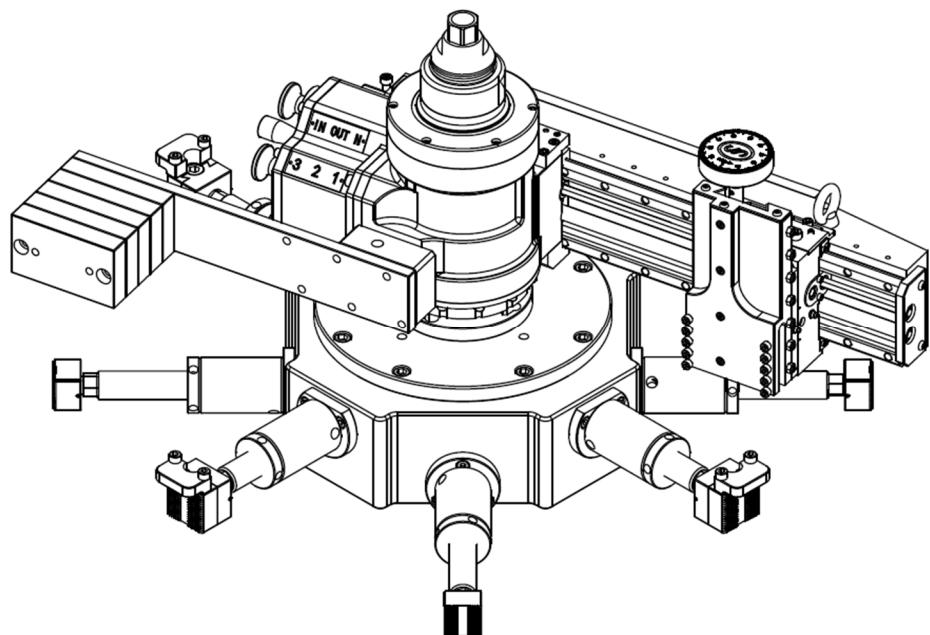




# Portable Flange Facer Machine

## FDG1000

OPERATING MANUAL



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## Important Notice

JOYSUNG Portable Machine Tools leads the way in promoting the safe use of portable machine tools. Safety is a joint effort. As the operator of this machine, you are expected to do your part by scrutinizing the job site and closely following the operating procedures outlined in this manual, your own company rules, and local regulations.

JOYSUNG Portable Machine Tools has made every effort to ensure that the information given in this technical leaflet and other publications relating to this machine is correct and understandable. However, it is acknowledged that there may be errors or omissions in this publication.

The company reserves the right to modify its products without notification and consequently to supply machines that may not be in accordance with the descriptions and procedures within this publication.

The company also reserves the right not to provide updates, corrections or amendments to this publication but will endeavor to keep its customers up to date with all changes that may affect the machine operation or safety.

## Compliance Statement

### EU Declaration of Conformity

Declares that this product has been tested and conforms to applicable standards and is compatible to all CE Requirements.

A copy of an EU Declaration of conformity is enclosed with each shipment of this product.

The CE mark is a black 'CE' symbol enclosed in a square border.	These tools conform with the requirements for CE.
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### ISO Declaration of Conformity

Declares that this product has been tested and conforms to applicable standards and is compatible to all ISO9001 Requirements.

The logo features the word 'ISO' in large blue letters above a globe graphic, with 'ISO9001' written below it.	These tools conform with the requirements for ISO9001.
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## Health & Safety at Work Act

Thank you for using JOYSUNG portable machine tools, this manual describes the machine's function, performance, usage and precautions. The following two points must be understood before using:

- To ensure safety, please read and understand this manual before operating this machine.
- Carry this manual for ready reference.

## Operation Instruction

Please read the manual before using the machine and check the products according to packing list, be aware of safety cautions, performance of the machine and how to use it.

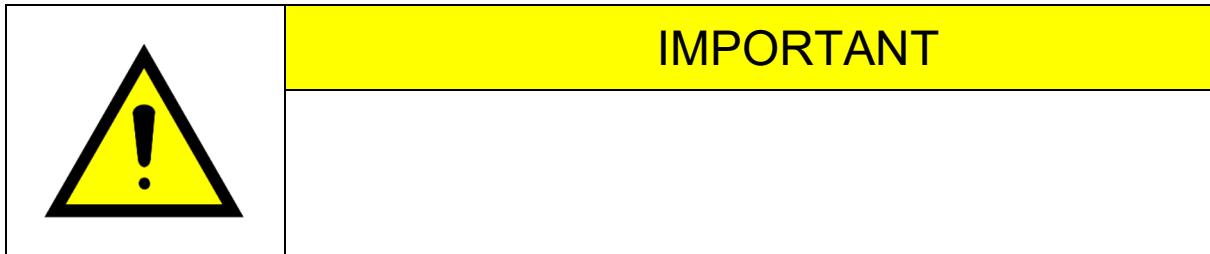
1. The operator must receive safe operation training before starting his/her work.
2. The operator must wear working suit and protection eye glasses.
3. Before starting the machine, please check the voltage and gas requirement on the data plate is same with the one you will use.
4. Please check whether the clamping system is locked or not before starting the machine.
5. You can only adjust the work piece at free position manually or at low speed, adjusting the work piece at high speed is not allowed.
6. Please do not put your hand or other things near the equipment when starting it up to prevent any injury.
7. The electrical wire shall be far away from high temperature, oil or sharp places.
8. When there is malfunction or abnormal sound, the power supply shall be shut down immediately through remote control and then to start checking and repairing.
9. Do not let the machine operating without anyone watching. Operators can only leave after the machine stop and make sure the power supply is switched off and transmission system is in free position.
10. It is prohibited that the machine is used beyond its working scope, any consequences thus caused is not the responsibilities of our company.
11. The machine could not be run beyond its highest cutting capability, to prevent any damage or human injury.
12. Do not attempt to alter the feeds whilst the machine is rotating.
13. Oil stain and iron dust shall be removed after work is done. And anti-corrosive oil shall be put on the cutting arm and main axis.



## Receiving Your Machine

### Inspect the machine upon receipt

1. Inspect the machine for shipping damage
2. Ensure you have received the parts listed on the invoice



3. When unpacking the machine, let the machine rest on 4-inch-high blocks to prevent damaging the components.
4. The machine has been coated with a waxy preservative to prevent corrosion during shipping. Clean this substance off the machine with solvent to prevent excess accumulation of dirt.



## Labeling Guidelines

The purpose of product safety signs and labels is to increase the level of awareness to possible dangers.

Safety Alert Symbols indicate **DANGER**, **WARNING** or **CAUTION**. These symbols may be used in conjunction with other symbols or pictographs. Failure to obey safety warnings can result in serious injury. Always follow safety precautions to reduce the risk of hazards and serious injury.

	<b>DANGER</b>
Indicates a hazardous situation that could be fatal or cause serious injury.	

	<b>WARNING</b>
Indicates a potentially hazardous situation that could be fatal or cause serious injury.	

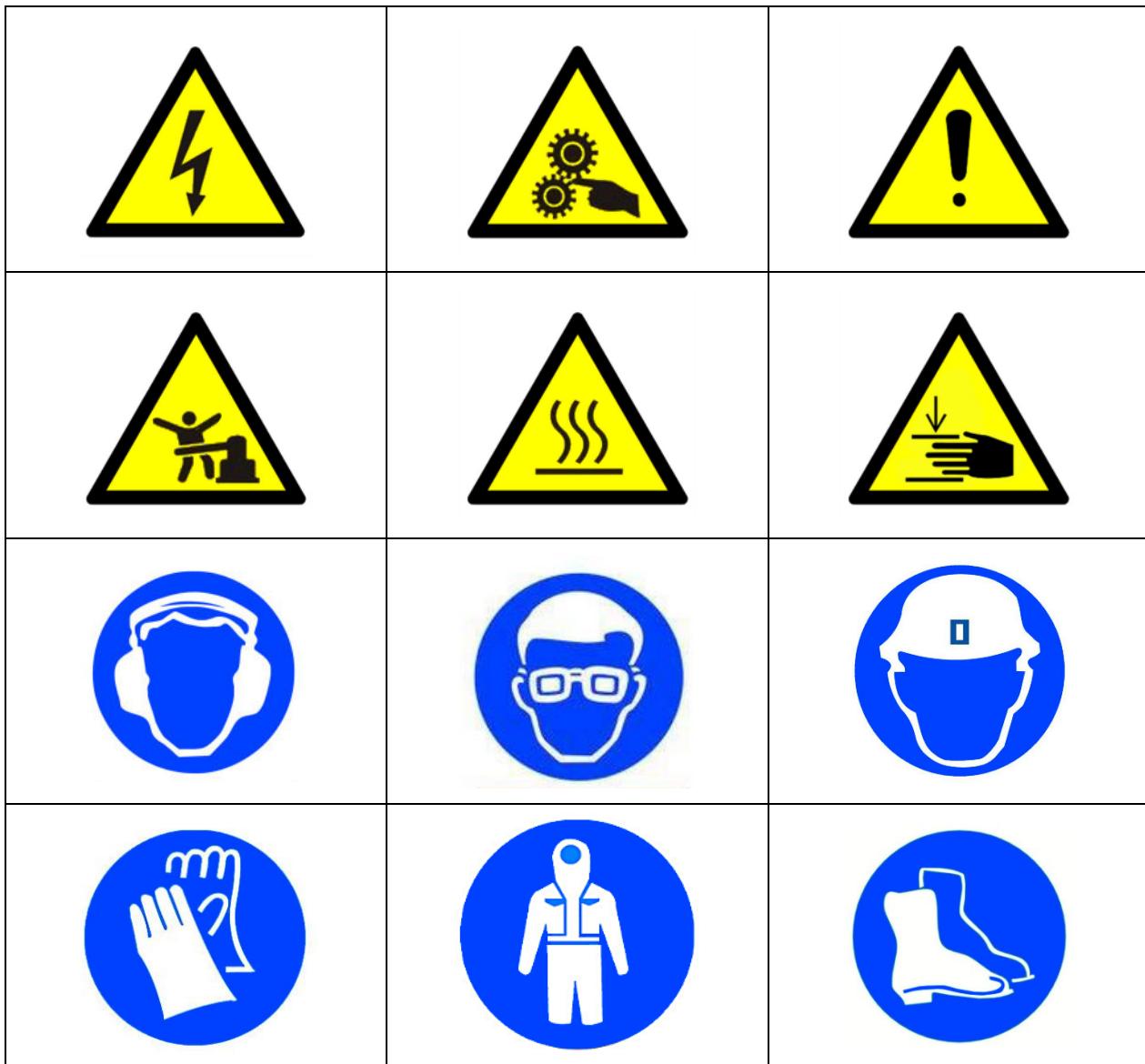
	<b>IMPORTANT</b>
Indicates a potentially hazardous situation that could result in minor to moderate injury, damage to the machine or interruption of an important process.	

	<b>IMPORTANT</b>
Provides critical information for the completion of a task. There is no associated hazard to people or the machine.	



## Warning Labels

Read and observe all warning labels.





## General Operation

The following procedures are provided to enable your JOYSUNG machine to be installed and function correctly and safely.

### **PLEASE READ THE FOLLOWING BEFORE PROCEEDING**

1. All safety procedures must be observed prior to operating the equipment.
2. Do not pressurise the equipment if the inlet hose or serviceability of the equipment is suspect.
3. The operators must wear the correct safety equipment whilst operating this equipment.
4. Do not attempt to machine above the specification of the machine or below the specified sizes. This will invalidate the guarantee.
5. Do not attempt to machine if the locking of the machine is suspect or below that recommended.
6. Ensure that the machine gearbox is stored in neutral and the Pneumatic motor is turned off and the valve is in the closed position. This is important before connecting the hydraulic supply to the machine.
7. Never allow another person to operate the HPU control valve whilst you are using the machine.
8. Never leave the machine working unattended or leave the hydraulics pressurised whilst disconnected.
9. Make sure that all personnel are fully trained in both the operation of the machine and all the relevant safety aspects.

### **CAUTIONS**

Do not attempt to alter the feeds whilst the machine is rotating



## 1. Machine Assembly

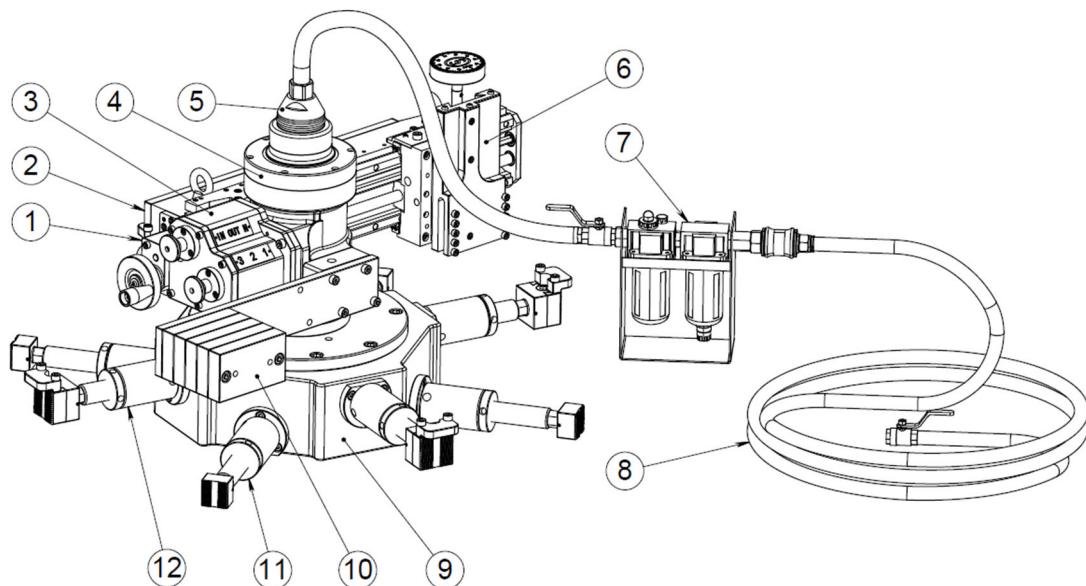


Fig. 1 FDG1000 Main Assembly

Serial number	Designation
1	Feed Gearbox
2	Rotation Arm
3	Speed Gearbox
4	Drive hub
5	Air motor
6	Tool Post
7	Air Lubrication unit
8	Air hose
9	ID Mounting Base
10	Counter weight
11	Jacking Leg
12	Adjustable Leg

