely smooth movement, added feed accuracy and superior grinding accuracy.

1. Summary

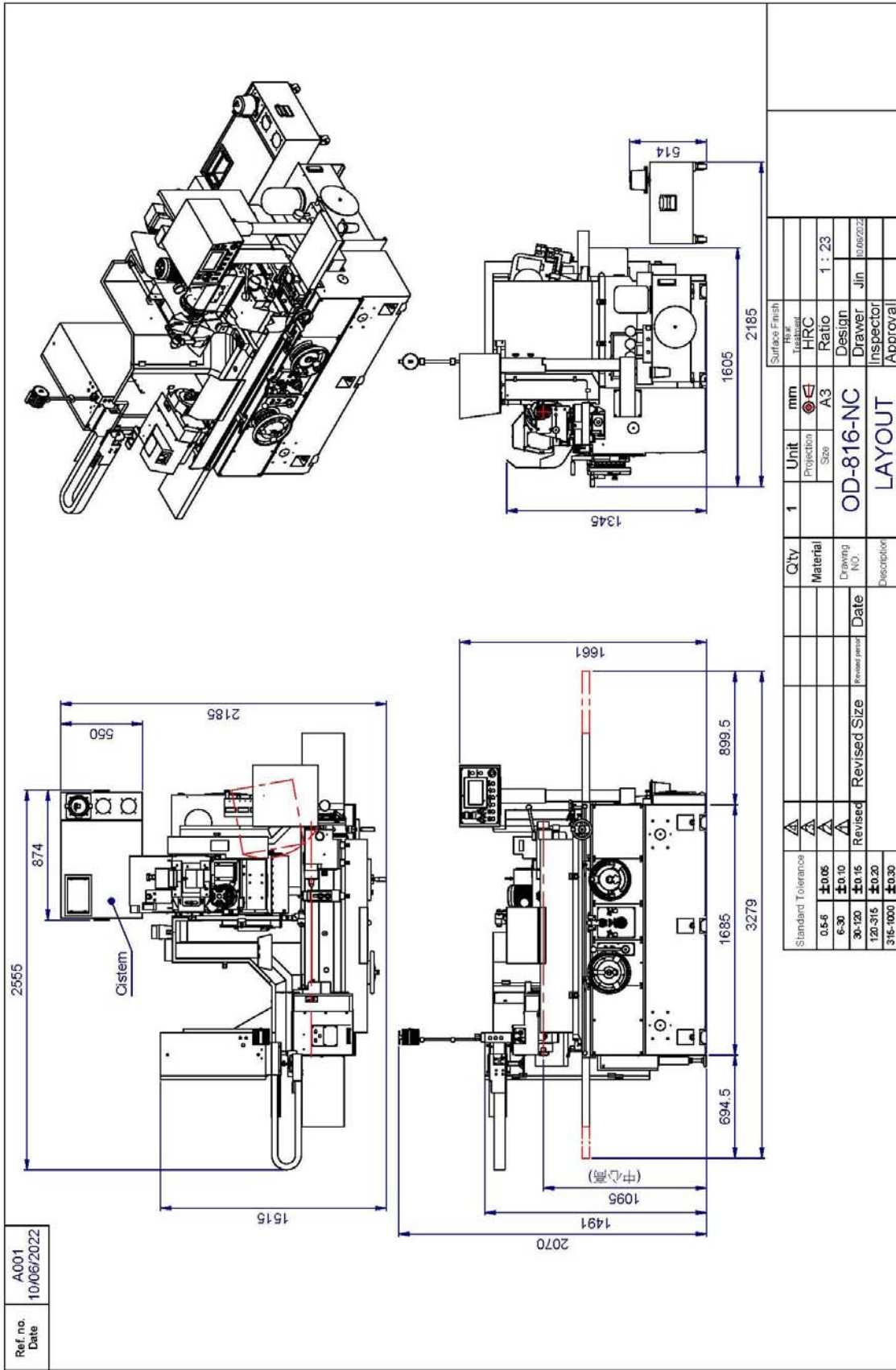
1-1 Specification

UNITS: mm

Model	OD-816-NC
Capacity	
Distance between Centers	400 mm
Swivel over table	200mm
Max.Load of Centers	60kgs
Max. External grinding diameter	180mm
Wheel head	
Swivel Angle	±30°
Manual Distance	135mm
Auto Rapid Advance	25mm
Sliding Seat Supplementary Displacement	95(total 255mm)
Min Setting Unit (Micro adjust)	0.001mm
One Turn of Handwheel (graduation)	2(0.005)mm
Grinding Wheel	
O.D. X Width X I.D.	φ355x38xφ127 mm
Surface speed	45 m/s
Work Spindle head	
Swivel angle	120° (+90° , - 30°)
Center Taper	MT: No.3
Spindle Speeds (variable) r.p.m	10 ~ 300 r.p.m
Max. Load of Spindle (tool holder included)	15kg(Max. length :100mm)
Tailstock	
Taper Center	MT: No.3
Stroke	20 mm
Table	
Swivel angle	(-3 °,+12°)
Traverse Speed	50 ~ 4000 mm/min
Auto. Reciprocate Min Stroke	8mm
Feed of One Turn of Handwheel (2-step)	20mm (2mm)
Motor	
Wheel spindle	3.75kw (6 P)
Workhead Spindle	0.37kw (4 P)
Hydraulic Pump	0.75kw (4 P)

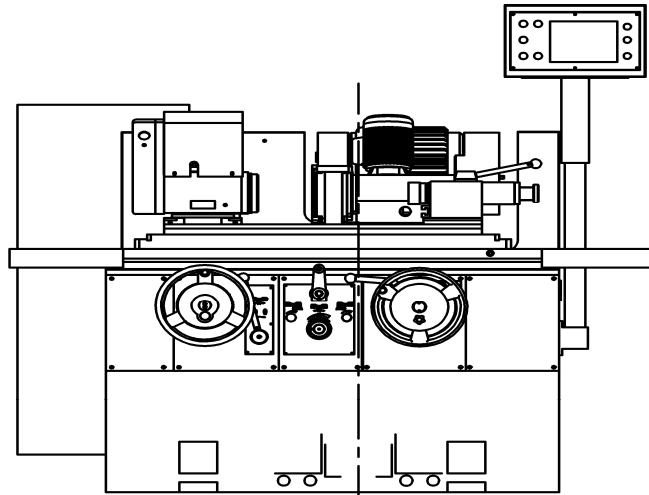
Wheel Spindle Lubricant Pump	0.18kw (2 P)
Coolant Pump	0.18kw (2 P)
Internal Grinding Spindle	0.37kw (2 P)
Tank Capacity	
Wheel spindle Lubricant Tank	7 L
Hydraulic Fluid Tank	46L
Coolant Tank	100L
Machine Weight	
Machine weight	2000kgs

1-2 Dimensions & floor occupation (OD-816-NC)



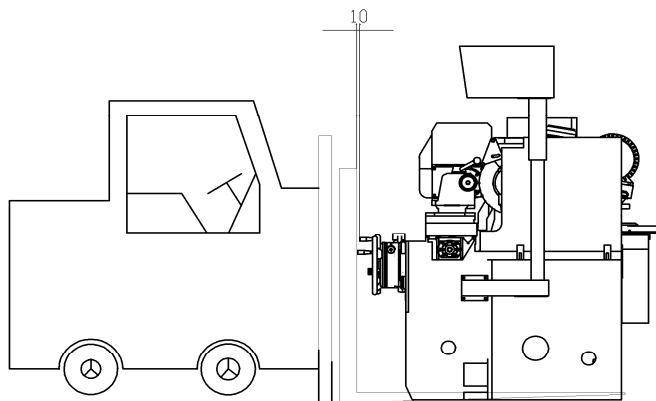
2. Move

2-1 The M/C will have to be moved by crane.



A front view of the m/c

* The center-of-gravity position will be on the mould G.W when moving the M/C by crane.

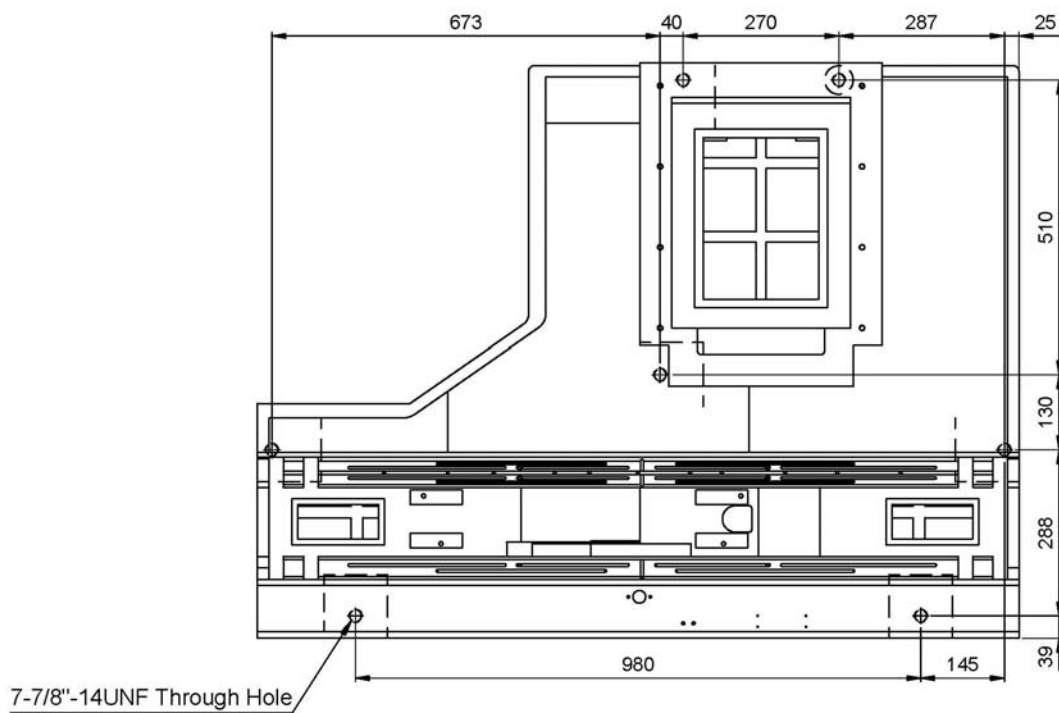


A side view of the m/c

To move the machine, the forklift shall have the lifting capacity of over 3.5 tons and it is also necessary to maintain the levelness of the unit. To avoid tipping, the machine should be unloaded slowly. To lift the machine, the crane shall have the lifting capacity of over 3.5 tons. Care should also be used to the position of lifting hook in maintaining the levelness of the unit to avoid tipping. Further, four steel ropes in diameter over 20mm each shall be used and hook these steel ropes on the crane with soft pad or cotton rags placed between the machine and steel ropes to avoid hurting the appearance.

2-2 Foundation

Because the base is equipped with anti-torque capacity, so the foundation will not be required; instead, 150mm thick of concrete shall be paved on the floor. In spite that the connection of foundation and base with concrete is not necessarily required, normally such method is recommended (for the position of foundation screws, please refer to the figure of below) so as to improve the horizontal stability of machine. However, the space for adjusting parts should be reserved during the concrete pouring lest that the levelness could not be adjusted. But the wooden foundation is absolutely prohibited, because the machine will slide slowly due to it being instable.



OD-816-NC Foundation

Floor Load requirement:

The normal floor load needs to have 600Kg/m^2 .

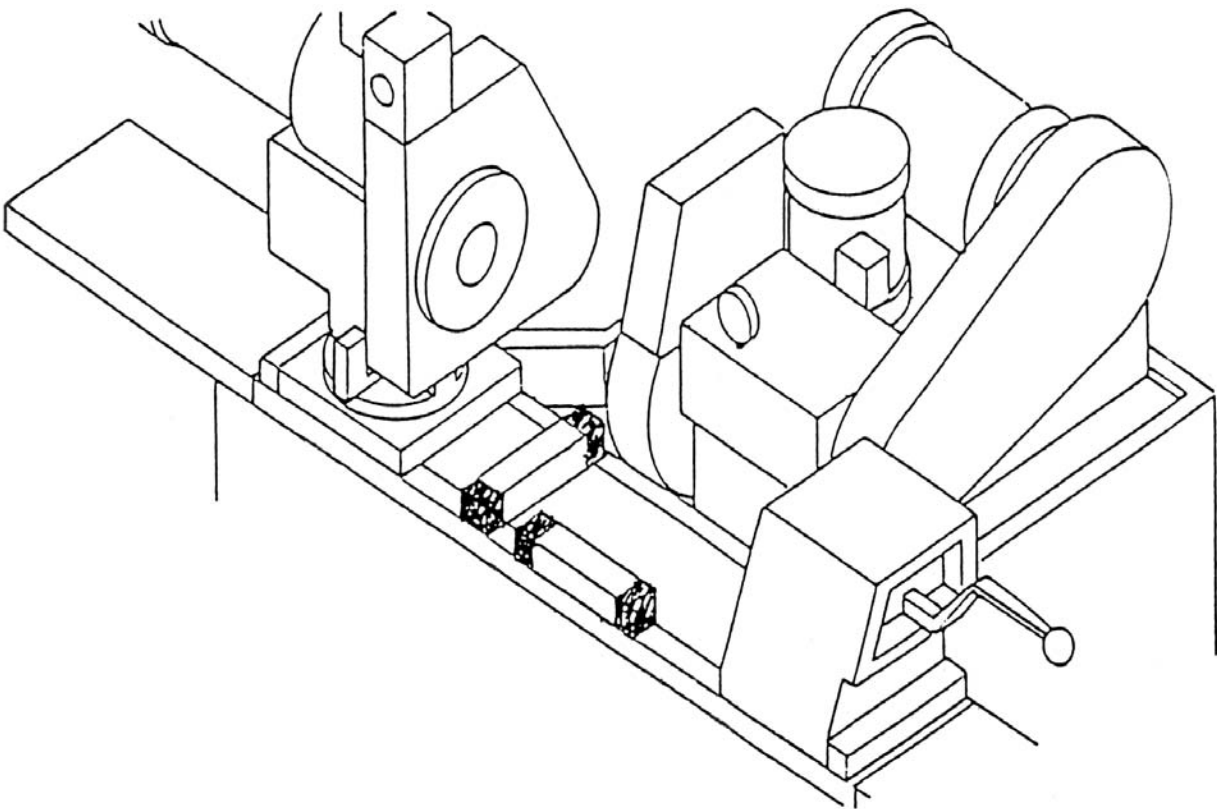
The floor with basement or the machine puts on 2nd floor or above need to have 1000Kg/m^2 .

The concrete strength needs to have 3000psi .

2-3 Leveling

The levelness adjustment is crucial to the machine. Therefore, care should be used to the followings:

- (1) Be sure to use 0.02/1000 leveler.
- (2) The working table shall be located at the center of machine.
- (3) The working table shall be always kept clean without any dirt.
- (4) After placing the leveler on the center of working table and adjusting the bolt under the table to zero position, move the working table to the right and left limits. The difference between two ends represents the tolerance which will be regarded as correct if the value is within 0.02mm. After installing the machine, some variation may happen to the levelness due to the weight of load and other factors and so it must be inspected. Calibrate the levelness once per week. After the foundation becomes stabilized, calibrate it once semi-yearly to ensure the accuracy of the workpiece.



2-4 Clean the machine

All of the machines are provided with anti-rust treatment. The moving parts are lubricated with grease and fixture points are applied with anti-rust oil.

Do not attempt to move any machine parts before cleaning, and prevent operate to any machine slides before thoroughly cleaning and oiling.

Do not use an air hose for cleaning, and it will drive grit and dirt into holes, bearing and slides.

Use a soft cloth with kerosene to clean the parts surface covered by anti-rust oil. If the grease on the parts is fouled, use soft cloth to clean these parts and apply new clean grease again.

2-5 Lubrication

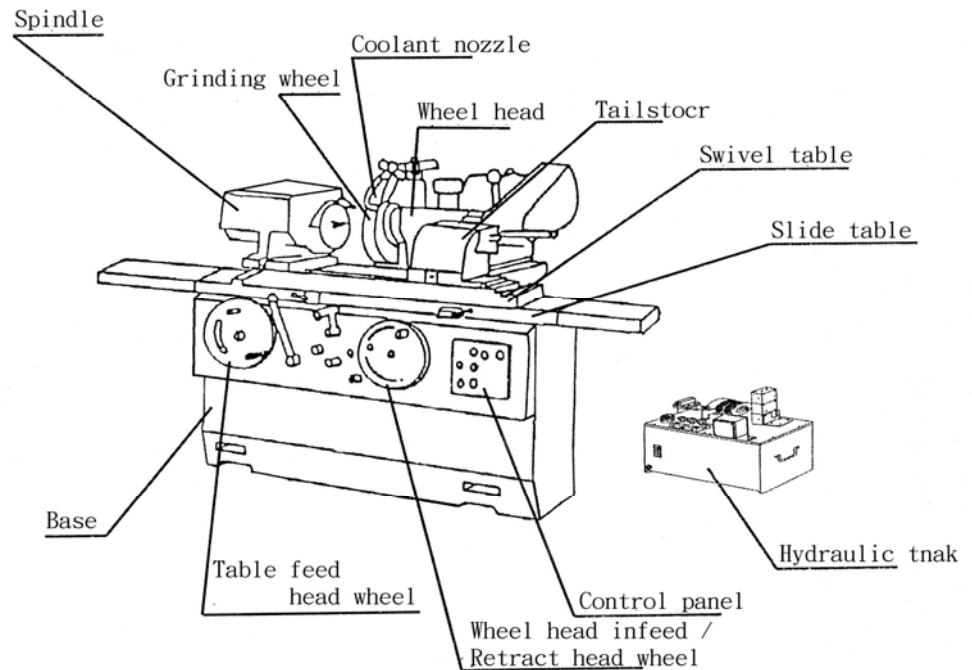
Thoroughly oil all moving parts as they are installed. They lubricate all principal points as list below, before starting motor. Periodic and thorough lubricant, as specified, will help maintain the long life and accuracy built into machine. The intervals listed are based on a normal eight-hour day.

Remarks:

1. These oils are not to imply that other brands of oil can not be used. However, they must be equal these oils recommended.
2. When machine used for high production in feed grinding should pull level lubricator every 4 hours.

2-6 Hydraulic unit – adjustment and maintenance

The unit is designed to be separated from machine itself, in which way to obtain good cooling efficiency. And a side of hydraulic tank, there is a radiator mounted to keep the pressure fixed on 9~12 kg/ cm².

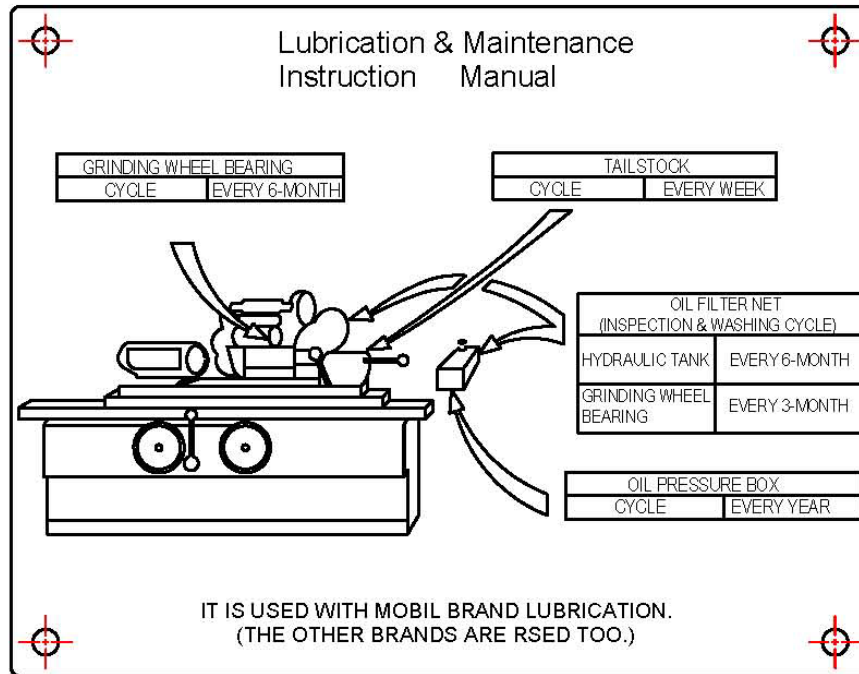


Adjusting the pressure on the slide table:

Model NC series	
OD-816-NC	0.3~0.5 kg/ cm ²

Adjusting the pressure on the slide of G.W : .6~8 kg/ cm²

2-7 Oil Change Position



G31020117-US

Lubrication & Maintenance Instrction Manual		
Oil Change Position	OIL SPECIFICATION	CYCLE
GRINDING WHEEL BEARING	Velocite No.3	EVERY 6-MONTH
TAILSTOCK	Lubrication Oil ISO 68	EVERY WEEK
OIL PRESSURE BOX	Vacuoline 1409	EVERY YEAR

OIL FILTER NET	INSPECTION & WASHING CYCLE
HYDRAULIC TANK	EVERY 6-MONTH
GRINDING WHEEL BEARING	EVERY 3-MONTH

2-8 Connection of power line

(1) Connection of power line and test

All electrical connections should be performed by qualified personnel. Make sure the power voltage is same as machine voltage. The main power line can be connected into the electric box and tightened to the terminal through the button of the box. Grounding and over voltage protector should be based the local electricity regulations. For wiring to different voltage, be sure to rewire hydraulic pump motor, spindle motor and transformer to the correct voltages. And to replace fuses to protect the electrical components. Do not use machine if its voltage preset is different from external power supply. Contact electric technician for reparation if necessary.

Attention:

Grounding should be based on the local regulations!

There is a chain reaction on the button of electric box. When you push the power button, must be start the oil pressure switch then other button will be started.

If you want to start the coolant switch, must be started the GW switch first.

(2) Emergent stop-Red button

When you push this button, all motor will be stopped. You must push the power button and start the oil pressure switch then other button will be started.

Please connect the electric line then check the direction of the G.W. If it reverses of direction, please change two lines of any line to be correct direction. The direction is same such as G.W., pump of auto. lubrication, motor. So, please don't change the line of motor.

Please check the pump direction of coolant switch and the direction of oil tank. If you want to stop the M/C, please wait two or three minutes after stopping the switch of coolant.