Table.1 FDG1000 Main Assembly



## 2. Specifications

### Standard Technical Details

#### PRINCIPAL DIMENSIONS:

Facing Diameter Range	152-1000 mm (6.0"-40.0")
I.D Clamp Range	150-860 mm(6.0"-34.0")
Min Swing Diameter	830 mm(32.7")
Max Swing Diameter	1054 mm(41.5")
Tool Post Stroke	102 mm(4.0")
Tool Post Swivel Angle	+ / - 45°
R.P.M	0-33

#### MOTOR INFORMATION:

Drive Type	Pneumatic
Drive Power Unit	2.2Hp (1.6 kw)
Air Supply Pressure	6.2 bar
Air Cons	1.69 m <sup>3</sup> /min

#### STORAGE AND TRANSPORTATION:

Machine Weight	≈195 Kg
Shipping Weight	≈260 Kg
Packing Size	985x650x742 mm

### Feed Rate

In		Out	
Gear	mm/rev	Gear	mm/rev
1	0.126	1	0.109
2	0.241	2	0.208
3	0.571	3	0.492

### Tool post Feed Rate

Down		Up	
Gear	mm/rev	Gear	mm/rev
1	0.025	1	0.028
2	0.047	2	0.054
3	0.111	3	0.128



## Optional Drive Unit

---

### Hydraulic Power Unit

Hydraulic Power Unit	15L/min 7.5KW
Max Flow/min	38 L
Working voltage	220V/380V/415V/480V/575V
Rotation Arm R.P.M	0-35
Packing Size	1100x800x550 mm

### Electric Drive

Drive Power	1.5 KW
Working voltage	Single phase, 200V
Rotation Arm R.P.M	0-35
Servo driver Size	170x150x85 mm

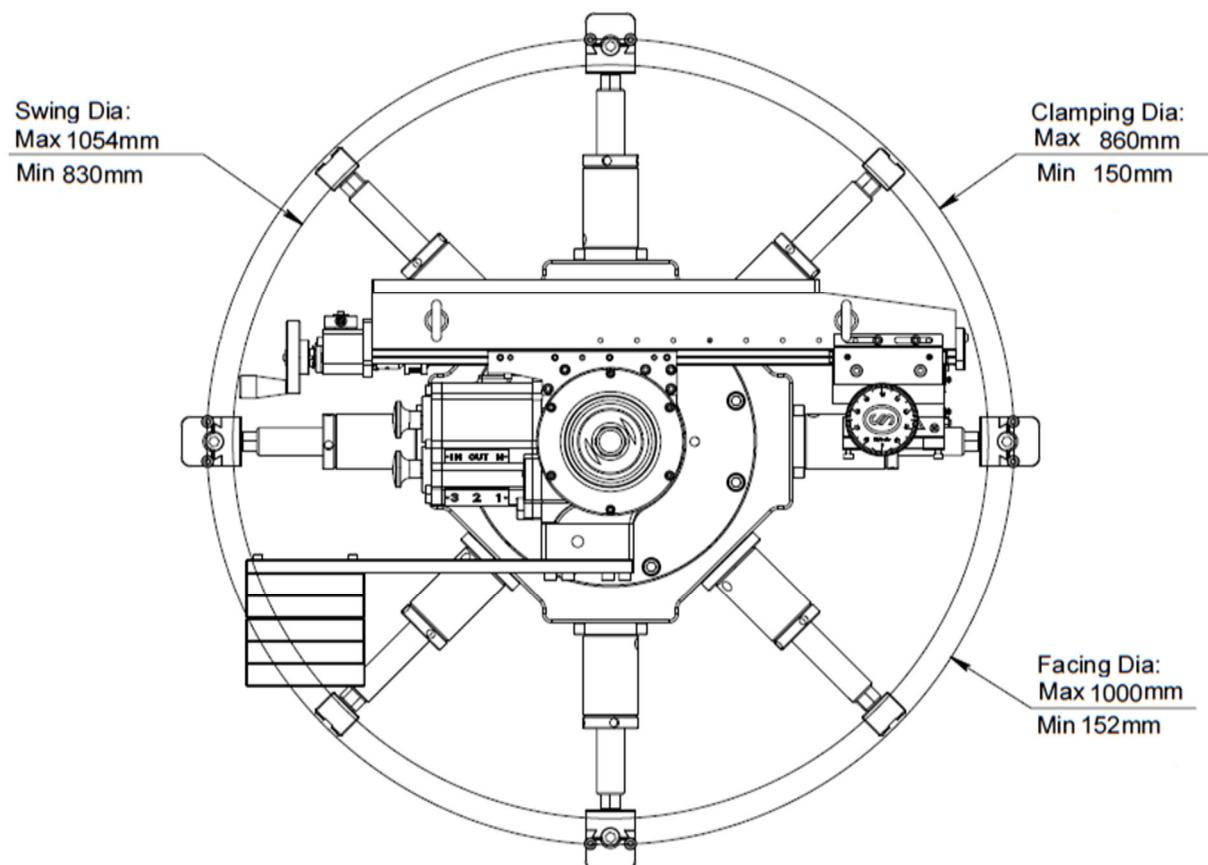
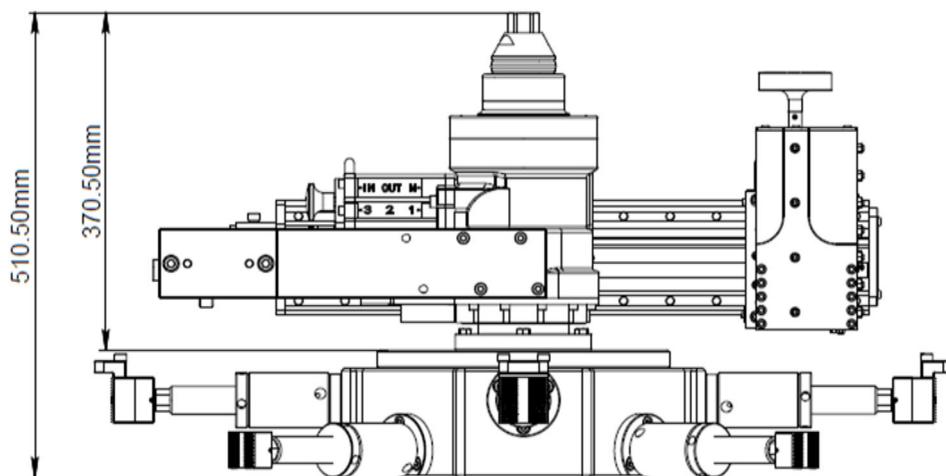


Fig. 2 FDG1000 Specifications



### 3. Lifting and Slinging Arrangements

The FDG1000 Flange Facer Machine can weigh up to approximately 195 kg when fully assembled in the ID configuration.

	<b>DANGER</b>
	<p>To prevent serious injury to yourself and others, always follow the operating procedures outlined in this manual, your own company rules, and local regulations for heavy lifting.</p> <p>Make sure that the counterweight and turning arm are secure before lifting or rigging this equipment. When lifting vertically, the machine will rotate to the center of mass (to the lowest point) and could swing or rotate uncontrollably!</p>

Always follow all required regulations regarding lifting and rigging of heavy equipment.

	<b>CAUTION</b>
	<p>Falling or uncontrolled swinging of machinery can cause serious injury or be fatal to the operator and bystanders. ONLY Lift the machine by the lifting eyes.</p> <p><b>DO NOT LIFT THE ASSEMBLED MACHINE BY THE COUNTERWEIGHT OR THE TURNING ARM!</b></p>

#### Rotation Arm Lifting Point:

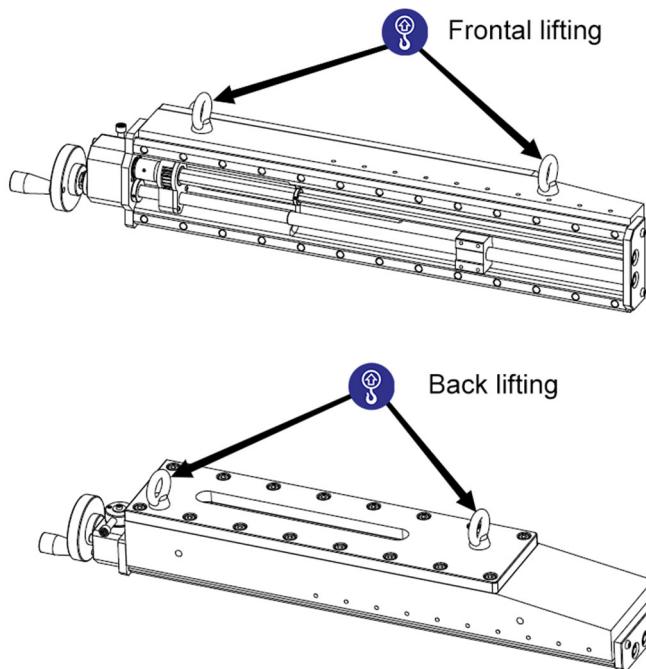


Fig. 3 Rotation Arm Lifting



**Drive Hub Assembly Lifting Point:**

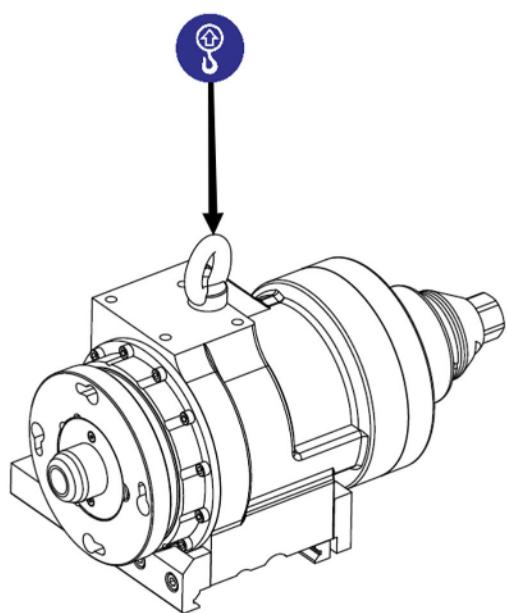


Fig. 4 Drive hub Arm Lifting

**Machine Lifting Point:**

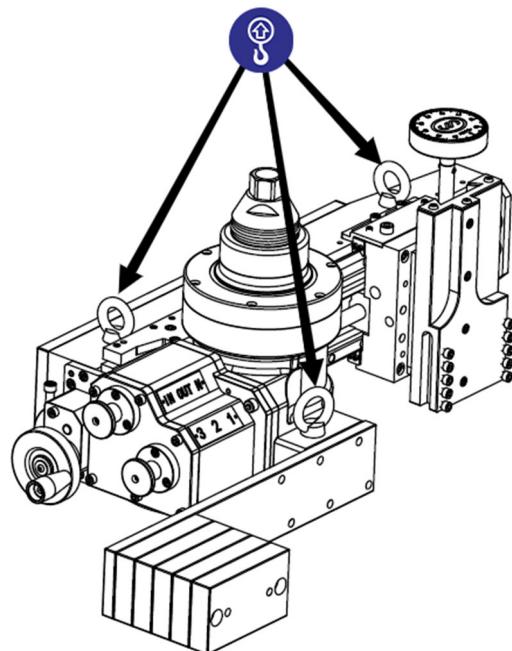


Fig. 5 Machine Lifting

**Mounting Base Lifting Point:**

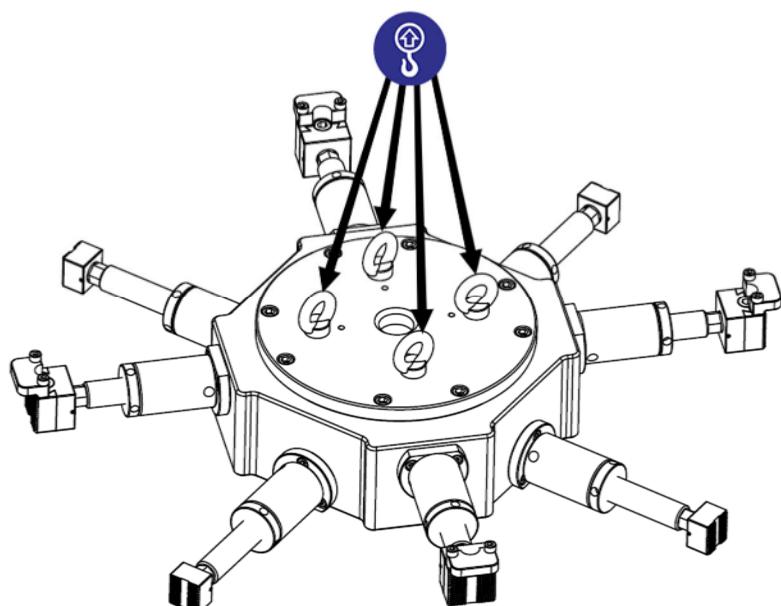


Fig. 6 Mounting Base Lifting



## 4. Equipment Description

The FDG1000 Flange Facing Machine is designed to machine full face, raised face and grooved flanges from 152mm to 1000mm (6.0" to 40").

The machine can achieve a variety of surface finishes from  $6.3\mu\text{m}$  to  $1.6\mu\text{m}$  RA when turning and  $1.6\mu\text{m}$  to  $0.8\mu\text{m}$  Ra when polishing. The machine can also produce Lens rings, 'O' ring grooves, RTJ grooves, 'V' grooves and other surfaces.

The machine consists of 3 main assemblies:

1. Drive hub assembly
2. Rotation arm assembly and tool post
3. Mounting base assembly

### 4.1 Drive hub assembly

The main drive assembly consists of 4 sub-assemblies:

- ①. Drive hub
- ②. Base plate assembly
- ③. Feed gearbox
- ④. Motor

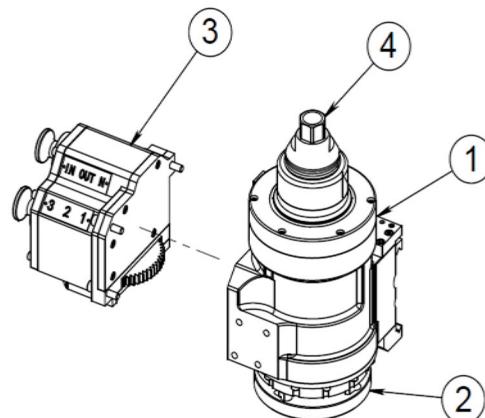


Fig. 7 Drive hub Assembly

#### Drive hub

The drive hub is the rotating part of the machine providing a rigid support for the gearbox, motor and rotation arm assembly.