(a) Test run

OPERATION PROCEDURE	DESCRIPTION
<p>1.To Push the manual / auto switch on table to the right side.</p> <p>2. For the machine attached with Internal Grinding Device, please push the selecting button fixed on the position of External Grinding Wheel.</p> <p>3.Push start button, the process of motor rotated as follows: Turn on of hydraulic system.</p> <ul style="list-style-type: none"> a. Turn on of Pressure pump for grinding wheel spindle. b. Once upon the bearing pressure being confirmed, then G.W. motor will rotate automatically. <p>4.Please pay more attention to the front side of G.W. where there should be enough safety distances among dressing unit 、tailstock and workpiece, because the distance of G.W. rapid feed will have 40 m/m ◦ In order to make the G.W. back toward to the safe position, please roll the hand wheel to the anti-clockwise direction. (remark 1)</p> <p>5. Push on the button of wheel head spindle.</p> <p>6.To move the wheel head forward, the standard actions are as follows: (remark 1)</p> <ul style="list-style-type: none"> c. Move wheel head on 40 m/m d. Coolant oil flow out c. Wheel head spindle rotates <p>(If the machine model is ‘S’ type, please push the handle of G.W. wheel head clockwise down.) ◦</p>	<p>Remark 1:Please check whether does the pressure of G.W. keep on 6~8 kg/cm²; Rotating direction is correct; the rotating direction for G.W toward down.</p>

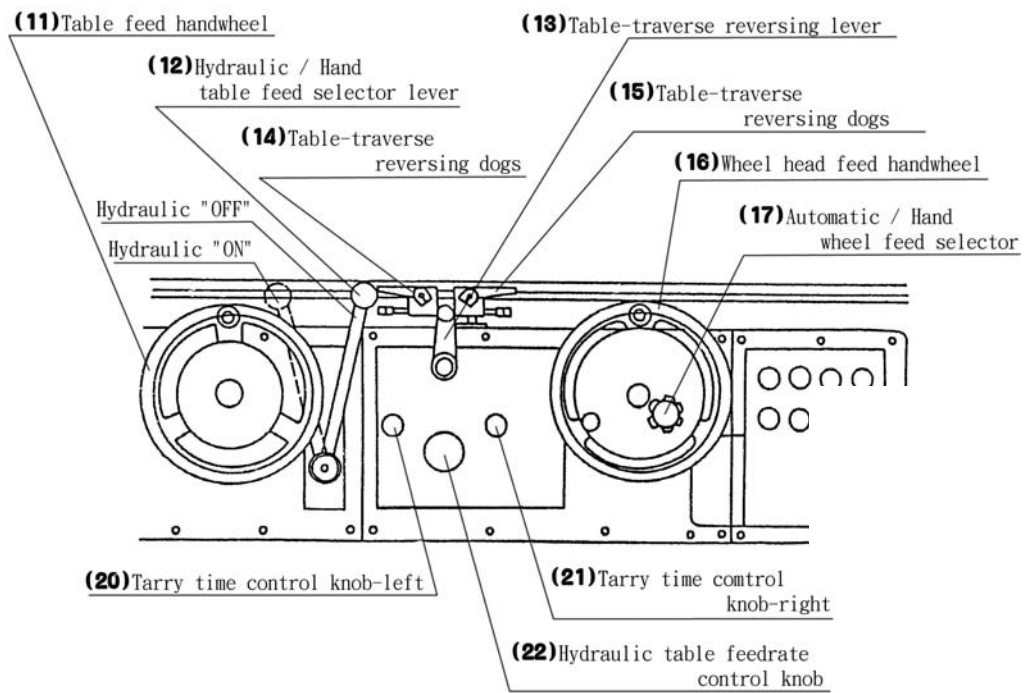
<p>7. Position the slide table properly to avoid any crash to G. W. Wheel head and Tailstock.</p>	<p>Remark : Wheel head rotating direction should be anti-clockwise.</p>
<p>8. The hand wheel on table should be put on the left side of showing hydraulic automatically.</p>	<p>The table will be moved the left & right automatically.</p>
<p>9. Adjust the speed for hydraulic traverse movement to the proper range, so that it will fit for workpiece being ground.</p>	<p>Faster on the direction of clockwise.</p>
<p>10. Pause adjusting function for table traverse movement is necessary in order to avoid any crash dangerous.</p>	<p>Hold on longer when clockwise direction be chosen.</p>
<p>11. Press the G.W. backward button ◦ If your m/c type is GUS, please turn upward the control handle of the G.W spindle to original position.</p>	<p>a. G.W. head back to 40 m/m (Remark 1) b. Stop running of wheel head c. Stop supplying with coolant fluid</p>
<p>12. Fix the handle of Hand wheel for G.W. on the right position.</p>	<p>Hand wheel can't be empty turned.</p>
<p>13. Hydraulic feed switch should be put on left side for traverse movement of plunge grinding.</p>	
<p>14. Press on the G.W. forward button. If your m/c type is GUS, please turn downward the control handle of the G.W spindle to original position.</p>	<p>Rapid move for G.W. speeds 40 m/m. (Remark 1)</p>
<p>15. Select the feed position of G.W., for example when select feed from left side ◦ right side or both side feed are all available</p>	<p>Counted less when clockwise.</p>
<p>16. Adjusting of G.W. feed amount (If the counter is mounted, then it can be started to count after positioning the feed)</p>	

<p>17. Press the G.W. backward button for positioning directly and adjusting the plunge grinding feed. If your m/c type is GUS, please turn upward the control handle of the G.W spindle to original position</p>	<p>G.W. backward 40 m/m (Remark 1)</p>
<p>18. Manual/Auto handle on slide table should be put on the manual positing.</p>	<p>Stop moving on table</p>
<p>19. Selection button for positioning timer should be put 'ON' position; the selection button for traverse grinding / plunge grinding should be put on plunge grinding.</p>	
<p>20. Adjust properly for the timer.</p>	
<p>21. Put the switch of hydraulic feed on the position of plunge grinding, and then adjust it to the suitable graduation.</p>	
<p>22. Push on the forward button. When G.W. auto feed position ready, timer will start to count and upon the predetermined time, G.W. will stop grinding and be backward automatically.</p>	<p>a. Wheel head move ahead rapidly 40 m/m. (Remark 1) b. Hand wheel feed automatically c. After positioning, timer start. d. When time is up, wheel head back rapidly. Whole machine will stop running upon the time, but the wheel head bearing pressure will be kept by timer for 45 seconds and then stop automatically.</p>

Remark : For 20x40 series, it should be 25m/m.

(b) Table transmission

1. Before traversing the table, turn the Hydraulic/manual table lever (12) to the ‘OFF position and turn it clockwise. The table will traverse in rightward direction.
 2. Please take a note that before using Hydraulic table feed hand wheel, be sure the machine should be always powered on firstly and then it could pull the table feed selecting lever in position (hydraulic). This can prevent the dangers caused by changing position.
 3. Due to the function of static pressure, the lubricating oil prevents effectively the friction between machine bed and slide. So it can be operated smoothly and prevent impurities getting into the slide by filtering lubricating oil through filter.
- * Please pay attention to clean the filter on time and change the lubricating oil in according to the indicating plate mounted on machine front side.



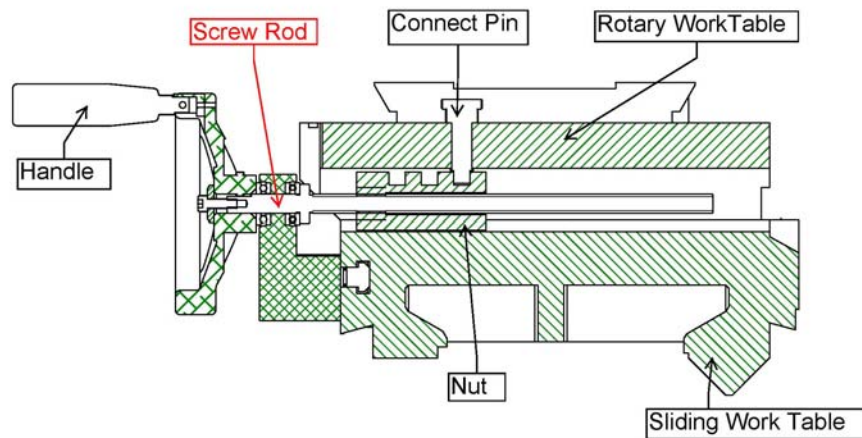
4. Please pay much attention on the oil press occurred when slide table moving, as higher or lower pressure than an level will cause an indent or a thread on the middle of ground workpiece.

Standard adjustment for lubricating oil press:

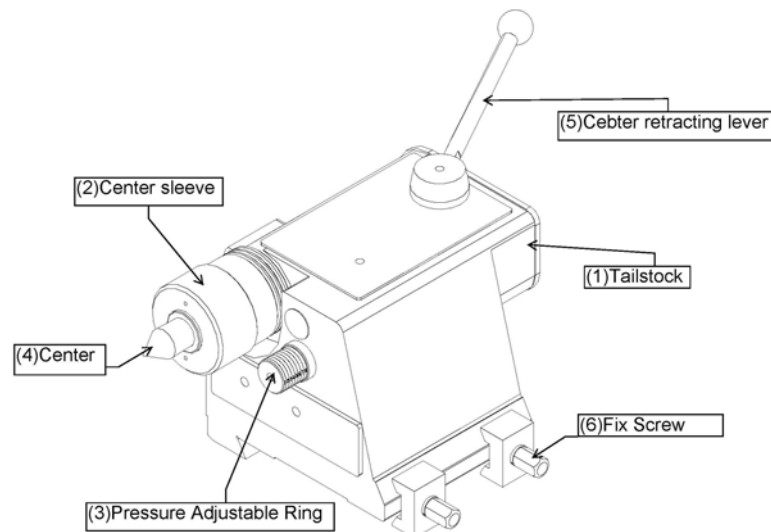
Model NC series	
OD-816-NC	0.3~0.5 kg/ cm ²

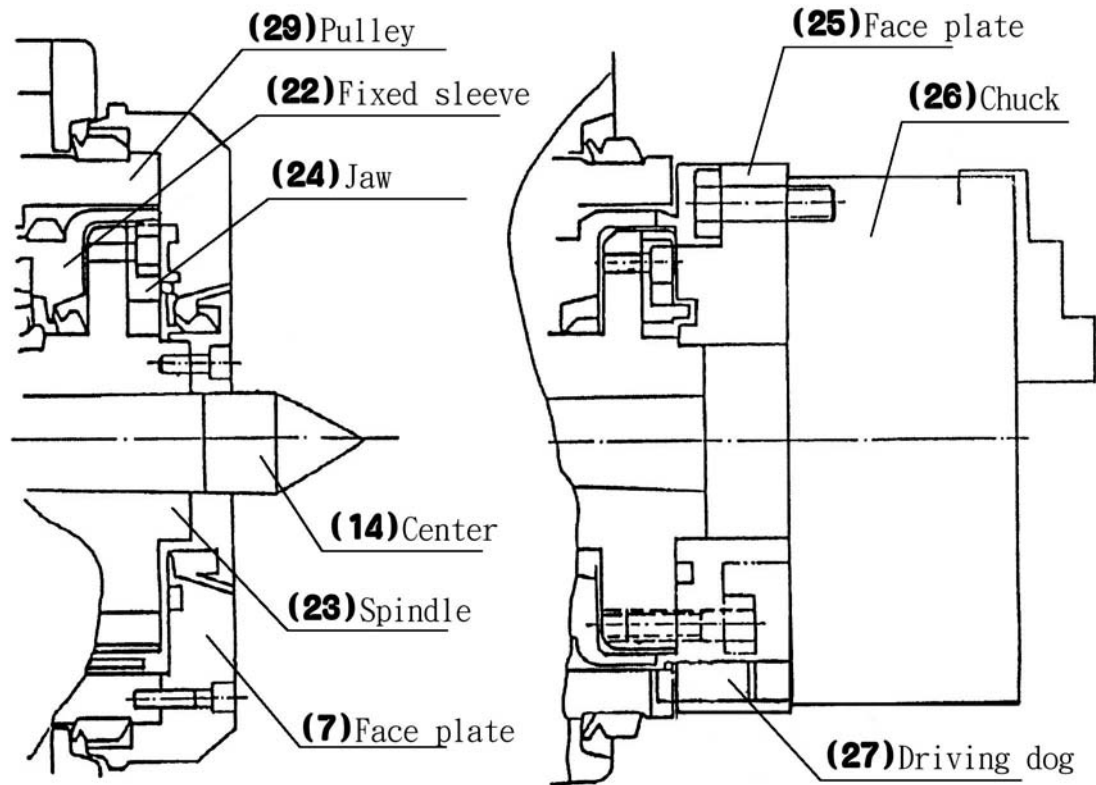
(c) The construction and adjustment for each machine part

1. Swivel over table
2. There are two parts, higher part and lower part in work table.
The higher part of work table is adjustable.
3. Externally connecting the adjustable handle with the adjustable screw shaft is workable.



(d) Tailstock





From Swivel to Faxed Spindle

To change from swivel to faxed spindle operation, engage the jaw (24) into the process on the fixed sleeve (22) and, then clamp it with a bolt. With this the work head may be used as a faxed spindle type work head. Mount the face plate (7) on the pulley (29).