The drive from the motor is passed through two intermediate gears to a drive gear on the main bearing inside the turntable.

#### Base plate

The base plate is the non-rotating part of the drive hub. The base plate is fixed to the mounting base assembly for most normal machining operations.



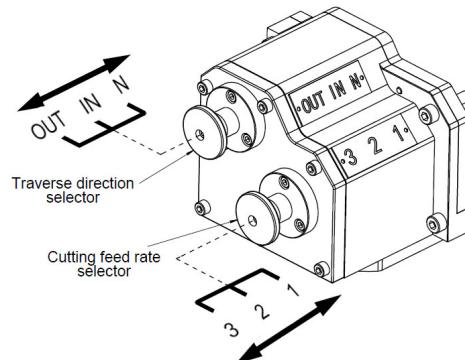
## Feed gearbox

The feed gearbox is mounted on the drive hub and provides a variety of cutting feeds for different machine applications. Drive from the feed gearbox to the tool post is via the surfacing arm leadscrew

Drive input to the feed gearbox is transmitted via the mast transfer gear. The feed gearbox provides three different tool feed rates, selected via the Cutting feed rate push/pull selector. Traverse direction is selected via the Traverse direction push/pull selector, which selects traverse IN, traverse OUT and neutral N position. The neutral (N) position can be used for manually positioning of the tool post.

### Traverse direction selector

Selects the direction of the tool post as it traverses across the work piece. The fully pulled out position 'N' disengages the traverse feed.



### Cutting feed rate selector

Selects the rate at which the tool post traverses across the work piece per machine revolution.

Fig. 8 Speed Gearbox Controls

TRAVERSE DIRECTION SELECTOR POSITION	TOOL DIRECTION
IN	Towards center of work piece
OUT	Away from center of work piece
N	No movement

Table.2 Traverse direction selector

CUTTING FEED RATE SELECTOR POSITION	FEED (mm per revolution)	
	IN	OUT
1	0.126	0.109
2	0.241	0.208
3	0.571	0.493

Table.3 Cutting feed rate selector

### Selecting Feed rate

1. Check feed rate table.
2. Select required feed and push or pull feed selector to required position.



## Selecting Feed direction

1. Check required direction IN will traverse the tool towards center – OUT will traverse the tool away from center.
2. Select required direction and push or pull feed selector to required position.
3. The direction lever can be rotated to engage feed rate and direction gears and will not rotate when both are fully engaged.

## Pneumatic Motor

The drive hub is driven by a motor which is an integral part of the assembly.

Drive Type	Pneumatic
Drive Power Unit	2.2Hp (1.6 kw)
Air Supply Pressure	6.2 bar
Air Cons	1.69 m <sup>3</sup> /min
NOISE EMISSION:	
Emission sound pressure level	92 dB(A)
Instantaneous sound pressure level	< 130 dB
Sound power level	101 dB(A)



Fig.9 Pneumatic motor

Our FDG1000 comes standard with a pneumatic motor, and if needed, hydraulic motor or electric motor can also be selected.

## Optional Hydraulic power unit

### Hydraulic station

Hydraulic Power Unit	15L/min 7.5KW
Max Flow/min	38 L
Working voltage	220V/380V/415V/480V/575V
Hydraulic motor	HT400
Size	1100x800x550 mm



Fig.10 Hydraulic station



Heavy-duty frame built with 6 inch (152.4 mm) urethane casters and robust hydraulic components, for reliable operation in the field.

Remote control box makes operation more convenient and improves safety, wire length can be reach 10m.

Quick disconnect couplings make connecting to the HPU and flow reversal processes quick and easy, with no need for any tools.

Before using hydraulic power unit always check for the following items:

- Hydraulic fluid reservoir is full.
- Lines are properly connected.
- Cables and hoses are away from moving machine parts
- Check the pressure of the pump station



Fig.11 Control box

### **Optional Electric Motor**

Drive Power	1.5 KW
Working voltage	Single phase, 200V
Servo driver	
Working voltage	Single phase 200V
Size	170x150x85



Fig.12 Electric Motor

Servomotors that flexibly and effectively fit into various system configurations.

- High-speed, high-torque, compact and lightweight.
- Enhanced position detecting resolution enables smoother and more precise positioning
- High-speed response, high-precision positioning for quick and accurate movement
- Easy and quick setting, shortening conventional settling time by approx. 64%

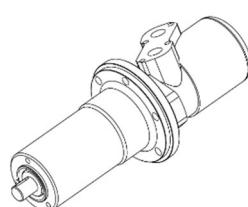


Fig.13 Servo Driver

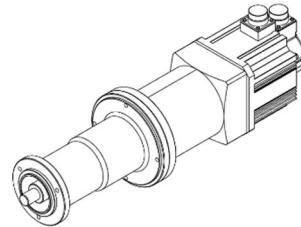


## Adapter

Installing a hydraulic or electric motor requires connecting adapter components.



Hydraulic



Electric

Fig.14 Adapter and Motor

## Motor replacement

### Step 1:

Loosen the screws and remove the bottom positioning shaft and top end cap;

### Step 2:

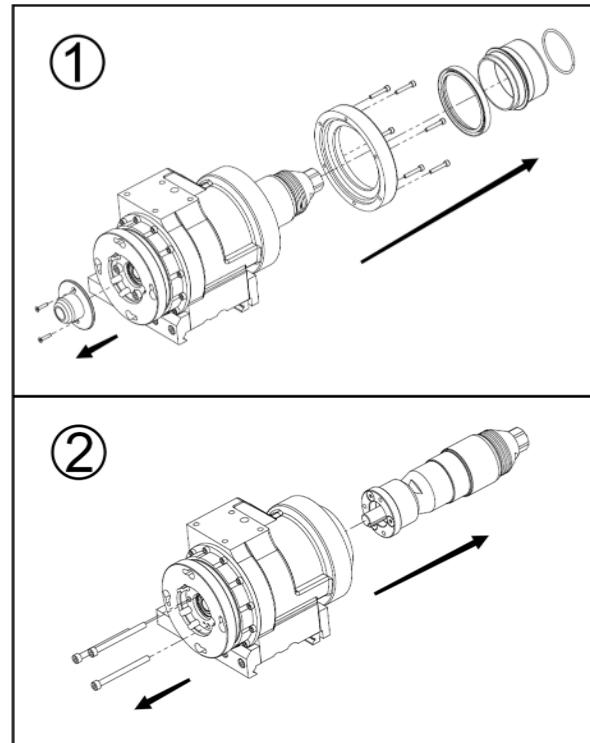
Loosen the three bottom bolts, remove and replace motor assembly.

### Step 3:

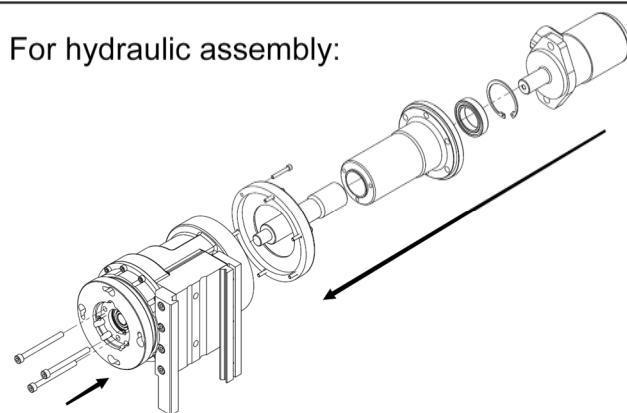
Install the hydraulic motor assembly or electric motor assembly into the spindle and lock the bolts.

### Step 4:

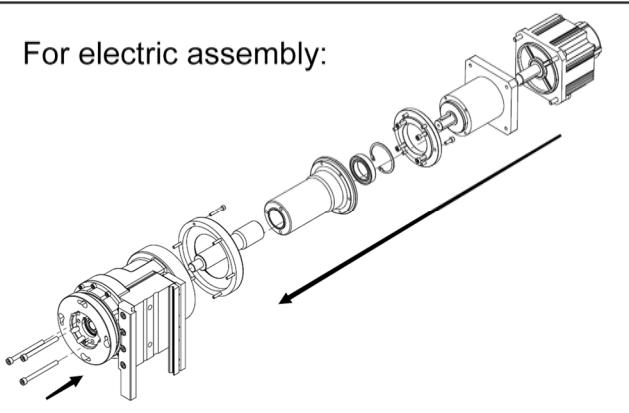
Reinstall the bottom positioning shaft and screws from Step 1.



For hydraulic assembly:



For electric assembly:





## Air motor assembly and pneumatic condition unit

To extend the useful life of the air motor:

1. Route the air supply through a lubricator and air filter.
2. Use nonrestrictive air lines and fittings. Check the air system periodically to be sure the air pressure is 90 psi (620 KPa).
3. Adjust the air motor speed by slowly turning the air control valve.

	<b>CATION</b>
Do not control motor speed by adjusting airline pressure. Damage to the motor can result.	

4. Fill the lubricator oil cup with air oil before using the machine. Use high-quality oil with rust inhibitors and emulsifiers such as Almo 525. The lubricator should oil the air at a rate of 2-4 drops of oil per minute.
5. Drain the air filter before and after using the machine.

	<b>CATION</b>
Using air that is not filtered and lubricated can damage the motor. When operating the machine, route the incoming air through the air filter and lubricator.	



## 4.2 Rotation arm assembly and toolpost

The rotation arm assembly is mounted on the drive hub assembly and provides a rigid support to which the toolpost is secured. The arm can be positioned at any diameter within the recommended facing range

Toolpost feed in and out is provided by a lead screw which is driven by the gearbox output gear. Alternative tools can be fitted to the tool post depending on the finish and cut required. For further information on cutting tools.

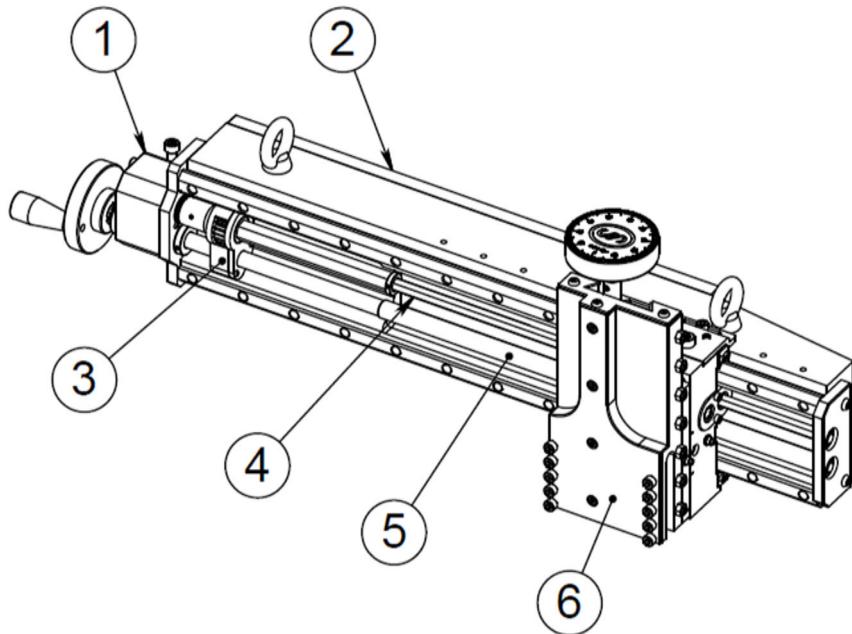


Fig. 15 Rotation arm Assembly and Toolpost

Serial number	Designation
①	Gearbox
②	Rotation arm
③	Pickup gear(PTO)
④	Hexagonal bar
⑤	Leadscrew
⑥	Tool post

Table.4 Rotation arm Assembly and Toolpost



## Facing/Boring Feed Gear

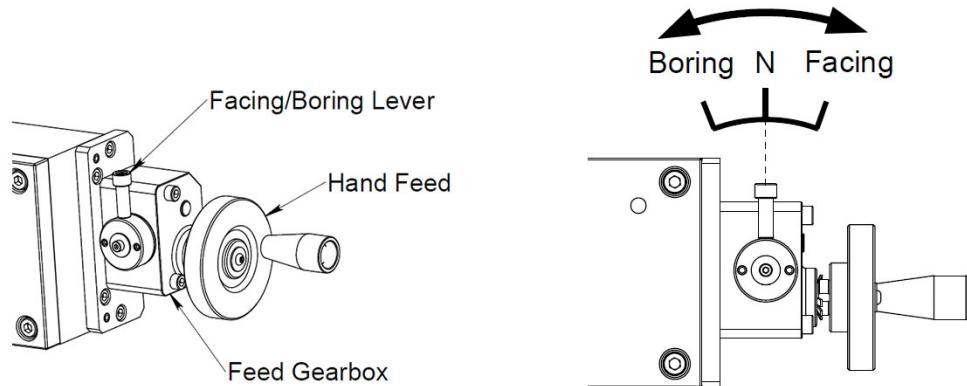


Fig. 16 Facing/Boring Gearbox Controls

### FOR BORING:

push lever towards the rotation arm whilst rotating the hand wheel located on the opposite end, engage the internal clutch of the gearbox with the gear.

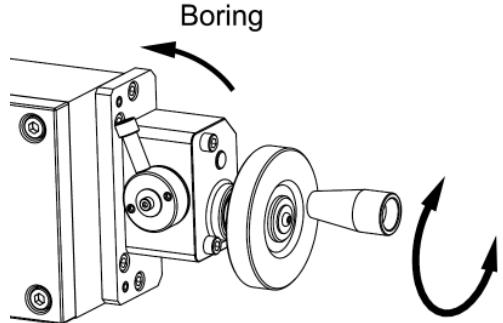


Fig. 17 Boring Controls

### FOR FACING:

push lever away from the rotation arm whilst rotating the tool post feed T-bar, engage the internal clutch of the gearbox with the gear.

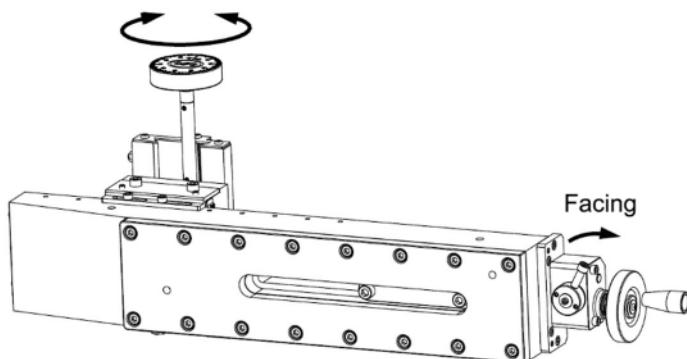


Fig. 18 Facing Controls

### NOTE:

If there is any stuck or gear mesh is not in place, gently rotate the handle.



## Tool Post

S/N	Description	Function description
①	Hand wheel	Manual feed
②	Screw	Carriage slide lock
③	Screw	Rotation limitation
④	Screw & Nut	Tool post gib strip adjusters

Table.5 Tool Post

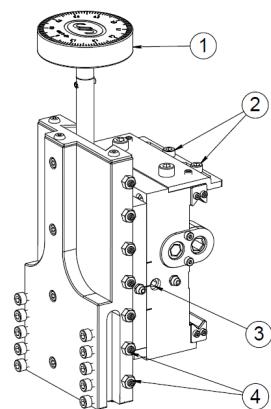


Fig. 19 Tool Post

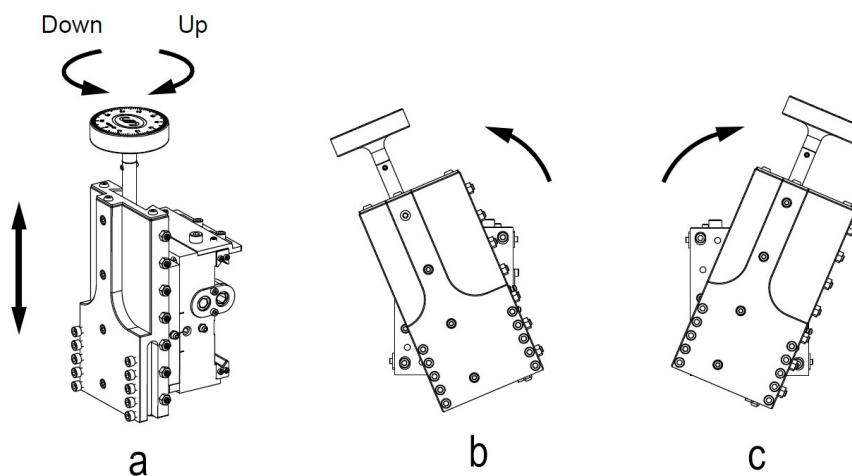


Fig. 20 Tool Post Controls

1. Turning the handwheel allows manual control of the toolpost up and down(Fig.20a).
2. There is a scale on the tool post, and the range is  $\pm 45^\circ$  (Fig.20b & Fig.20c).
3. Before rotating, please loosen the screw (Fig.19 ③), after rotating a certain angle, please tighten the screw.



### 4.3 Mounting base assemblies

Three separate mounting base assemblies are provided to enable the machine to be installed in the center of any flange from 150mm (6") to 860mm (34") in diameter. The table below gives the range of flange sizes for each base assembly.

Base Assembly	Flange Range
① Base	150mm - 360mm
② Base	330mm - 635mm
③ Base	560mm - 860mm

Table.6 Base Assembly Flange Size Range

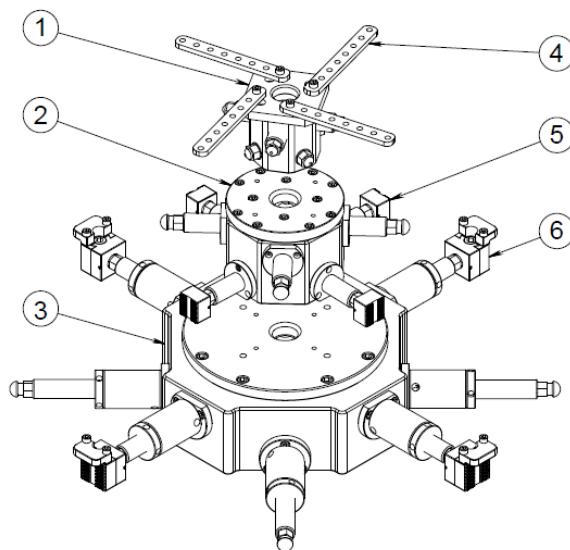


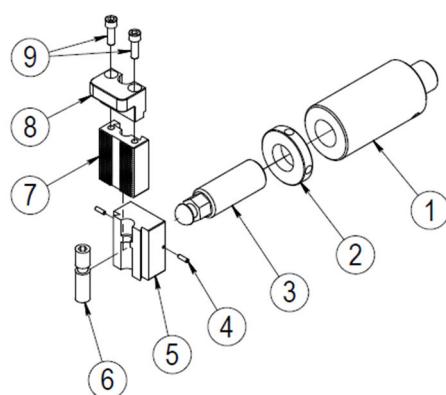
Fig. 21 Mounting Base Assembly

Serial number	Designation
①	105 x 105 base
②	180 x 180 base
③	360 x 400 base
④	Mounting strip
⑤	Jacking leg
⑥	Adjustable leg

Table.7 Mounting Base Assembly



Adjustable Leg



Jacking Leg

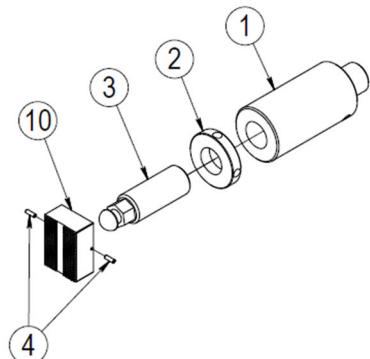


Fig. 22 Leg Construction

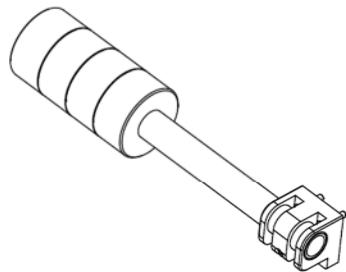
Serial number	Designation
①	Extension leg
②	Nut
③	Ram bolt
④	Screw
⑤	Fixed block
⑥	Adjusting screw
⑦	Fixed jaw
⑧	Setting strap
⑨	Screw
⑩	Fixed jaw

Table.8 Leg Construction

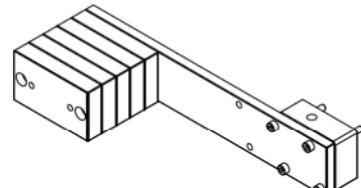


#### 4.4 Counter balance weight

Provide two options for counterweight components, which ensure balance during machine rotation, greatly reducing machine wear and tear, and prolonging machine lifespan.



Type A



Type B

Fig. 23 Counter balance weight

#### 4.5 Air Lubrication unit

A gate valve on the pack is used to set the machine speed at the desired RPM when the control valve is fully open.

Air Lubrication unit is adjusted to provide a lubrication rate of 8 drops every 1 minute at full motor speed.

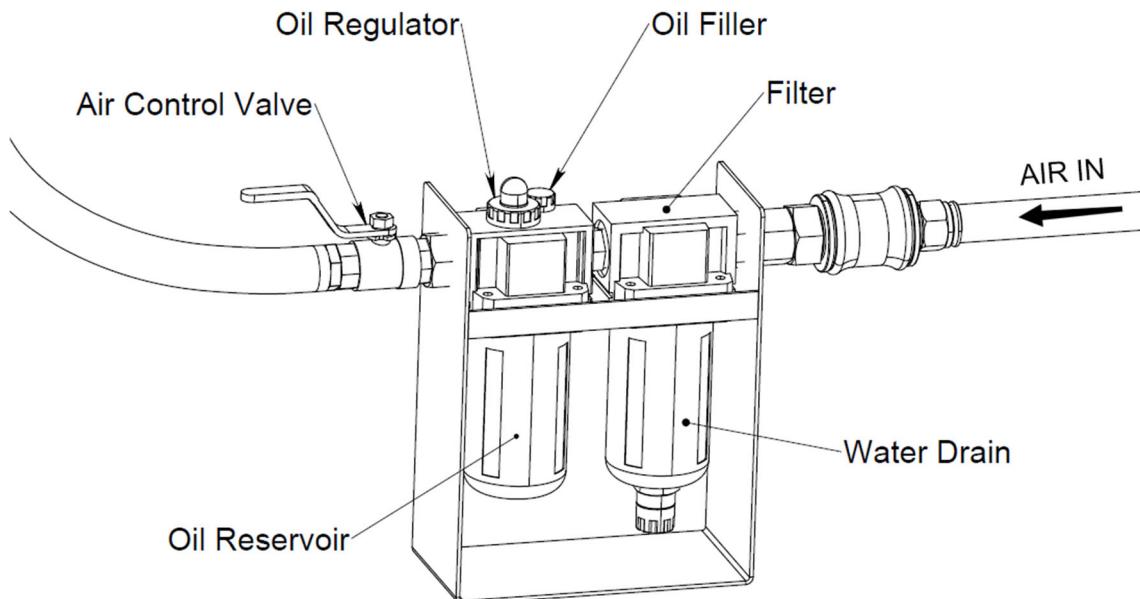


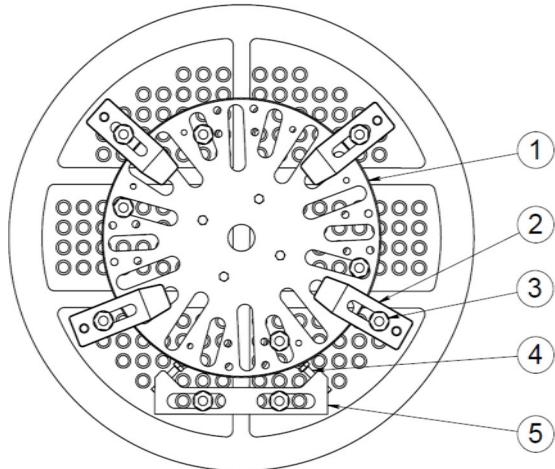
Fig. 24 Air Lubrication unit



## 4.6 Optional accessories

The following optional accessories are available upon request:

### Tube sheet machining kit



number	Designation	Describe
①	Fixed plate	Connect the machine
②	Pressure plate	Press the fixed plate
③	Expansion screw	Locking fixed plate
④	bolt	Adjustment Center
⑤	Adjustment block	Adjustment Center

Fig. 25 Tube sheet machining kit

When machining the tube plate, it is necessary to replace it with a dedicated bottom plate.

Fix the bottom plate to the tube plate using expansion screws, and if necessary, press it down with pressure plates.

After installation, the center of the equipment can be adjusted by adjusting the blocks and screws

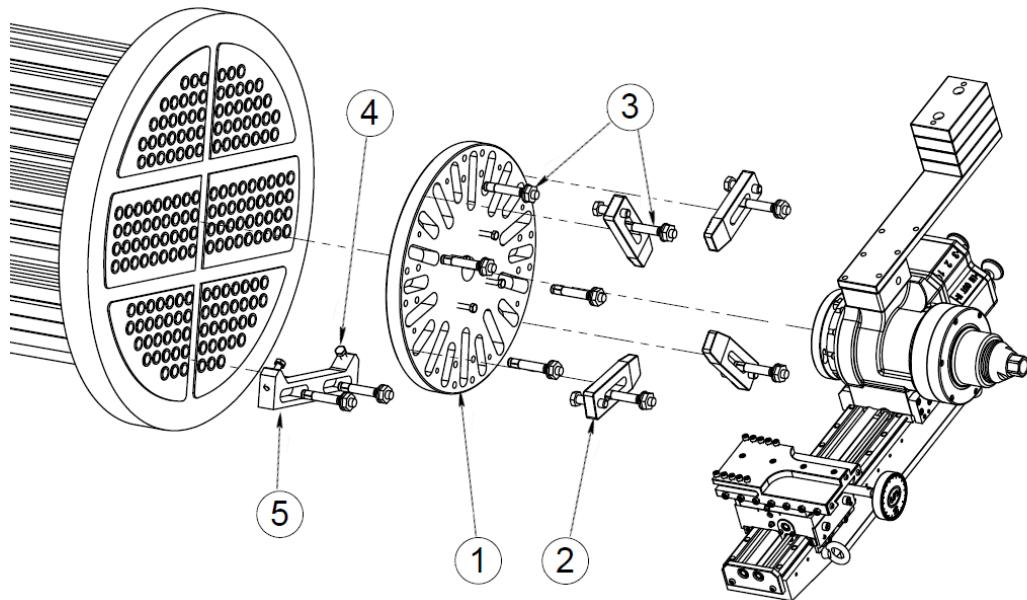


Fig. 26 kit installation



## Back facing kit

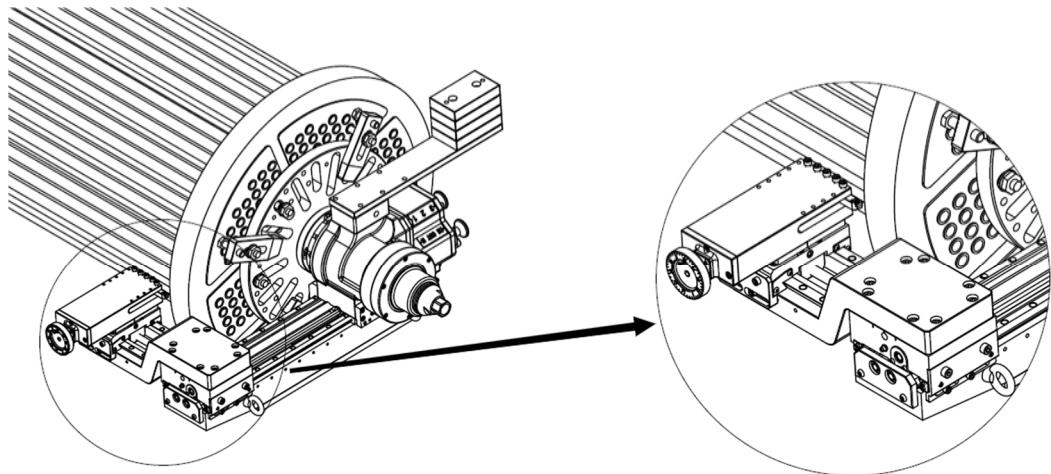


Fig. 27 Application of back facing kit

When machining the back of flanges or tube plates, back facing kit can be used.