From Faxed to Live Spindle

To change from faxed to sieve spindle operation, disengage the jaw (24) from the process on the fixed sleeve (22) and, then clamp it with a bolt. This allows the spindle to rotate freely. Setting the driving dog (27) supplied with the faceplate (25) for mounting the chuck (26) into the process on the pulley (29), clamp it with the knob (28).

(f) Mounting right hand side wheel

Wheelhead Position & Angular Adjustment

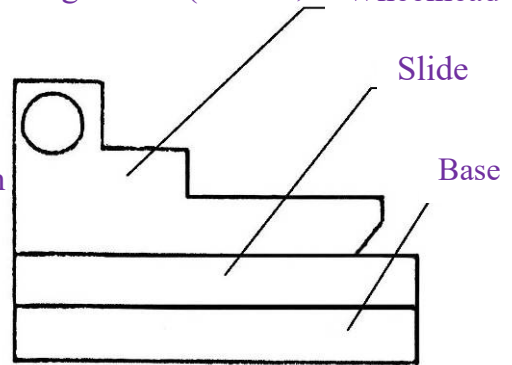
1. Wheelhead Construction (Assembly)

Bottom base screw move 160m/m Hydr. Rapid Moving 40m/m(Note.1) Wheelhead

Wheelhead and assistant table can be adjustment

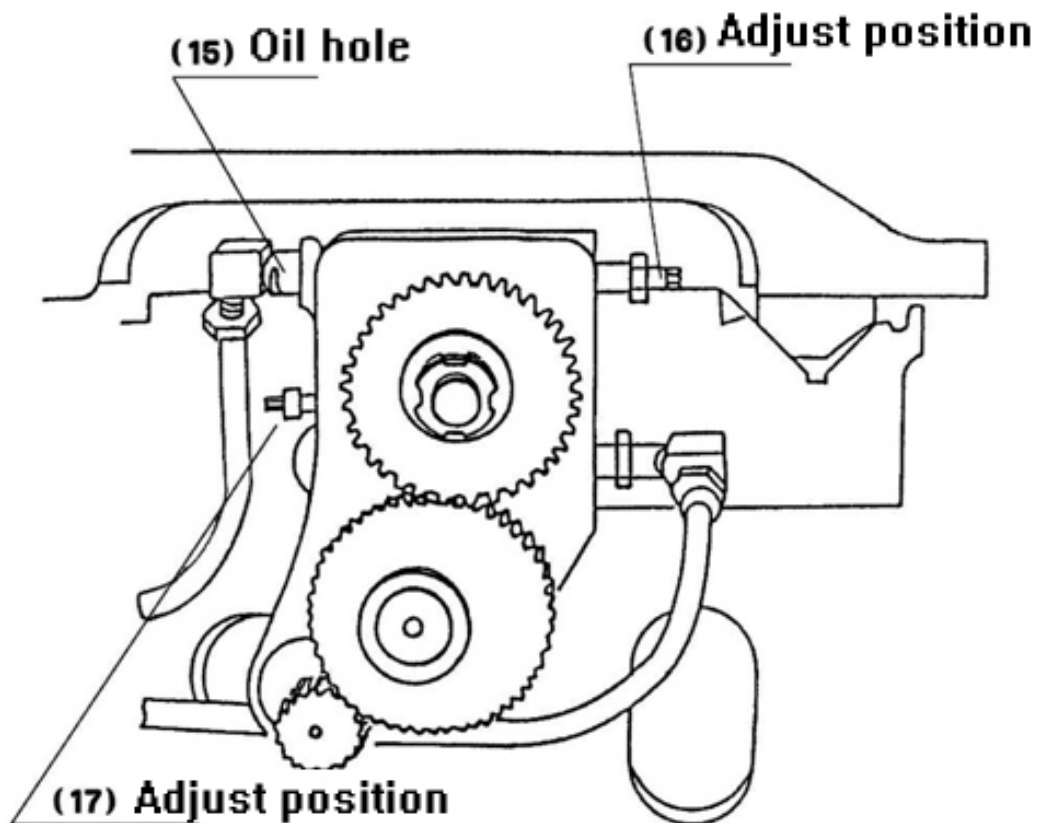
Per the parts proper position front and rear 95m/m

And right and left turning 30° for each.



(g) Adjustment of wheel head feed device

At the advance and retraction end of the wheel head rapid feed cylinder are the pushing valves to eliminate shock generated at rapid feed end. To adjust the valves, rotate the needles (16), (17) with the lock nut loosened. Since the rate of the oil flowing through the needle valve varies according to the change of oil viscosity due to oil temperature change, the valves should be adjusted time to time to provide their best effect. Otherwise, a shock might be generated at stroke end, or grinding might be carried out though the wheel head does not reach its stroke end.



- (15) Inlet of compressed oil for cylinder retraction
- (16) Retraction end cushion adjusting needle
- (17) Advance end cushion adjusting needle

(h)The method validation of cylindrical motor belt tension :

1.

While adjusting the belt tension, please press 5 kg by tension meter and make the belt height difference by 20 ~ 22 mm as standard,
in accordance with what nameplate shows.

2. Without Tension Meter

While adjusting the belt tension, please making the belt tighten and rotate the pulley of grinding wheel by counterclockwise;
after it is done, go off the hands, the belt will rotate by clockwise accordingly.

Attention: be sure not to rotate the pulley of grinding wheel by counterclockwise too strongly.

3. Installation of coolant system

Coolant is to get rid of grits binding agent and chips from grinding wheel and regulating wheel quickly, to cool workpiece, reduce friction between workpiece and grinding wheel, and enhance surface of finish of workpiece.

Coolant flows from tank through pump, and is pumped to machine, then back to coolant tank which will flow through some deposit tanks to get rid of sands, binding agent and chips. Hence, a great amount of mud-like things is deposited in reservoir, in this case, coolant had better been changed frequently otherwise outface finish and accuracy will be effected, pump is easily damaged. Magnetic separator or paper filter can get rid of great amount of grinding chips, coolant can be changed for along time.

Acid sodium such inorganic base and organic ammonium, dissolving into water appear transparent, which develops anti-solubility and rust prevention, good grinding effect, suitable for case iron and cast steel.

Coolant

Good in cooling but less good in lubrication, with rusting to metal works, under special condition, grinding in porcelain and glass fiber. But don't apply the used water.

- CPC (TAIWAN)-FULLY SYTHETIC COOLANT-MODEL:LB73666
- CUTTING FLUID 908 COOLANT
- QW-401 SYNTHETIC COOLANT

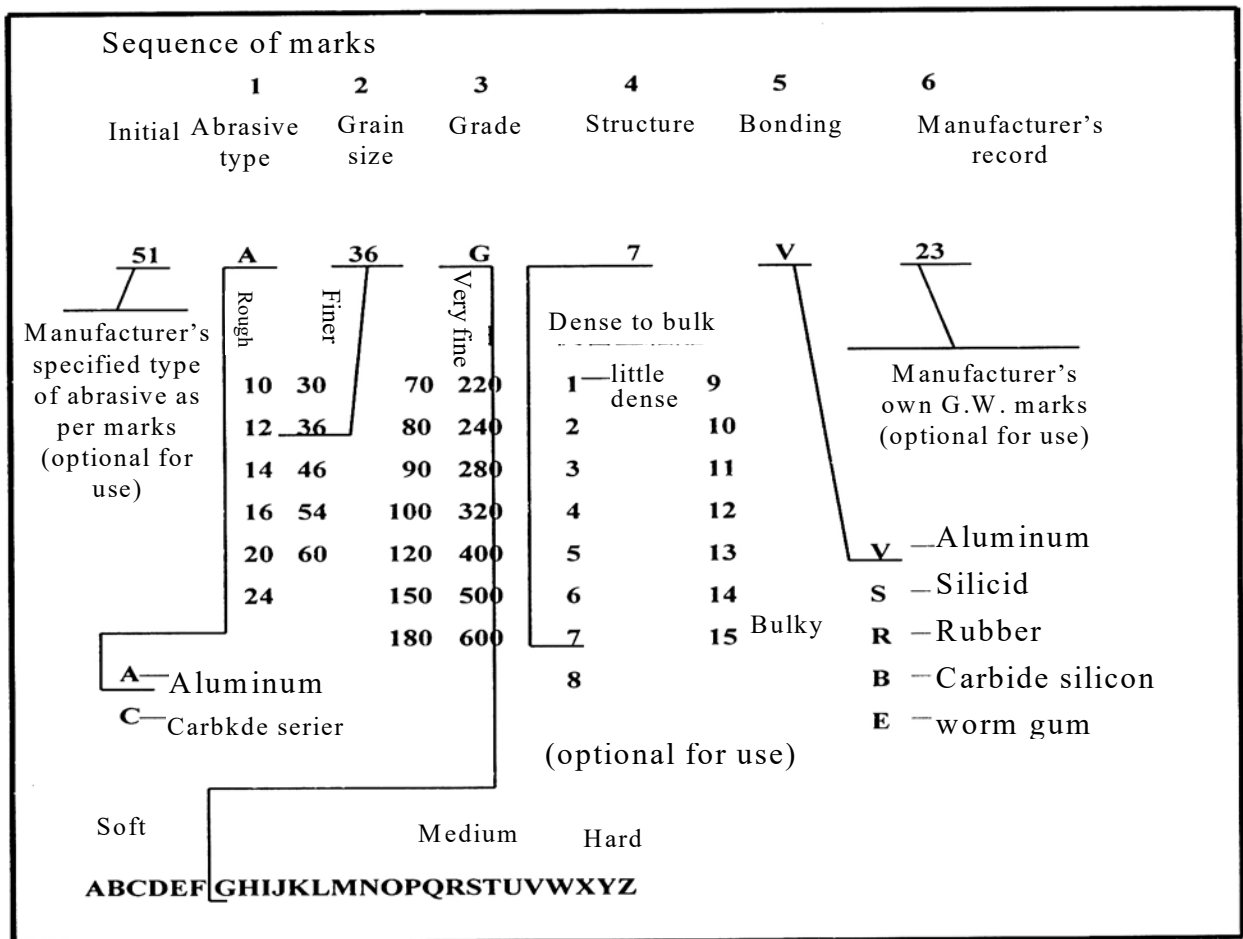
MATERIAL	Cast-Iron Steels	Alloyed Steels Hard Steels	Aluminum and Alloys	Copper and Alloys
COOLANT	Mobil cut 321	Mobil cut 321	Mobil cut 232	Mobil cut 321
	Caltex Aquatexm H1	Caltex Aquatexm H	Caltex Aquatexm ALH2	Caltex Aquatexm H2
	CPC-LB73671 LB73664 (31C)	CPC-LB73664(44A)	CPC-LB73657(15A)	CPC-LB73671 LB736664

4.Grinding Wheel Select

4-1.Select Suitable Grinding wheel

A successful grinding mostly relies upon operator's experience, who must understand the features of various types, shapes of Grinding wheel and how to use them under different conditions.

Standard G.W. Marks



Marks System Chart

In the Marks Chart, the meaning of each alphabet and figure will be described below where complete chart and basic elements of G.W. are Abrasive granulation, bonding material, grade and structure.

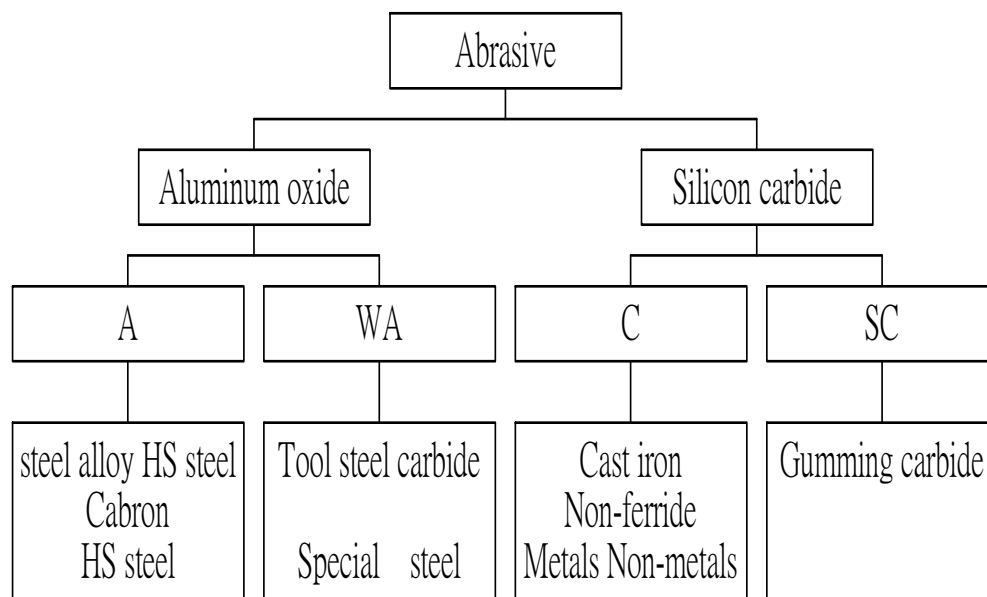
Grinding Abrasive

Abrasive type, the most common one, is aluminum oxide and silicon carbide. As crystal of aluminum oxide is not so hard as that of silicon carbide but not so fragile as silicon carbide does and therefore it is more suitable for grinding H. Tensile Strength such as carbon steel alloy which is soft or hard, fine-forged iron, copper, etc.

Some commercial terms of Aluminum oxide is steel aluminum stone (Aloxite, Alundum Borolon).

Crystal of silicon carbide is extremely fragile so Grinding wheel made from such type of Abrasive is suitable for grinding such as H. Tensile Strength steel, cast iron, brass, copper, aluminum and common copper, and other non-forged materials such as rubber, Sacruru, marble and glass.

Commercial terms of silicon carbide refers to carborundum, crystolon, electron and there are two special forms, aluminum oxide and silicon carbide, which will be described below. In G.W. marks, Abrasive has figure as code instruction.



Sand granulation

Granulation is named subject to grading sieve size.

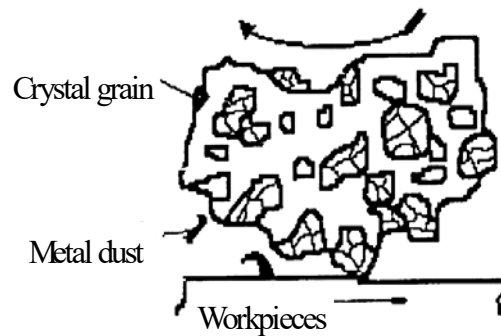
E.G.: a sand material that can pass each of 1" 24-sieve eyes is called 24-grain and normally plane grinding applies to granulation of 48 to 80.

For rough grinding, when finish is not important, rough-grain G.W. can be used, including relative narrow grinding face, which shall require using narrow-side fine-grain grinding.

G.W. Bonder

G.W. bonding is to bond Abrasive together and to support them during G.W. Feed.

“Soft and Hard” is referred to indicating bonding strength. The stronger the Abrasive bond rate is higher, the grains bonding film around Abrasive is thicker, and bonding support strength higher, G.W. harder. G.W., in general, has 5 types of bonder :



(1)Glass bonder

More than 75% of G.W. is made from glass bonder, and poly-orifice and strength contribute to high Feed. Bonder of this type is free from being affected by water, acid, and oil or temperature conditions so G.W. of this type is more often than not applied to production and tool chamber grinding.

(2)Silicate bonder

Silicate bonder Grinding wheel is more liable to discharging Abrasive grains as compared to glass bonder Grinding wheel, and normally applied to grinding Feed with Cutter but thermal production shall be kept very low.

(3)Worm gum bonder

This bonder can produce high finish and deep side Cutting.

(4)Resin bonder

This is a synthetic organic compound and G.W. of this type can be applied to cold grinding, Rapid Cutting and Cutting under high speed.

(5)Rubber bonder

Rubber bonder G.W. is chiefly applied to grinding good finish. Owing its strength and hardness, such bonder is widely applied to grinding deep slot and similar work.

Grade

G.W. grade lies in the measurements such as “holding strength” or bonding strength, etc.

Grinding wheel is called as “Soft Grade” when Abrasive is easy for re-packed, and as “Hard Grade” when grains are bonded together strongly.

Structure

This term relates to the gap between grains, i.e. density. (FIGURE 8-1) . Bulky type Grinding wheel is faster than that of equivalent (grade and granulation) Dense type Grinding wheel grinding. Hard and fragile materials shall apply Dense type Grinding wheel grinding to obtain more effects.

As described above : The focus on SELECT Grinding wheel lies in weighing the characteristics of Abrasive.

Refer to the below Grinding wheel SELECT Chart, similarly Grinding wheel manufacturers may introduce some Grinding wheel Specifications which are more suited to work requirements.

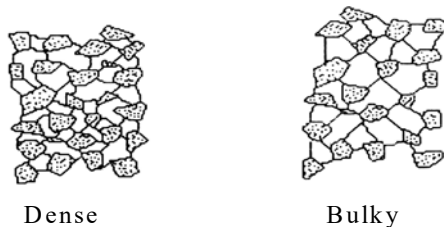


FIG. 4-1

◎ Grinding wheel SELECT Chart

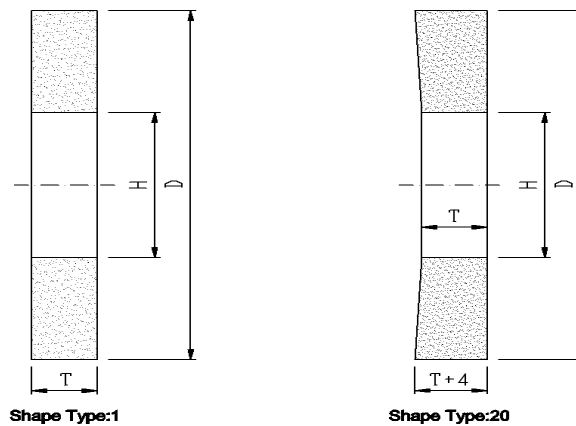
Workpiece Materials		Wheel Diameter (Vitrified)			
		~355mm	355~455mm	455~610mm	610mm~
Carbon Steel	≤ HRC25	FA60MV	FA54MV	FA46MV	FA46LV
	> HRC25	WA60MV	WA54LV	WA46LV	WA46KV
Alloy Steel	≤ HRC55	WA60LV	WA54LV	WA46LV	WA46LV
	> HRC55	WA60KV	WA54K	WA46KV	WA46JV
Tool Steel	≤ HRC60	WA60KV	WA54KV	WA46KV	WA46JV
	> HRC60	WA60JV	WA54JV	WA46JV	WA46IV
Stainless steel heat resistance steel		WA60KV	WA54KV	WA46KV	WA46JV
Cast Iron		C60JV	C54KV	C46KV	C36KV
Special Cast Iron		GC60IV	GC54JV	GC46JV	GC36JV
Deep cold Cast Iron		GC60IV	GC54JV	GC46JV	GC36JV
Malleable Cast Iron		FA60MV	FA54MV	OA46MV	FA46LV
Brass		C46JV~C36JV			
Bronze		10A54LV~10A36LV			
Al. Alloy		C46JV~C36JV			
Super Alloy		GC80IV~GC60IV			
(Alnico)		WA46KV			
Magnet Steel		C/GC36~60H~LV			

© **Standard Dimensions (mm)**

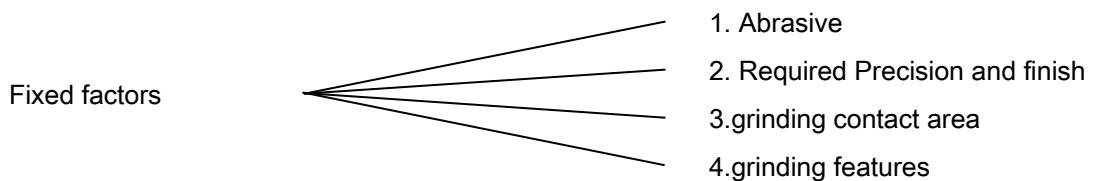
Model	D(O.D.)	T	H(I.D.)
OD-816-NC	305	38	127
	355	38	127

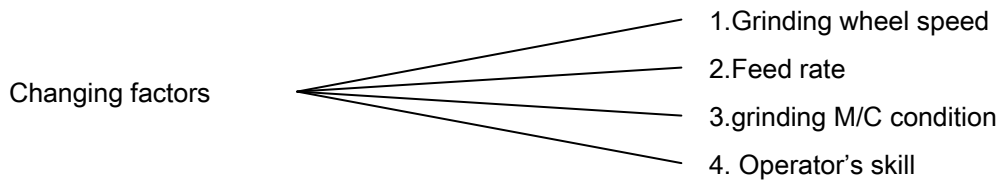
4-2 The safety range of cylindrical grinding wheel

Model	G.W. (O.D.)	O.D. limit	Available Diameter Range	peripheral speed
OD-816-NC	φ 305	φ 235	70 m/m	2000 m/min.
	φ 355	φ 285	70m/m	2000 m/min.



According to some user's statement, SELECT G.W. has four factors and four changing factors.





- (1) If Abrasive is steel or its alloy, Abrasive normally adopts aluminum oxide; if cast iron, non-ferro metals or non-metals is the case, Abrasive shall adopt silicon carbide; fine-grain Abrasive applies to Soft, high prolongation substances; hard Grinding wheel applies to Soft substance; Soft Grinding wheel applies to Hard substance. However, Soft Grinding wheel applies to very soft substances such as brass to avoid “clogging” or “loading”, and dense contact grains Abrasive applies to hard and fragile substances; bulky grain Abrasive applies to soft, good prolongation substances.
- (2) When weighing Precision and finish to require rough grain G.W. it is recommended to use Quick Cutting; while fine finish is required, Use fine grain G.W.

However, fine finish can still be made if dressing as appropriate in case of using medium grain Grinding wheel; glass bonder applies to rough and semi-fine dressing while resin, rubber, worm gum bonder apply to high fine dressing finish.

- (3) When weighing contact area small area shall use fine grain and hard Grinding wheel; dense type Abrasive applies to small contact area while bulky applies to large contact area.
- (4) When weighing the characteristics of grinding operation, precision grinding normally applies to glass bonder G.W., while for especially fine finish is required resin, rubber and worm gum bonder G.W. are more suitable perhaps.
- (5) When work movement rate is higher corresponding to Grinding wheel RPM, Grinding wheel shall be softer the better; if Grinding wheel RPM should be reduced to lower Grinding wheel speed, then its function is like Soft, and increase Grinding wheel speed its function like Hard. Glass bonder Grinding wheel applies to 6500S.F.P.M under, while rubber, worm gum and resin bonder Grinding wheel applies to 6500S.F.P.M above.
- (6) Feed rate higher and grinding pressure higher too so Grinding wheel shall be harder; if workpieces rate shall be increased to match In-feed Amount, Feed rate will be Auto advanced to cause Grinding wheel wearing faster. Such wearing can be improved by using Hard Grinding wheel.
- (7) When weighing operator's skill, it can be found Hard Grinding wheel is more suitable for pay by time than that of workpiece.

Viewing grinding cost tends to vary up to 100% for non-manual grinds, the same work and in the same factory.

Grinding wheel installation

Before installation, release Grinding wheel, listen to its sound by softly clicking it to check if any crack; if sound is clear and good, that's good Grinding wheel, and Never use any Grinding wheel that is not good; softly push Grinding wheel onto the flange, do not apply large force to forcibly push it in, and elastic washer (if possible, rubber only) shall be placed between the contact sides of Grinding wheel and flange, Do not use paper for fixing the sides of Grinding wheel for wet grinding will cause it rolling which, when getting dry, will cause Grinding wheel loose; retaining nut should be tightened up to ensure Grinding wheel is secured firmly but excessive tightening is not recommended. Never apply a hammer to tightening which will cause Grinding wheel breakage.