## Back facing kit installation:

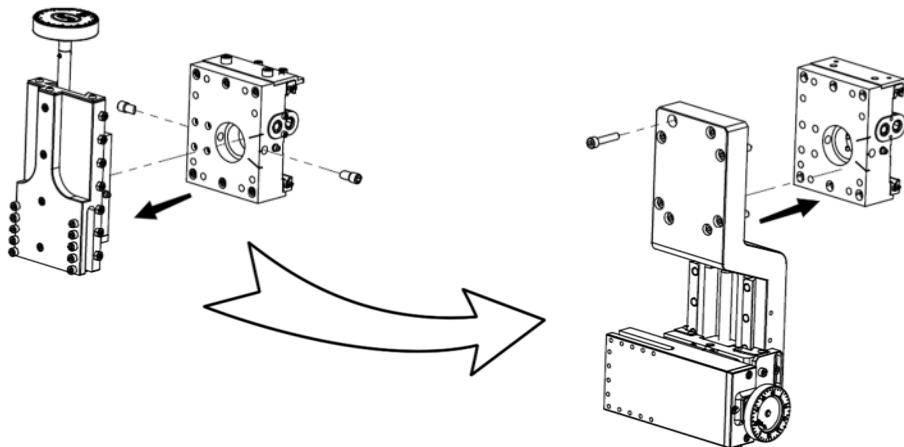


Fig. 28 Reverse Tool post installation

Step 1:

Remove the rotary locking screws on both sides of the tool post.

Step 2:

Remove the tool post rotating assembly.

Step 3:

Install the back facing kit post and lock the screws.



## Back Facing Kit Installation Specifications

Max Flange Diameter	710mm
The Kit Radial stroke	80mm
The Kit Axial stroke	80mm
Max Swing Diameter	1230mm

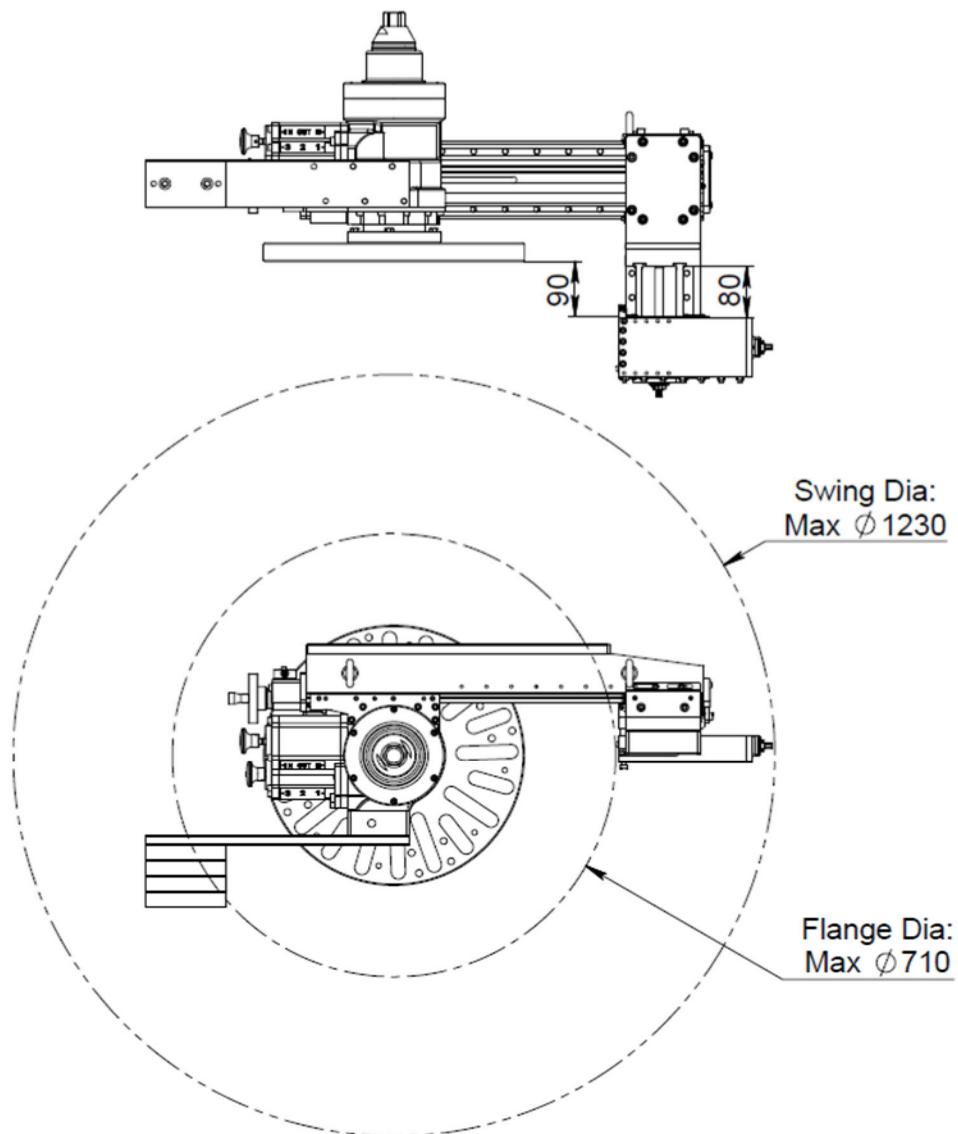
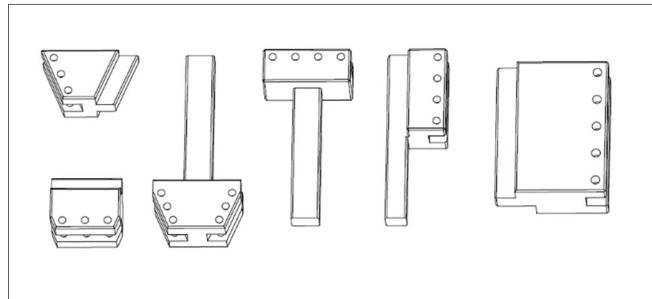


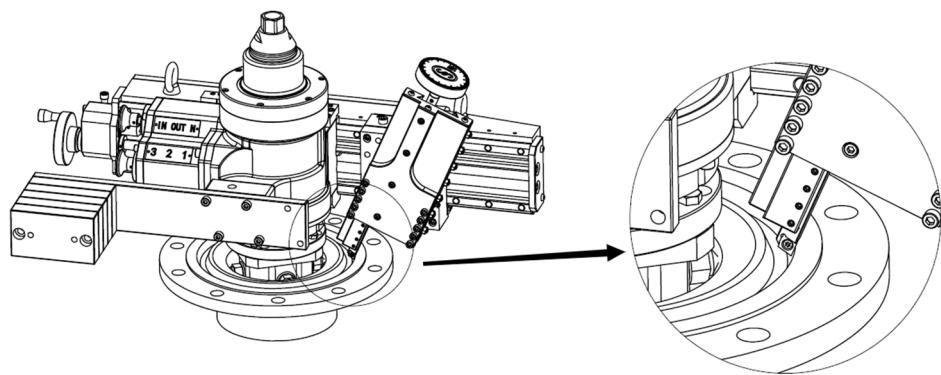
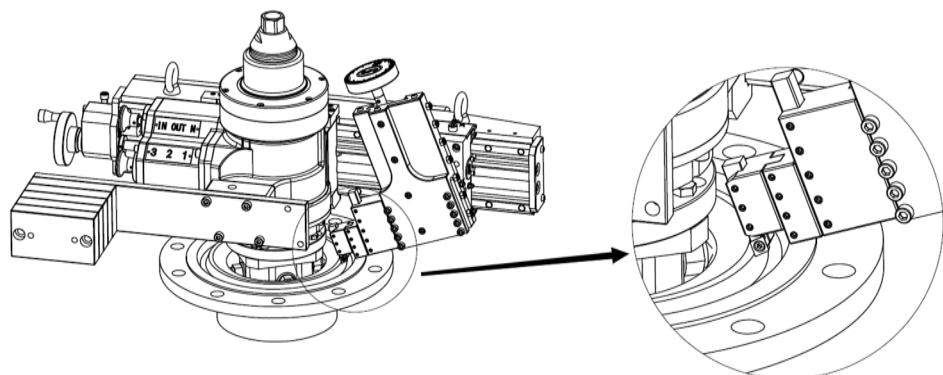
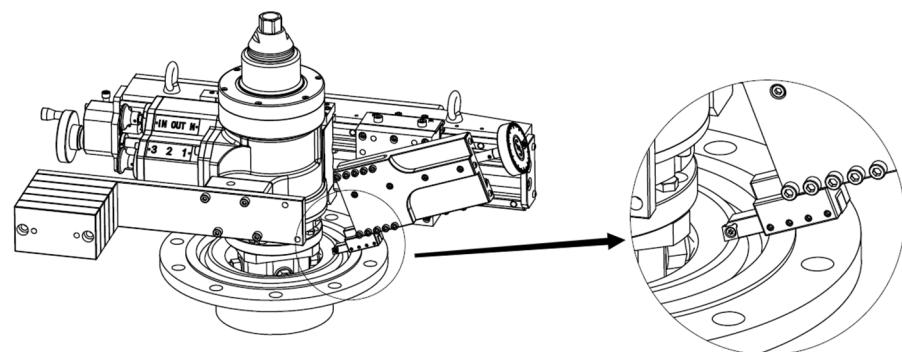
Fig. 29 Back facing kit Specifications



## Secondary tool holder



For RTJ groove machining:





## RTJ Groove measuring kit

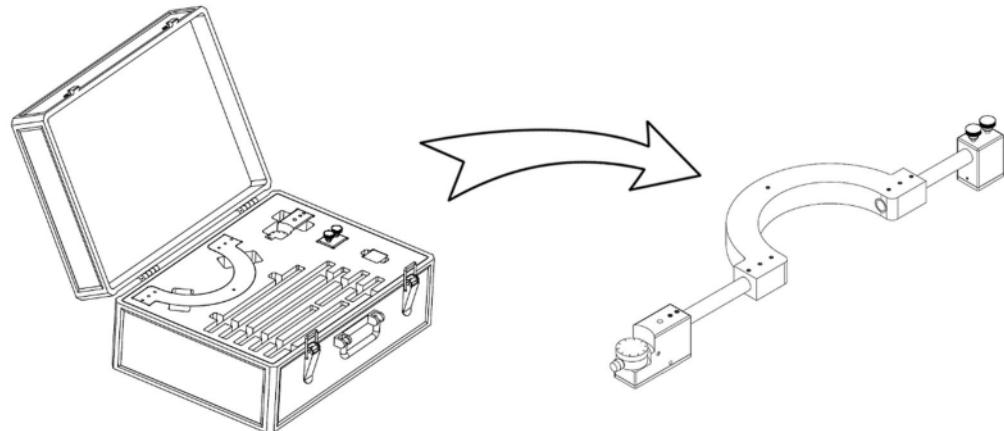


Fig.30 RTJ Groove measuring kit

The kit can be used to measure straight or conical groove diameter, shallow hole and hole position.

The ball gauge uses a precision contact ball with a diameter of 4.76mm to accurately measure the ring groove diameter at the end face of the sealing surface. All sizes of R, RX ring grooves can be adjusted and measured

When measuring the workpiece, the measuring ball is placed in the groove of the workpiece, and then the gauge is positioned by moving the gauge left and right to obtain the minimum dial indicator reading.

The gauge dial indicator shows the actual deviation of the preset main size, and the average groove diameter is obtained by measuring at multiple different locations in the groove.

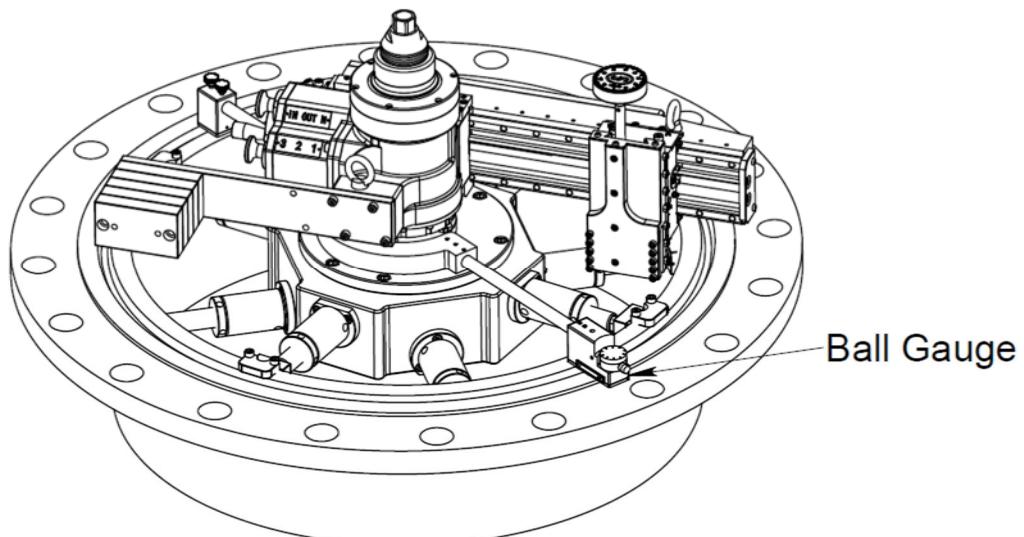


Fig.31 The application of measuring kit

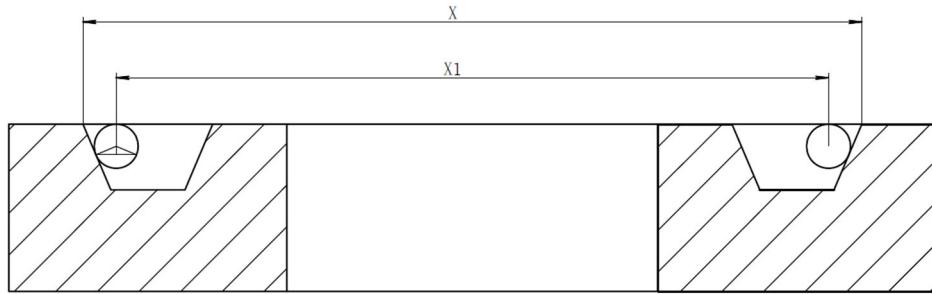
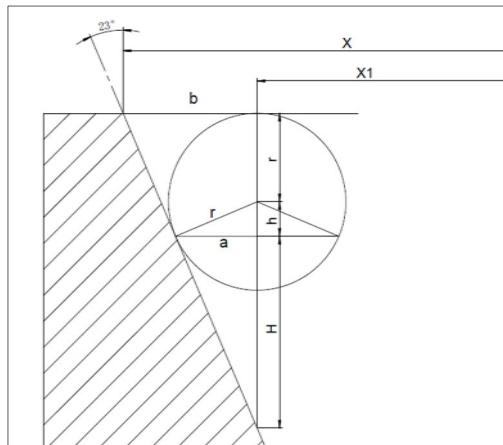


Fig.32 RTJ Groove measurement diagram



$$a = r \cos \beta$$

$$h = r \sin \beta$$

$$\frac{a}{b} = \frac{H}{r + h + H}$$

$$X = X_1 + 2b$$

When the measuring groove is a standard RTJ groove( $\beta=23^\circ$ ):

$$a=2.191, \quad b=3.596, \quad r=2.38$$

So the outer groove diameter:

$$X = X_1 + 7.192$$

Inner groove diameter:

$$X = X_1 - 7.192$$

For example:

When measuring the outer groove with a diameter of about 800mm, set the center distance between the two balls of the ball gauge to 793mm.