4-3 Test run

For safety purposes, the use of each G.W., test run for 5 minutes within the range of designated speed is always required and during test run no one shall be allowed to stand within the hazardous area. Never use until test run says OK!

a. Grinding wheel balance

In order to achieve high precision and fine finish, Grinding wheel shall require total balance. Delivered with M/C, Grinding wheel and its fastener all have been conducted dynamic and static balance. However, check often is required due to G.W. wearing. Adjust standard width of balance (50mm) when necessary. New Grinding wheel is normally mounted on balance shaft, then placed on balance stand to Calibrate its static balance. Therefore, on the flange there has three Adjust balance Weighing, and after balance Calibrated, place Grinding wheel with its flange on the shaft and dress it with Dresser which may be on shaft slide table or Work Table; if mounted on Work Table, lock up work longitudinal shift, move Work Table horizontally with Manual Wheel, and Dressing till Grinding wheel running is genuinely circular movement, and total balance will be achieved; if after Dressing, total balance remains not achieved, then O.D. Grinding wheel should have to be removed from the shaft, and carefully Calibrate balance again, and then mount it on the shaft again and that's all set.

b. Balance Calibrate

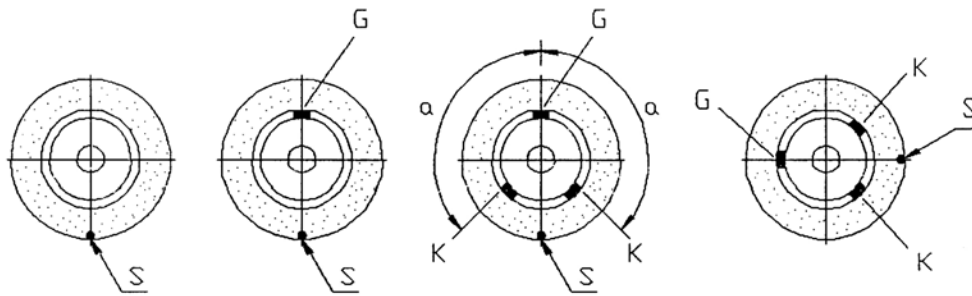


FIG 4-2

In order to obtain Precision grinding effect, mount Grinding wheel on balance shaft, then fasten it on the lathe, dressing its front and lateral sides with Diamond Dresser, and then place it on balance M/C, Calibrate balance as follows:

1. Make Grinding wheel swinging freely to find its gravity center S Pos. and draw marks by using chalk.
2. Add one balance weighing to G Pos. corresponding to Point "S" and turn it 90° to see S and G which is heavier.
3. Place two balances weighing "K" to the circumference where has equal distance from both the heavier one and G.
4. Rotate Grinding wheel 90° and check if Grinding wheel is in balance, if not, move K till Grinding wheel balanced.

If grinding has different materials, it is recommended to change Grinding wheel. In this case replacing it with its flange may save balance and Dressing time.

c. Dressing Grinding wheel

Place diamond in Dresser. Dresser fixing hole is 5-degree angle, and when diamond gets blunt turn the sleeve at a little degree it may ensure Dressing edge to be sharp.

Recommend to use the lowest Grinding wheel speed (1400rpm) for dressing Grinding wheel to prolong the life of diamond. Work surface roughness has close relationship with the speed of diamond passing the wheel surface.

If grinding is desired for reserving just 0.2mm to 0.3mm, it is recommended to Dressing in order to make wheel surface rough which can cause Dressing Feed amount about 0.03mm Rapid Manual Wheel revolution so that diamond can pass the wheel surface swiftly to make wheel surface rough.

When it is desired to use the same Grinding wheel for fine grinding, Dressing again is required and Dressing amount is about 0.01mm which will cause diamond passing the wheel surface slowly. Dressing 2 or 3 times.

Dressing amount relatively small may prolong the life of Grinding wheel. Cooling is required during Dressing, but sudden cooling is quite a risk which might cause diamond cracking. As Grinding wheel is very hard and fragile, little strike may crack it. Dressing (diamond pen) shall start from the center for abrasive loss is less; if start from abrasive side, when Dressing reaches the center, diamond will sustain more stress to cause it jump as a result of large Dressing amount. Experiences tell us that when high Precision grinding result is desired, Manual Dressing is not good for it might cause bias that result in irregular wheel.

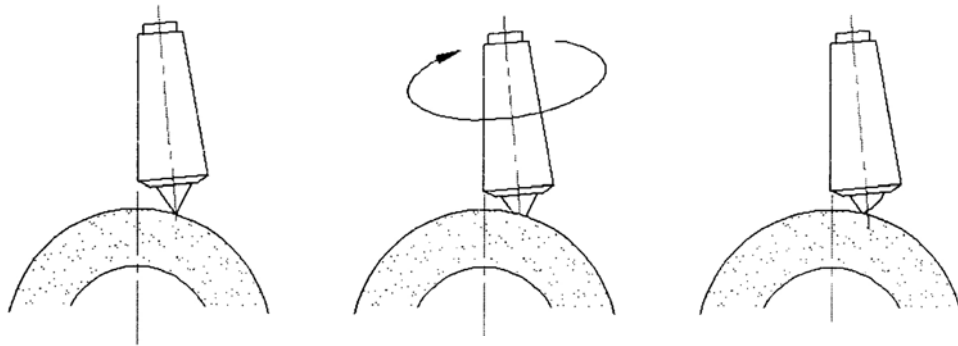


FIG 4-3

1. Bevel angle of new diamond and Grinding wheel is correct.
2. Diamond Cutting part appears plane and turn little degree of angle along shaft is required.
3. New Dressing points seem to be as sharp as that new diamond.

After a period of time, diamond shall be replaced or it could damage to diamond fastening arm as a result abrasive wearing which might cause diamond being thrown out or getting loosed. Further, as diamond gets smaller, it's too small to setting and cost time.

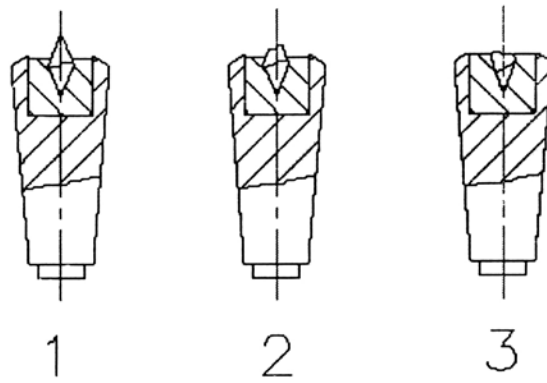


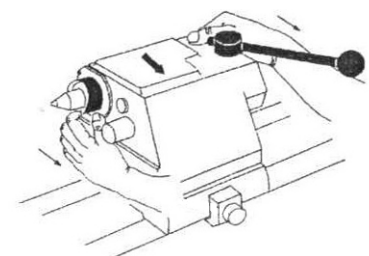
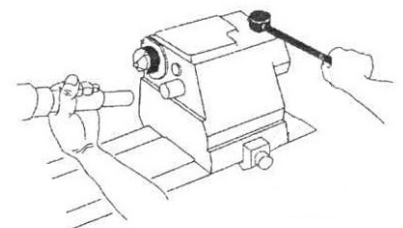
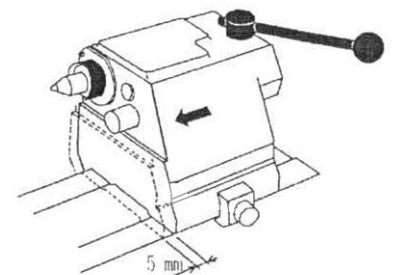
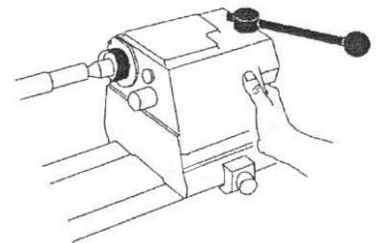
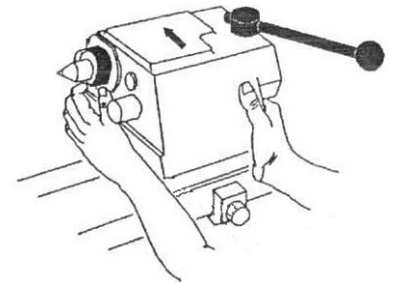
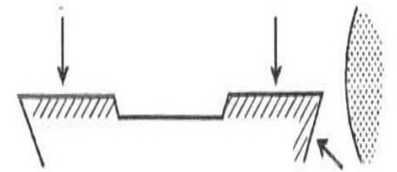
FIG. 4-4

1. New diamond
2. Need to replace diamond
3. It's too late to replace diamond.

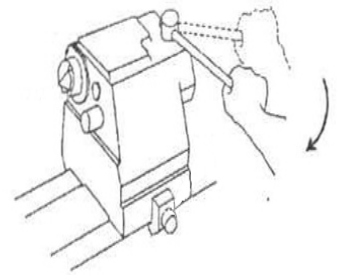
* Replacing diamond should only be done by an expert.

4-4 Dismount the grinding wheel flange

- (1) In the work head spindle slide way & the tailstock slide way, need to clean carefully & put some lube.
- (2) In the tailstock, loose the fixed handle in anticlockwise, the tailstock may stick well on the slide and need to push by hand toward the wheel head direction.
- (3) Push the tailstock fixed handle in anticlockwise to make the carbide tipped center forward. Move the tailstock to approach the workpiece center hole. Take the workpiece by left hand, move the tailstock by right hand to let the center to support the workpiece. Push the tailstock fixed handle clockwise and then fix the tailstock.
- (4) Take the workpiece by left hand, move the tailstock clockwise by right hand to let the center backward and then take the workpiece out.
- (5) Loose the tailstock fixed handle in anticlockwise. Move toward work spindle base 5mm. Adjust the tailstock spring pressure to 5mm.
- (6) Push the tailstock forward in order to make the tailstock base stick on table slide way, then fix the tailstock handle in clockwise.

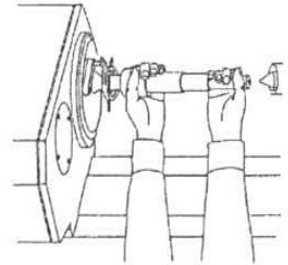


- (7) Push the center handle to 100k in clockwise, install the driving dog. Use both hands to hold the workpiece and let work spindle head center insert the workpiece center hole.



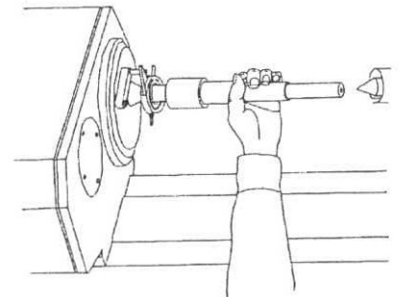
(key point)

Need to let work spindle head carbide tipped center slowly insert the workpiece center hole. If any damage on carbide tipped center front side, after grinding the roundness will not good.

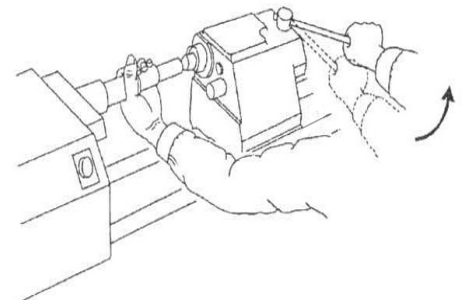


(note)

If the workpiece is too heavy to hold by hand, need to use two-point steady rest or crane.