Put the ball gauge into the tank to measure, resulting in a dial indicator reading of 0.2mm.

So the outer groove diameter:

$$X = 793 + 7.192 - 0.2 = 799.992\text{mm}$$



## 5. Basic Operation of the Equipment

The basic operation of the machine follows the routine:

1. Lifting the machine from its packing case.
2. Checking the machine for completeness and condition.
3. Fitting the appropriate base assembly to the work piece.
4. Lifting and positioning the machine on the base assembly.
5. Adjusting the machine so the surfacing arm is parallel with the work piece.
6. Balancing the machine, if being used in a vertical orientation.
7. Connecting the air supply and setting the rotational speed.
8. Setting the tool for facing and grooving.
9. Performing the machining operation.
10. Removal of the machine on completion and preservation and packing.



## 6. Setting Up the Equipment

The following instructions are for installing the flange facing and grooving machine in position prior to operating the equipment.

### 6.1 Unpacking the machine

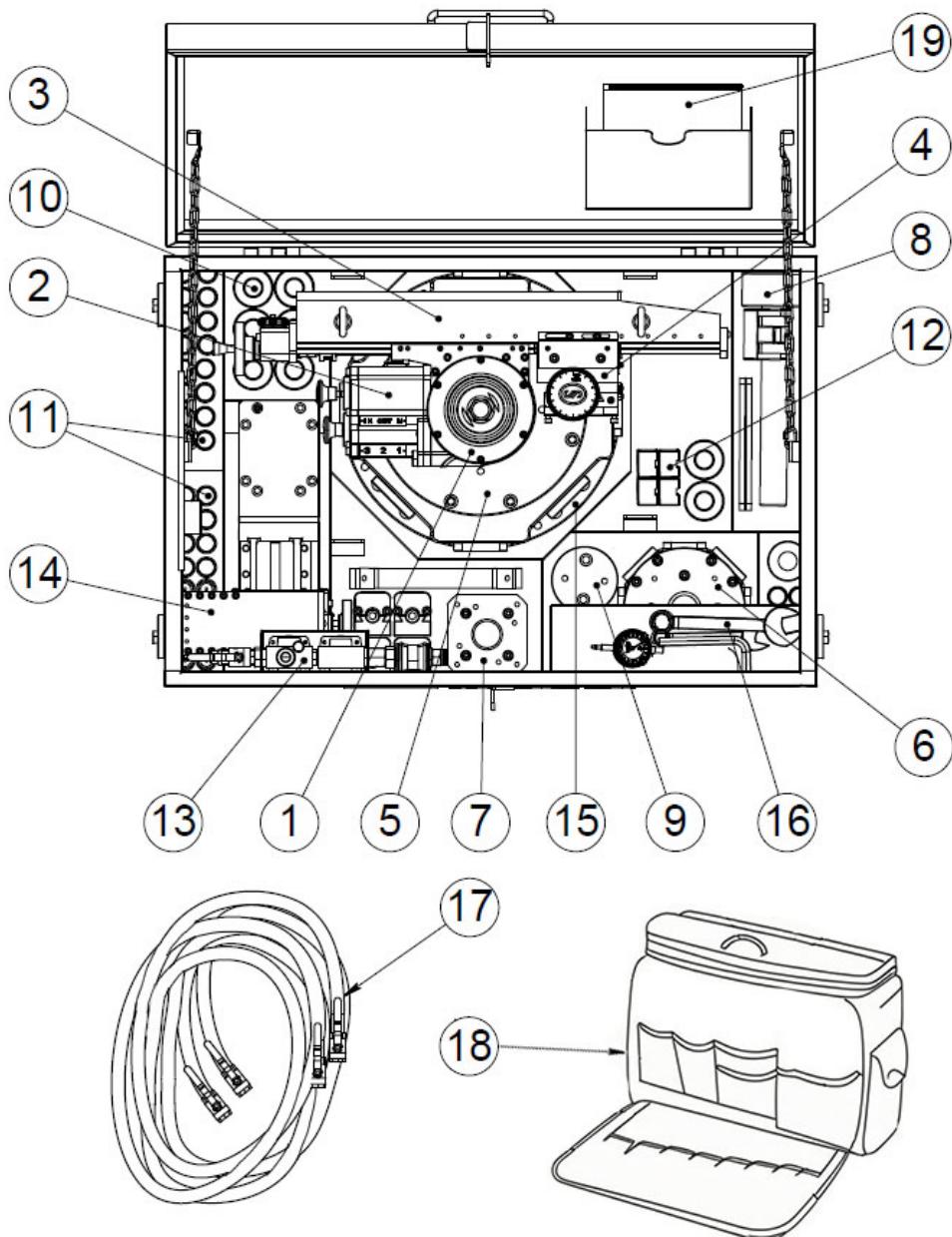


Fig. 33 Packing case contents



## Packing Case Contents

1. Drive Hub
2. Feed Gearbox
3. Rotation Arm
4. Tool post
5. 360 x 400 Mounting Base
6. 180 x 180 Mounting Base
7. 105 x 105 Mounting Base
8. Counter Balance Weight Mounting bracket
9. Counter Balance Weight Blocks
10. Extension Legs
11. Ram Bolt Legs
12. Fixed jaws
13. Air Lubrication unit
14. Back facing kit (Optional Accessories)
15. Tube Sheet Fixed Plate (Optional Accessories)
16. Wrench and Tool Kit
17. Air hose
18. Spares Kit
19. Document

The machine and its associated equipment should be removed from the case and visually inspected for signs of wear, damage or corrosion before use.

This installation procedure provides detail on setting up the FDG1000 in a horizontal position. If the machine is to be set up in the vertical or inverted position follow this set up procedure but extreme care must be taken due to the greater risk of the machine falling off the flange during the setting and adjusting procedure.



## 6.2 Mounting base installation

The mounting base assembly consists of a central hub, extension legs, collars, ram bolts and jaw assemblies with setting straps. When using the correct configuration of extension legs the base can be located in the flange bore and locked in position by tightening the jaws against the wall of the bore.

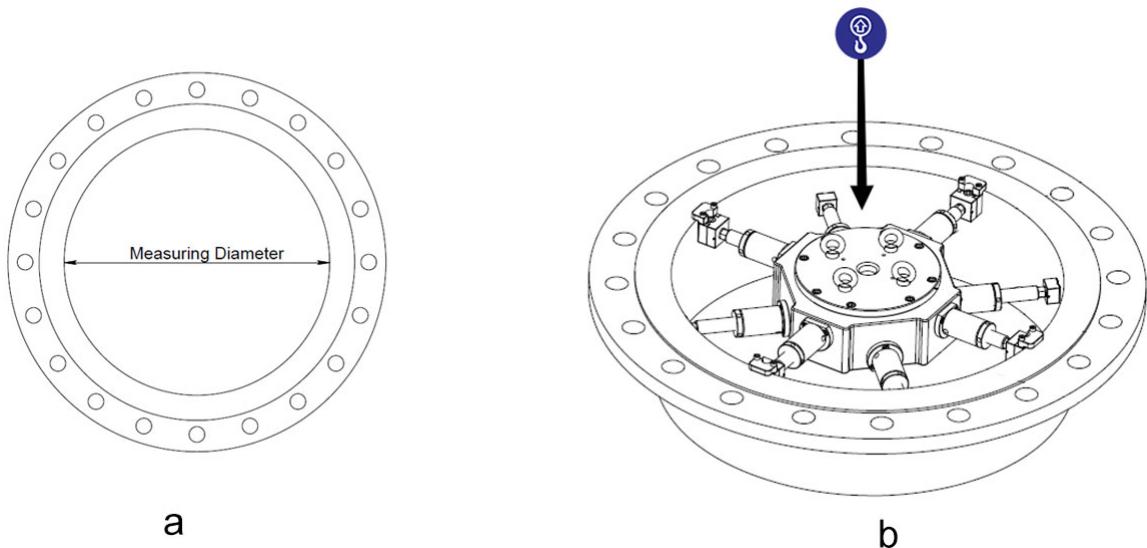


Fig. 34 Mounting base installation

### Step 1:

Measure the inside diameter of the flange to be machined and ensure this is within the working parameters of the machine(Fig.33a).

### Step 2:

From the pages showing the recommended base size and parts combination select the required components(Table.9). Screw the base components into the correct base until they measure equally 6mm (0.25") below the inside diameter from step 1.

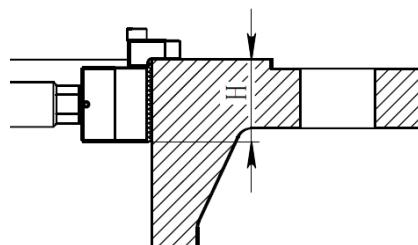


Fig. 35 Setting strap

### Step 3:

Bolt the setting straps onto the fixed jaws.

### Step 4:

Position the base into the flange bore, adjust the base depth by adjusting the screw. Check the centralization by measurement and adjust Using ram bolts as necessary.

### Step 5:

Adjustments can be made by tightening and loosening opposing adjustable jaws, it is recommended that the setting straps are left in place until the base unit is fully installed.



## Flange Range Range

Refer to the following table when setting up your single plane chuck to fit the ID of your work piece.

Range (mm)	Base unit	Copper Ram bolt 40mm	Ram bolt 37mm	Ram bolt 75mm	Ram bolt 85mm	Ram bolt 130mm	Extension leg 90mm
150 - 200	105	Y					
200 - 230	105		Y				
230 - 310	105			Y			
230 - 330	105				Y		
330 - 420	180				Y		
330 - 510	180					Y	
500 - 540	180					Y/AL	
					Y/JL		Y
540 - 600	180				Y		Y
600 - 640	180				Y/AL		Y
						Y/JL	Y
640 - 690	180					Y	Y
550 - 600	400				Y		
550 - 690	400					Y	
690 - 765	400					Y/AL	
					Y/JL		Y
765 - 860	400				Y/AL		Y
						Y/JL	Y

Table.9 Flange Range Range

### Note:

AL – Adjustable Leg, Y/AL indicates the use of adjusting legs in this range.

JL – Jacking Leg, Y/JL indicates the use of adjusting legs in this range.

Y – Use the part.



## 6.3 Drive hub installation

Mount the drive hub onto the base and lightly secure using the four shouldered bolts. Place the positioning shaft into the center hole so that the machine is located in the center of the base, and adjust the center through the base leg.

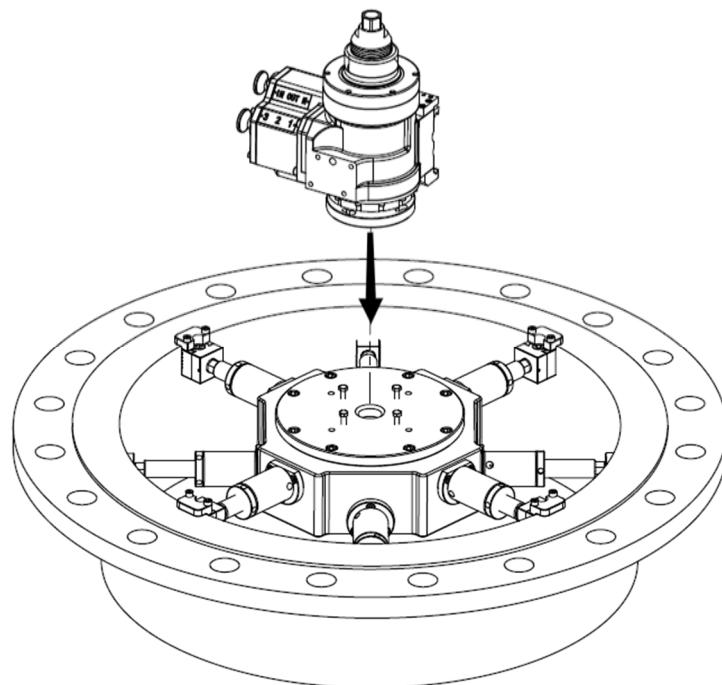


Fig. 36 Drive hub installation

**Step 1.** Lock four bolts into the base and leave a length of about 20mm.

**Step 2.** Lift the drive hub carefully and align the bolts so that the positioning shaft fits into the center hole of the base.