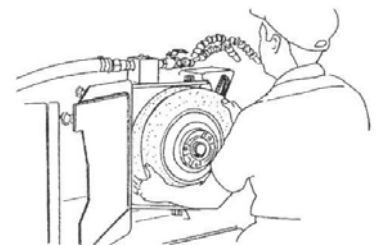
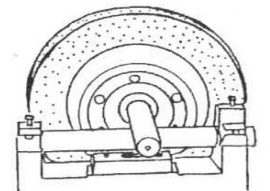
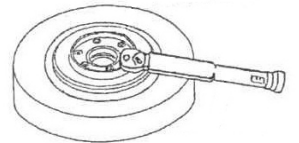
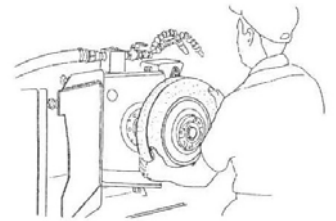
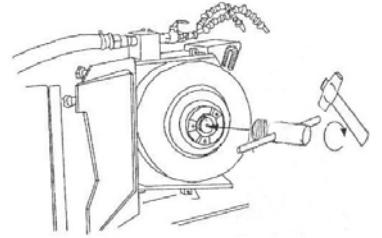
- (8) Use left hand to hold the workpiece while the workpiece is inserting work head center, then use right hand to push the tailstock fixed handle slowly to let the tailstock carbide tipped centers insert the workpiece center hole.



- (9) After the two carbide tipped centers hold the workpiece, check the tailstock spring to make sure or need to adjust.

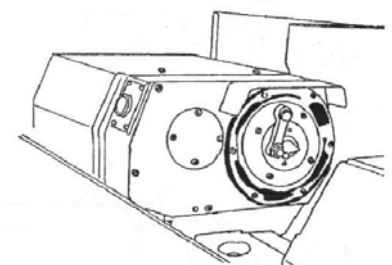
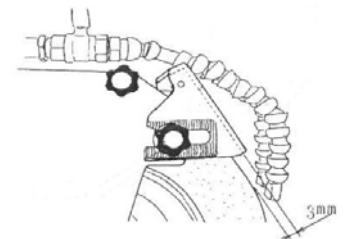
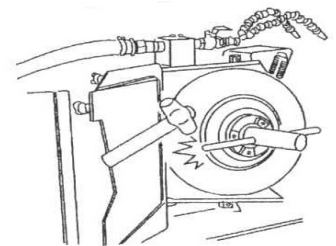
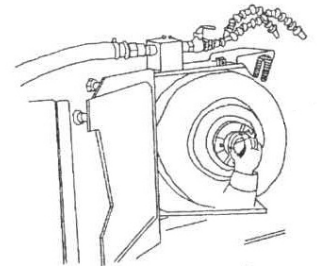
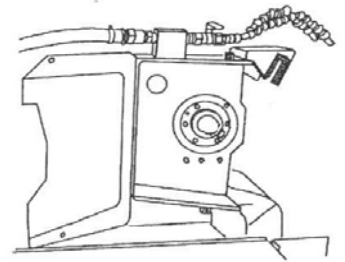
Dismount the grinding wheel flange

- (1) Make sure the grinding wheel already stop and then turn the main power off.
- (2) Dismount the left side wheel cover, move the coolant nozzle upward. Lift the wheel cover.
- (3) Open the wheel cover.
- (4) Take the flange extractor & hammer to loose the grinding wheel flange (left thread) in clockwise.
- (5) Mount the flange extractor in the wheel flange, turn the screw to let flange taper totally meet the wheel spindle taper.
- (6) Dismount the flange extractor, install the spindle protection tube on the spindle.
- (7) Move the flange forward in order to take off the flange.
- (8) Dismount the old grinding wheel from the flange, then mount a new wheel.
- (9) Make sure the grinding wheel is balance.



Mount the grinding wheel flange

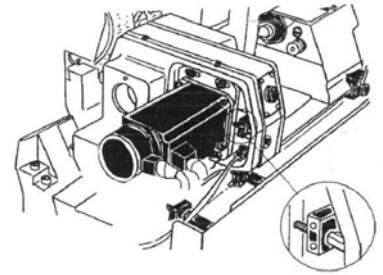
- (1) Clean the inside of wheel cover, clean the spindle taper and make sure if any ragged edge or damage. Clean the spindle front side thread and make sure if any damage (tumid). Clean the nut and put butter on spindle thread and also nut thread. Install the spindle protection tube in anticlockwise.
- (2) Clean the flange taper hole and make sure if any ragged edge or damage (tumid).
- (3) Put the spindle protection tube in the flange & let its taper meet the spindle taper. Mount the wheel flange on the spindle.
- (4) Dismount the spindle protection tube and put the nut in the spindle (left thread) in anticlockwise.
- (5) Mount the nut fixer, use a hammer to hammer at the nut in anticlockwise in order to fix the nut.
- (6) Mount the wheel side cover, adjust grinding wheel upper cover downward & let it has 3mm backlash with grinding wheel, then fix the screw. Adjust the coolant nozzle to suitable position.



(7) Mount grinding wheel left side protection cover.

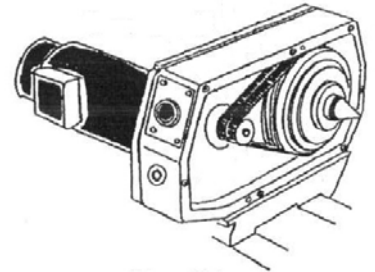
Change work spindle belt steps

(1) Refer the “Power OFF steps”, turn off the power.



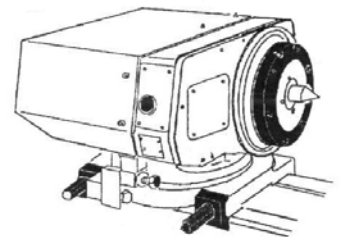
(2) Loose work spindle base rear cover screws, and take off the rear cover.

(3) Use hexagon wrench to loose the 4 nos. screws in the plate, and take off the plate.

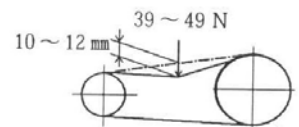


(4) Loose the front cover 6 nos. screws, and take off the work spindle front cover.

(5) Loose motor lower cover 4 nos. screws, then tighten the lower cover slightly (still can move the lower cover), use a wrench to adjust in anticlockwise in the belt tension adjust screw, the motor pulley will move toward work spindle & the belt will be loosen.



(6) Put on 2 nos. new belts (5BT4PK0735), use a wrench to adjust in clockwise in the belt tension adjust screw, the belt will be tighten (slightly).



NOTE:

If the belt tension is too loose, the belt will slide and will make the workpiece stop to turn and this will cause the grinding wheel to break.

If the belt tension is too tight, the work spindle servo motor shaft will worn out easily.

(7) When the motor belt tension adjust suitable, tighten the motor lower cover 4 nos. screws & fix it.

(8) Clean the work spindle front cover. Use an oil stone to touch the connecting face & make sure if any bur or damage (tumid). Put the liquid waterproof glue, mount the front cover & tighten 6 nos. screws lightly.

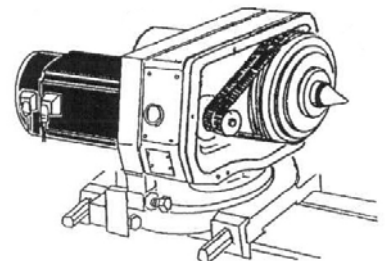
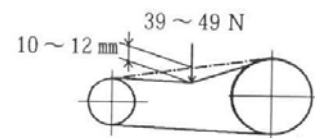
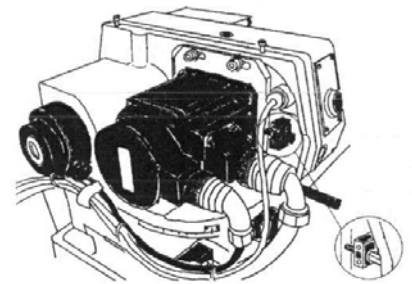
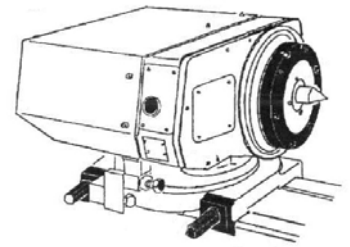
(9) Put on the work spindle plate & tighten 4 nos. screws.

(10) Put on the rear cover & tighten the screws.

NOTE:

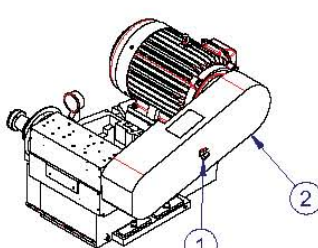
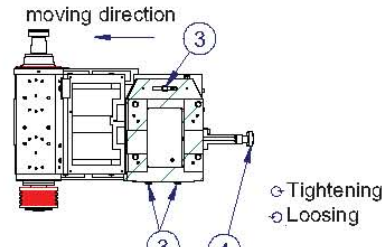
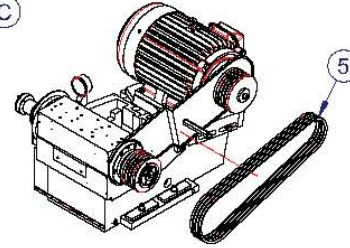
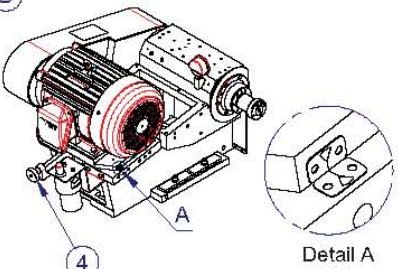
The new belt is easy to extend, when change the new belt after one week, need to check the belt tension everyday.

o

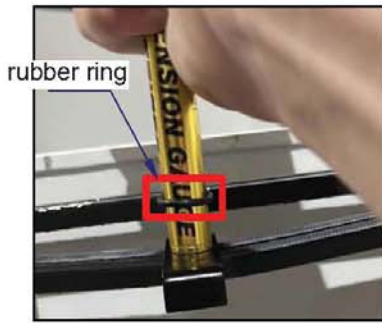


4-5 Change Belt Process

Adjustment Steps for Belt Replacement and Belt Tightness

<p>When to use: 1. Repair the new grinding wheel 2. Grinding and processing belt slippage 3. With a belt tension meter tool</p>	
<p>(A)</p> 	<p>Before adjusting the belt, need to start the machine oil supply system. Then, loose the star knob (1) and take off the belt cover (2).</p>
<p>(B)</p> 	<p>Loosen the three fixing bolts (3) of the motor mounting base. Turn the screw handle (4) behind the motor base to make the motor base (slash) move forward to loosen the belt.</p>
<p>(C)</p> 	<p>Remove belt (5) and replace with correct belt size</p>
<p>(D)</p> 	<p>First, adjust the screw handle (4) to move the motor base backwards. Then, align the reference datum position pointer on the side of the motor base as shown in detail A. ※ Before using the tension for testing, always adjust it to the datum position. Then, proceed the detection steps (E).</p>

(E)



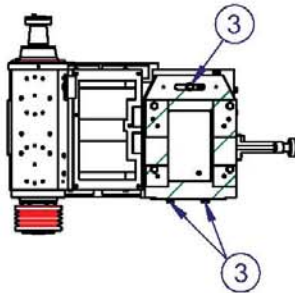
Belt specifications: _____
 The grinding wheel belt tension uses 10lb (4.54kg) of tension to bend the belt 18-22mm.

WARNING

Use a tensiometer (optional or purchased by the user)
 (Recommended brand: FIRSTIAFO Model: F3278)
 Place the measurer vertically in the center of the belt span, apply 10 pounds of pressure so that the lower rubber ring of the meter is parallel to the unstressed belt.
 (If it is a single measurement, use a line along the belt surface to measure the sag depth. Pull out the reference horizontal line)
 Use it to measure the depth of subsidence.
 As shown on the left
 (※Measurement is based on pressing one belt)

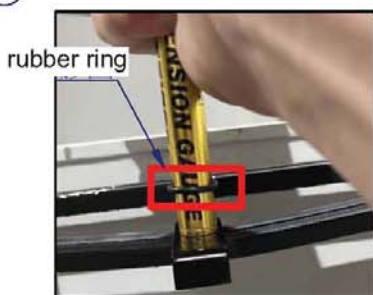
※The depth of subsidence must be between 18~22
 (If the measured value is more than 22, the belt needs to be tightened, and if it is less than 18, the belt needs to be loosened)

(F)



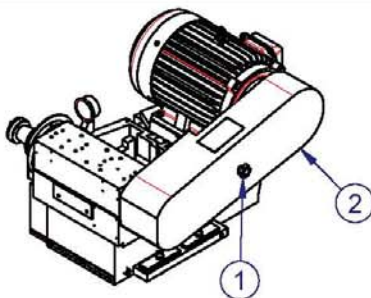
Tighten the three fixing bolts ③ of the motor mounting base

(G)



After tightening, measure the belt tension again with a tension meter.
 Determine the belt sag depth to be between 18 and 22.
 If the measured value is not within the range, loosen the fixing bolts again.
 Repeat (E) ~ (G) steps to make adjustments.