**Step 3.** Rotate the drive hub and lock the bolts.

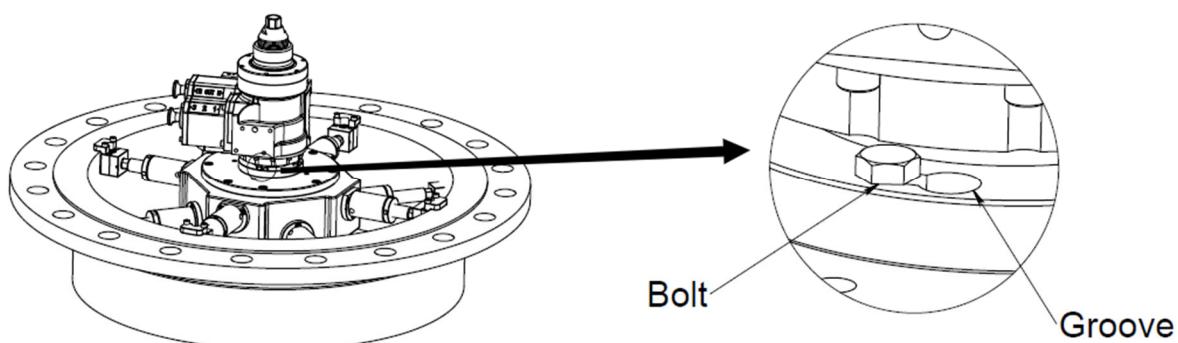


Fig. 37 Drive hub groove



## 6.4 Rotation Arm Installation

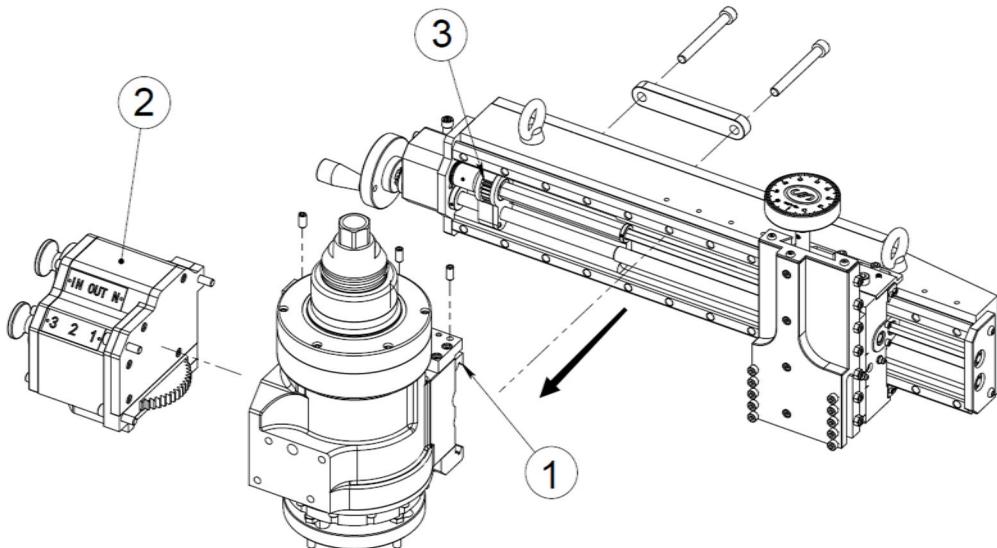


Fig. 38 Rotation arm installation

### Step 1:

Place the gearbox traverse selector shaft into the neutral position.

### Step 2:

Install the slider(Fig.38 ①) to the drive hub.

### Step 3:

Using suitable lifting apparatus lift the rotation arm onto the drive hub assembly ensuring the rotation arm is clean and free from debris.

### Step 4:

Move the pickup gear (PTO / Fig.38 ③) on the rotation arm to mesh with the gearbox gear on the drive hub. When inserting the PTO into the gearbox, rotate the gears on the shaft to allow them to mesh more easily.

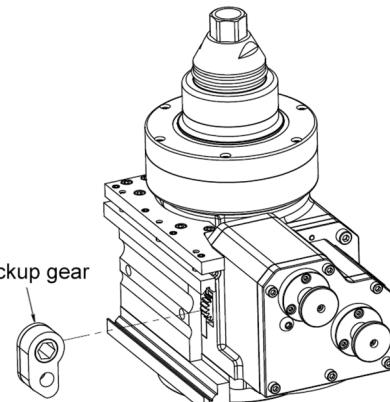


Fig. 39 Pickup Gear Fit

### Step 5:

Lock the screw to fasten the rotation arm on the drive hub.

	<h3>WARNING</h3>
When installing the rotation arm, pay attention to meshing the pickup gear (PTO) on the tool arm with the transmission gear on the speed gearbox.	



## 6.5 Setting the concentricity

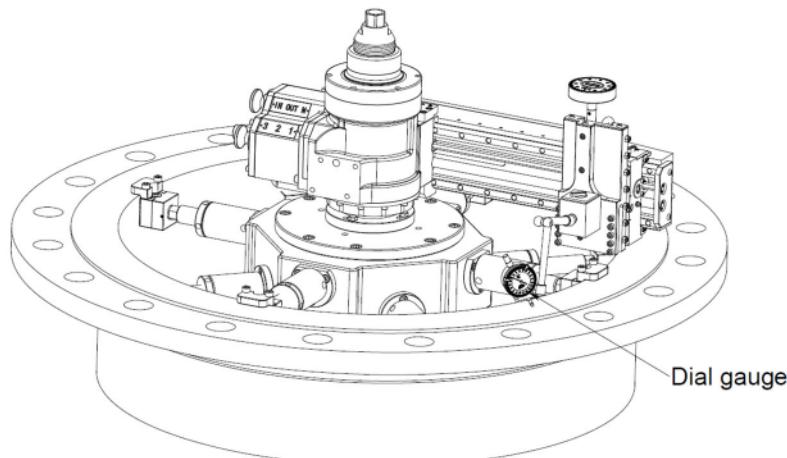


Fig. 40 Setting the concentricity

### Step 1:

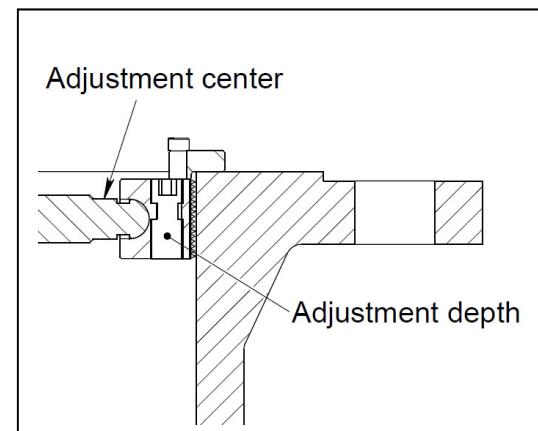
Place the magnetic suction base on the arm or tool post;

### Step 2:

Adjust the knuckle, using the dial gauge thimble select the datum diameter (i.e. raised face, 'V' groove or bolt holes);

### Step 3:

Connect the air power, slow rotate the drive hub, observe the dial gauge, check whether the thimble follows the reference plane and whether the pointer jumps;



### Step 4:

To adjust the base, tighten and slacken opposite sets of ram bolts (similar to a four jaw chuck operation) securing the unit progressively in the flange until the desired accuracy has been achieved.

### Step 5:

When the base assembly is correctly positioned within the bore, evenly tighten the remaining 4 non-adjustable ram bolts. Take care not to move the base assembly out of position.

	<b>CAUTION</b>
Setting the centrality requires multiple measurements, and after each tightening of the bolts, it is necessary to check whether the base is in the center.	



## 6.6 Counter balance weight installation

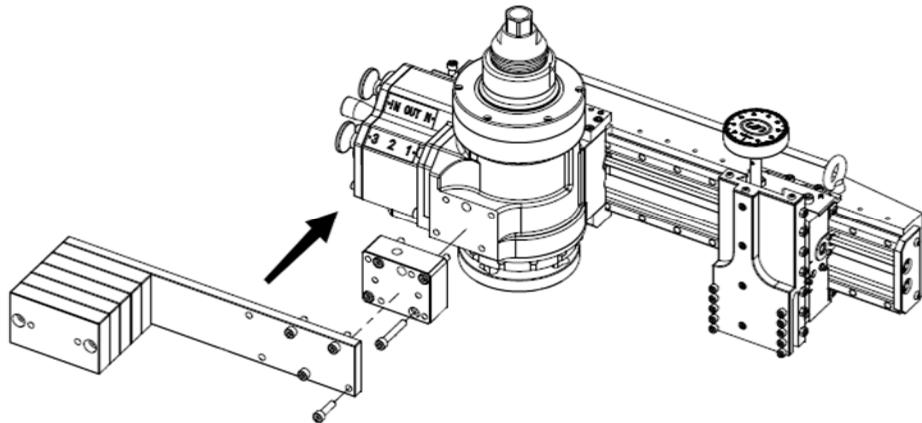


Fig. 41 Counter balance weight installation

If the machine is to be used in a vertical mode the machine must be balanced. Observe the following points when balancing the machine:

1. Before balancing the machine, position the toolpost at the mid cut position. This will average the out of balance effect as the toolpost moves along the machining arm.
2. The assembly includes a mounting bracket and balance weight blocks, which can be used in different quantities when machining different diameters
3. Add the required counter balance weights to the bar. Position the weights to counter balance the arm and toolpost. Tighten the 4 screw to secure the counter balance weight to the machine.



## 6.7 Setting up the tool

The following procedure is for setting up the tool for facing full and raised face flanges and grooving:

1. Using the standard tool post select the appropriate tool for the job.
2. Install the tool in one of the two positions on the tool post (see Fig.42b & Fig.42c). Tool feed is achieved by the tool post feed handwheel (see Fig.42a).
3. With the tool in position check that there are no obstructions to the tool and saddle. Determine the point at which the tool touches the flange, this is achieved by slowly rotating the machine, and advancing the tool by turning the tool post feed handwheel until it just touches the surface of the flange. Traverse the tool to an edge and stop the machine.

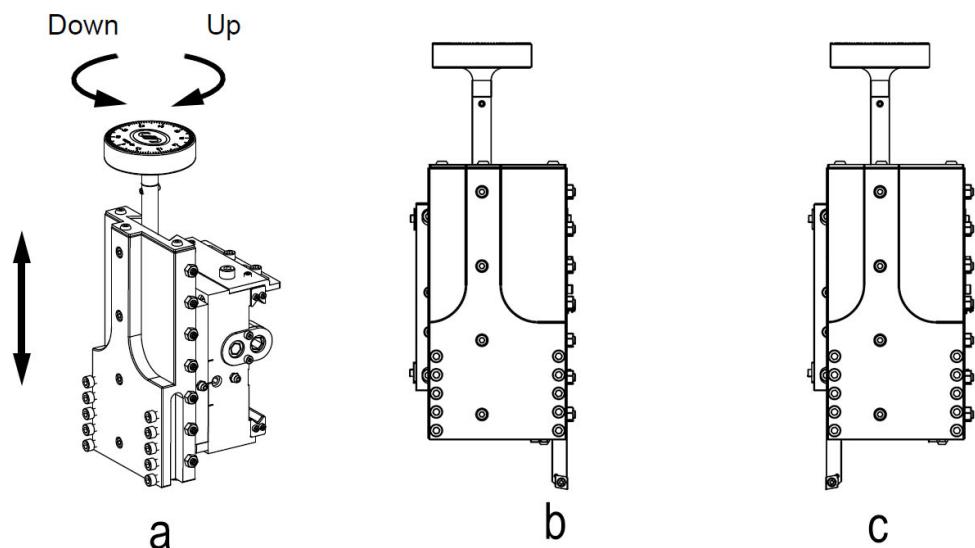


Fig. 42 Tool positions



## 7. Using The Equipment

The following instructions are for operating the flange facing machine correctly once installed on a flange.

### 7.1 Connection to Air Supply

The air supply must always be connected to the machine using the air lubrication unit supplied (Fig. 24). Use of the machine without the air lubrication unit will result in premature motor failure.

A gate valve on the pack is used to set the machine speed at the desired RPM when the control valve is fully open. To set the speed proceed as follows:

1. Observe all Warnings and Cautions.
2. Set traverse direction selector to 'N' (feed disengaged).
3. Connect the air line to the machine and route it away from all moving parts.
4. Caution to make sure any feed/supply hoses are clear of the rotating machinery
5. Close the gate valve and open the control valve.
6. Turn on the main air supply.
7. Open the gate valve until the desired rotational speed is obtained.
8. Close the control valve.



## 7.2 Starting the machine - Facing and Grooving

1. Check if the base and equipment are secure
2. Set up the tool
3. Select the cutting feed on the cutting feed rate selector.
4. Make sure the traverse directional selector is set to neutral 'N'.
5. Using the handwheel on the rotation arm, slowly rotate the leadscrew to position the tool away from the cutting area.
6. Set depth of cut on the toolpost feed handwheel.
7. Engage the traverse directional indicator to the required position.
8. Start the machine by slowly opening the air supply.

If the cutting feed or direction of the machine is to be changed, the machine must be stopped and the appropriate feed/direction selected. The machine can then be restarted.

Now the machine is ready to use, the operator can adjust any one of the following variables:

- a. depth of cut
- b. tool profile
- c. manual or automatic traverse
- d. rate and direction of feed

	<b>CAUTION</b>
Should the air supply fail for any reason, the operator must shut the air control valve so that it locks in the closed position until the air supply has been restored.	

	<b>DANGER</b>
Do not attempt to make adjustments while the machine is operating. <b>Always stop the machine first.</b>	



## 7.3 Removing The Equipment

1. Observe all warnings and cautions.
2. Isolate the machine from the air supply and disconnect.
3. Ensure that the cutting tool has been removed from the tool post.
4. Refit the base assembly setting plates.
5. Remove all swarf and thoroughly clean the machine.
6. Remove the surfacing arm assembly.
7. Remove the drive hub assembly.
8. Remove the mounting base assembly from the bore.

	<b>CAUTION</b>
	<p>Always use a mechanical lift to remove the machine from the flange. Remove the machine from the base before loosening the jaw bolts.</p>

## 7.4 Storing The Equipment

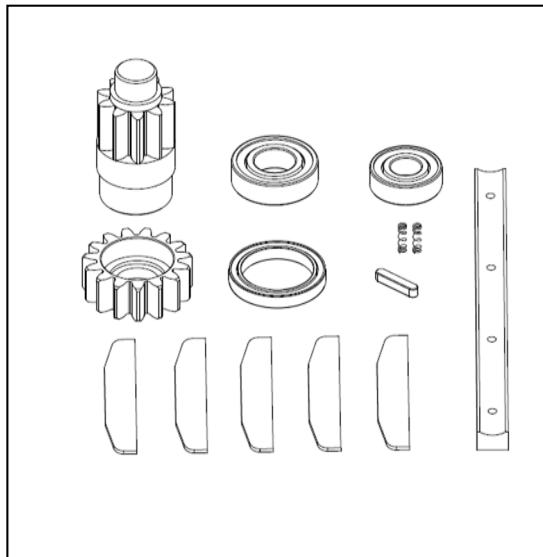
After removing the equipment from the job site the equipment should be thoroughly cleaned and inspected. Any faults should be rectified before the equipment is re-used or returned to storage.

After cleaning and inspecting the equipment, the unprotected parts must be protected from corrosion by smearing them with a thin coat of oil.



## 8 Recommended Spares Kit

During the use of the equipment, wear and tear of some parts is inevitable. Therefore, we have equipped a set of easily damaged components, which can be replaced when damaged.