(H)



Install the belt cover ② first and then lock the star knob ①.

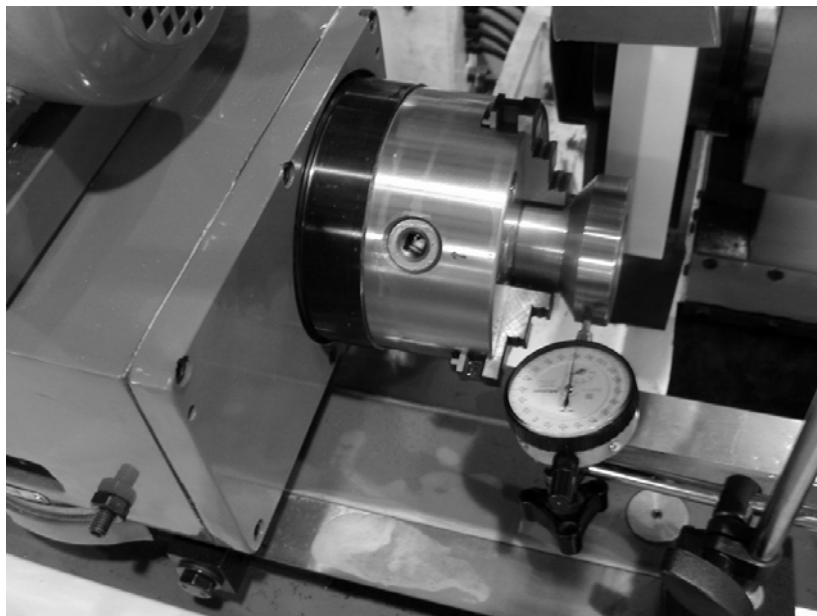
4-6 Grinding Example:

(1) 2 Point Center Grinding:



Cam-Lock driving Dog

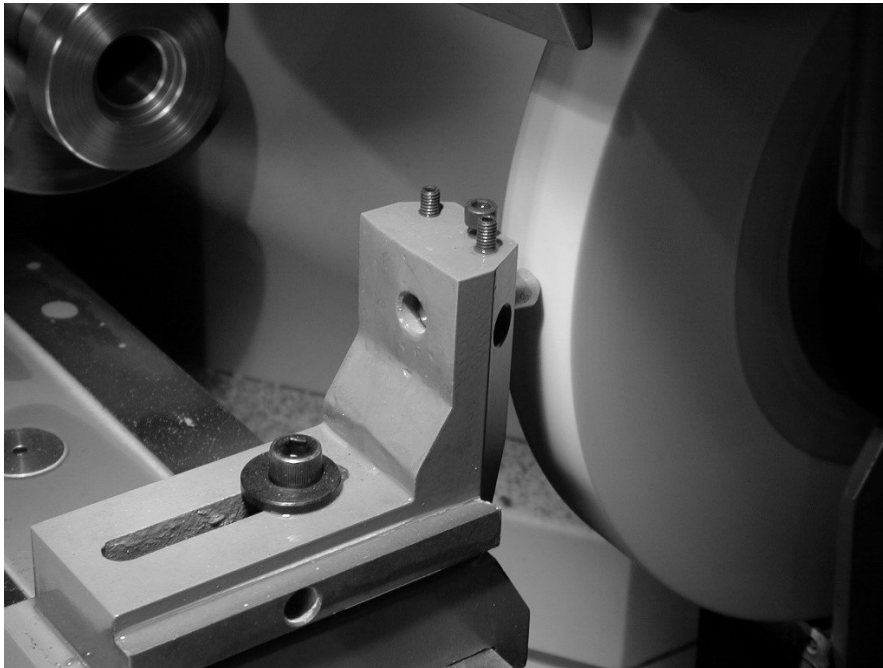
(2) Adjustable 3-jaw scroll chuck:



(3) Chuck Grinding (Face Grinding) :



(4) Working Table G.W. Dressing :



(5) Chuck Grinding (Internal Grinding Attachment) :



Diamond tool holder for In and External Grinding Wheel

(6) Radius Trimming Device:



5.Grinding Wheel Safety Rules

Operate Cylindrical Grinding M/C shall observe the SAFETY RULES as follows:

Operating error might cause an accident. The Instructions are hereby edited as indicated below. Without observing these rules it might cause severe damages to the M/C as well as to the risk of operators.

5-1 M/C Assembly

Substantiate to refer Assembly Drawing, ensure Work Table saddle within its total stroke without possibility of being hit by wall or other M/C or anything else. In Assembly Drawing there has indicated limit lines of the M/C and none except it shall be placed within that zone.

Grinding wheel

Grinding wheel has marked below :

1. Manufacturer
2. Bonding type
3. Size
4. New Grinding wheel max. permissible RPM :

Grinding wheel applicable to the M/C shall be validated that its max. permissible RPM is 35m/sec.

5-2 Grinding wheel Storage

Grinding wheel shall be stored only within dry thermostat room; if temperature varied too large, which might cause Grinding wheel sustaining tensile tension, particularly porcelain bonding type Grinding wheel which is more liable to cracking or damage.

Grinding wheel shall not contact oil or grease, for oil-contained Grinding wheel cannot use for Cutting. The best way of storage for Grinding wheel is to store Grinding wheel in specially made wooden case stand; thin or formed Grinding wheel shall apply the same too, only difference is to lay it flatly. For handling Grinding wheel, do not hammer or get it vibrated.

5-3 Sound test

Before Grinding wheel mounted in Grinding wheel head, place it on center shaft, strike it with a wood hammer, the sound shall be clear. Never use the Grinding wheel that is not usable based on such test.

5-4 Mounting Grinding wheel

Mount Grinding wheel shall require experienced operators who shall softly push it into the fastener. Do not force it in. Grinding wheel side and between with the fastener shall be added elastic ring. Do not use paper for fixing the sides of Grinding wheel for wet grinding otherwise, when it gets dry, it will cause Grinding wheel loose; retaining nut should be tightened up to ensure Grinding wheel is secured firmly but excessive tightening is not recommended. Check tightness often is highly recommended.

5-5 Grinding wheel balance Calibrate

When obtain perfect grinding finish is desired, carefully Calibrate Grinding wheel is essential. When Calibrate, one can use balancer or balance scale or electronic power balancer.

Delivered with M/C, Grinding wheel and its fastener all have been conducted dynamic and static balance. However, check often is required due to Grinding wheel wearing. New Grinding wheel normally is balanced, and can be used right after sound test. Calibrate its balance is recommended after a period of use.

When grinding to use Grinding/cutting liquid, idle run for 15 minutes is necessary for Grinding wheel to cause Grinding wheel orifices moisture escape to avoid bias.

5-6 Test run

Before use of any Grinding wheel, test run at maxi. Allowable speed for 5 minutes is required and nobody shall stand near it. Only Grinding wheel that pass the test can be used. Please observe the max. allowable speed, do not exceed it.

5-7 Dressing

Grinding wheel shall often be maintained in circular manner, and irregular Grinding wheel can be maintained in circular manner through appropriate Dresser Dressing.

5-8 Dry grinding

Dry grinding operator shall wear protective glasses and dust shall be removed if worked for long.

6、Consumables Specification

7. Consumables Specification Drawing

7-1 G.W.

7-2 Diamond tool

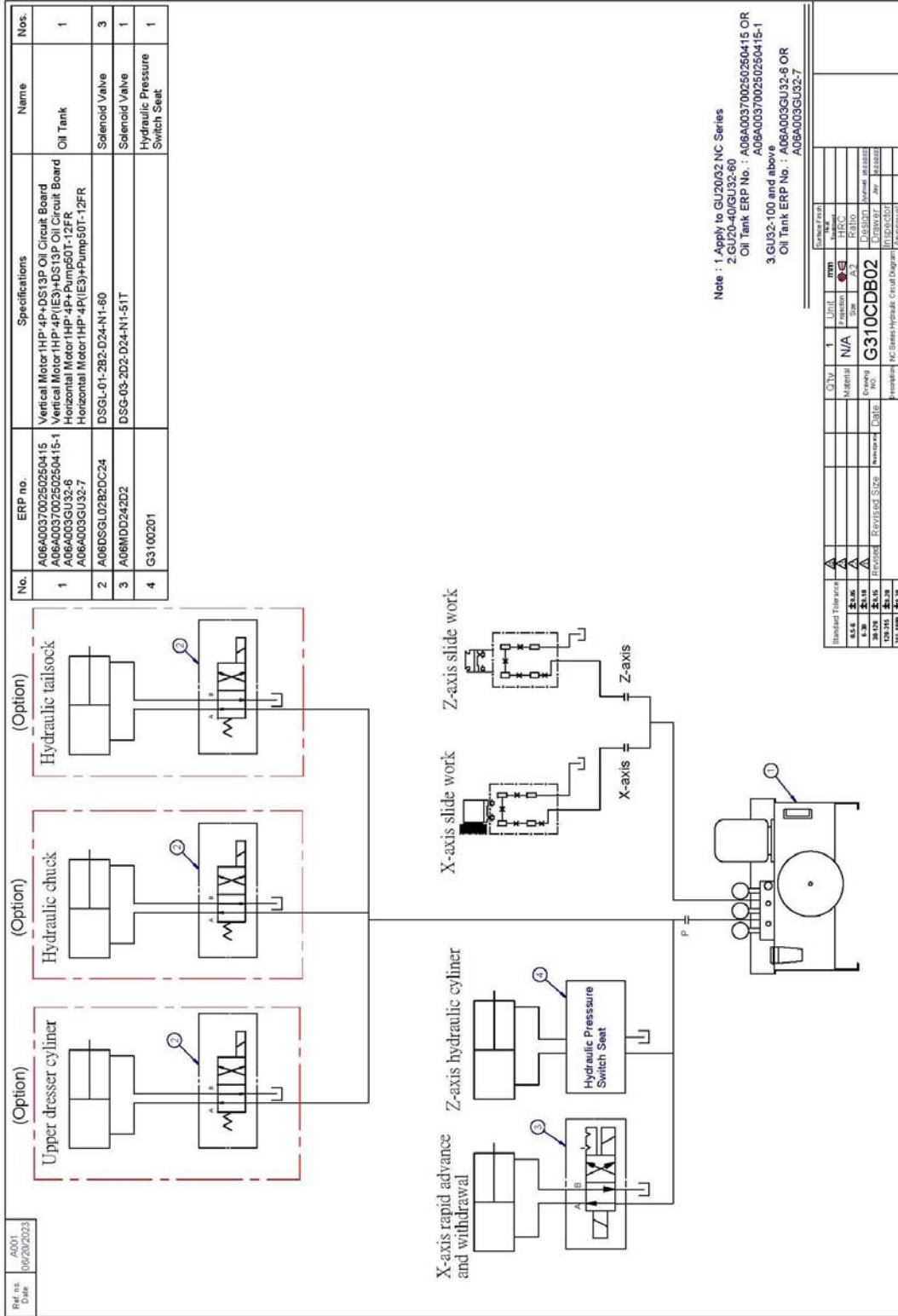
7-3 Center

8. NC Electric Control Operation Panel

9. Circuit Diagram

10. Oil Circuit

10.1 Oil circuit of OD-816-NC series (G310CDB02)



11.Part List

12. Accuracy Checking List/ Trial Report

13. Accessories Checking List

14. Optional Accessories Operational Manual