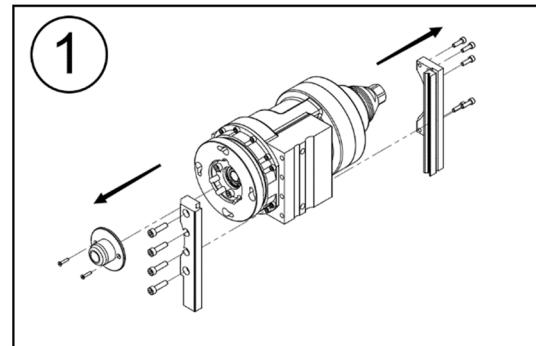


Name	Spec.
Drive gear	FDG1000-01-30
Transition gear	FDG1000-01-31
Nut	FDG1000-04-25A
Deep groove ball bearing	
Deep groove ball bearing	
Deep groove ball bearing	
Key	
Spring	
Motor Blades	

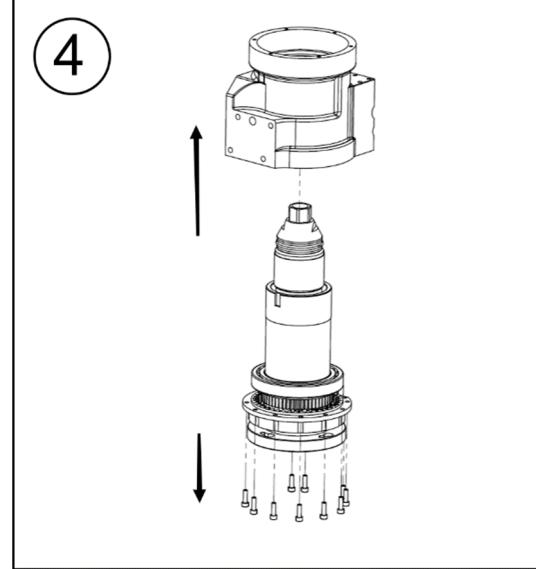
### 8.1 Drive hub gear

Replacement of drive gear and transition gear:

1. Use a wrench to remove the screws and remove the bottom positioning shaft of the spindle and the rotation arm fixing plate.



2. Remove the motor dust cover and spindle end cover;



3. Use a wrench to remove the round nut, take out the stop washer and bearing;

4. remove the screws and the spindle housing;

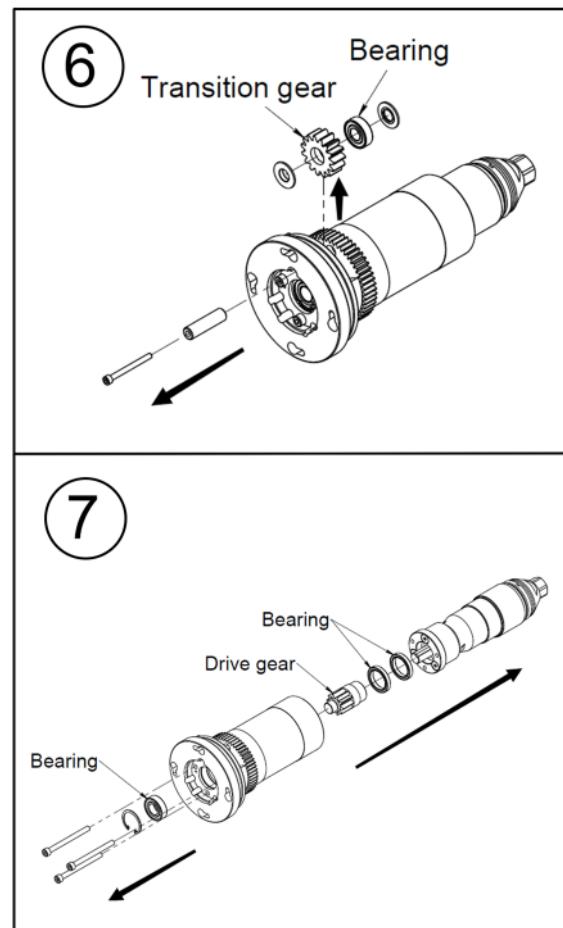
5. Remove the bearings and gear rings.



6. Remove the locking screws and shaft of the bottom gear, take out the transition gear from the side and replace it;

7. Remove the bottom screws and elastic retaining rings for the holes, first remove the air motor component, then push out the drive gear and bearings, and replace the damaged gear and bearings;

9. Install the removed parts, the installation sequence is opposite to the disassembly sequence.





## 8.2 Gearbox Key and Spring

Replacement of gearbox key and spring:

1. Remove bottom cover plate and bearing of gear box

2. Remove the drive shaft. If the key is damaged, remove and replace the key;

3 Remove the selectors;

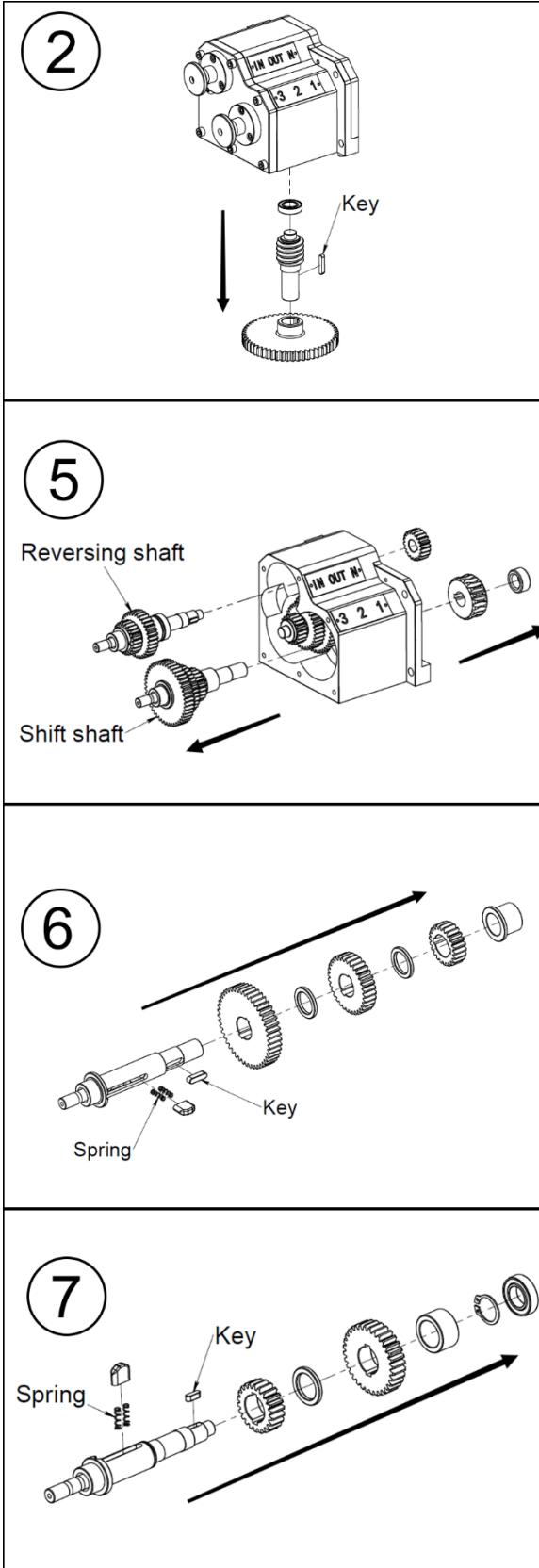
4. Remove both cover plates and bearings;

5. Take out the reversing shaft and shift shaft, check whether the gear is lost and replace the key bar;

6. Take out the gears and washers on the reversing shaft in order to replace the spring and key;

7. As step 6, remove the gear and washer of the shift shaft in sequence, and replace the spring and key;

8. Install the removed parts, the installation sequence is opposite to the disassembly sequence.

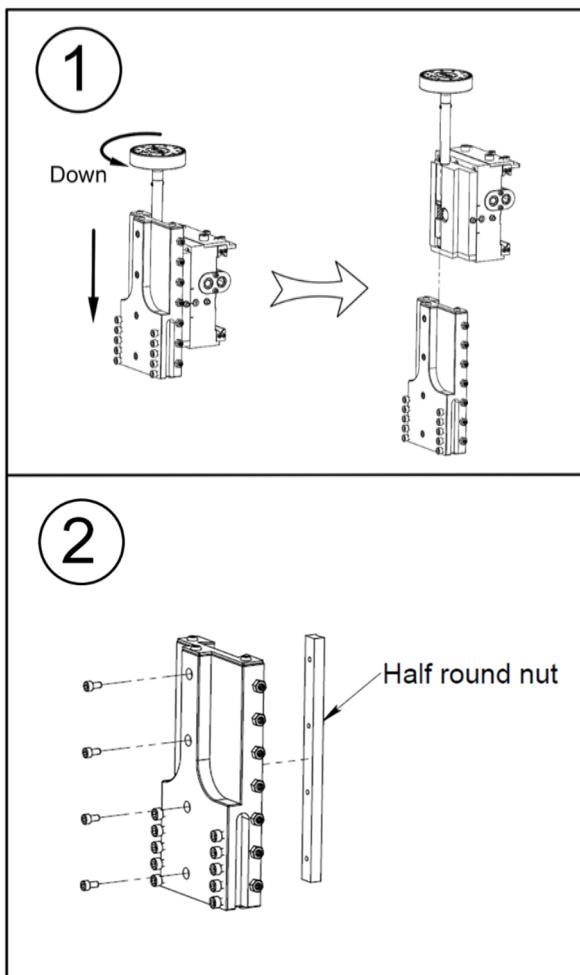




### 8.3 Tool post Nut

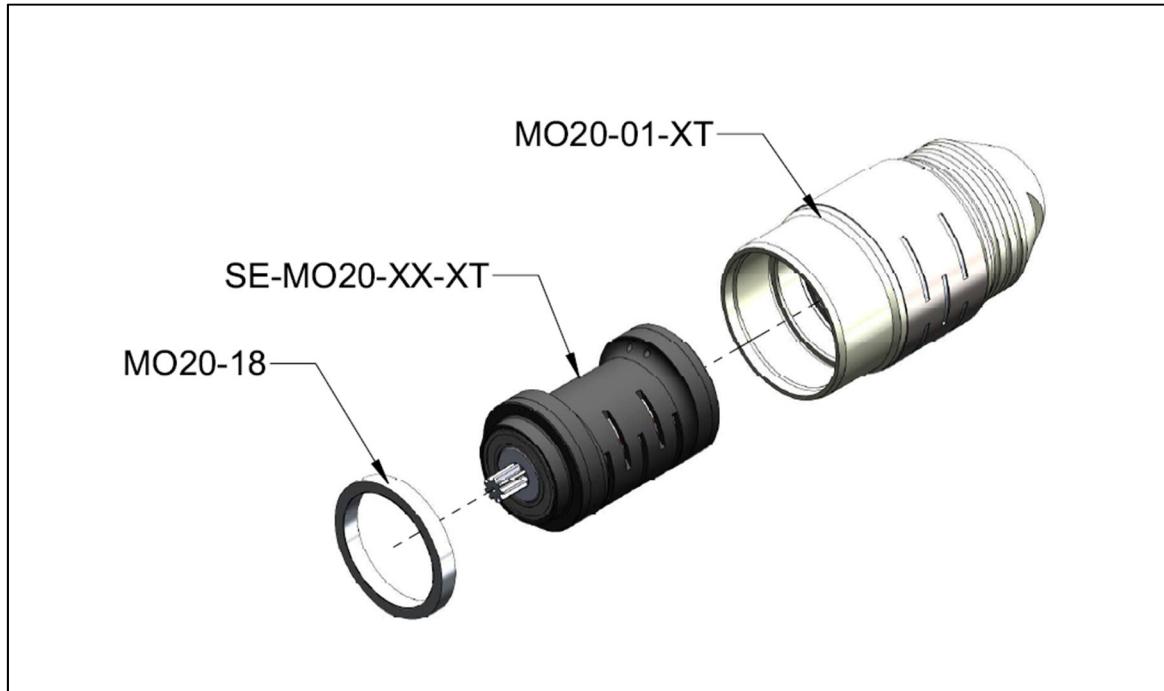
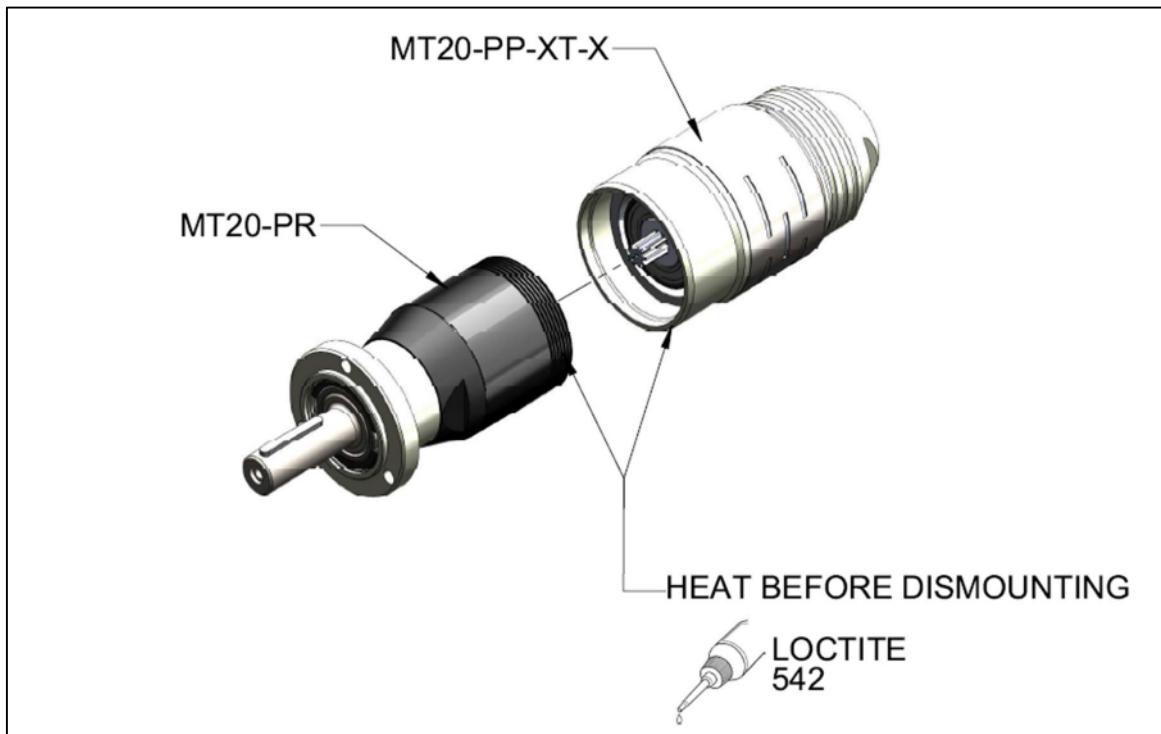
Replacement of tool post half round nut:

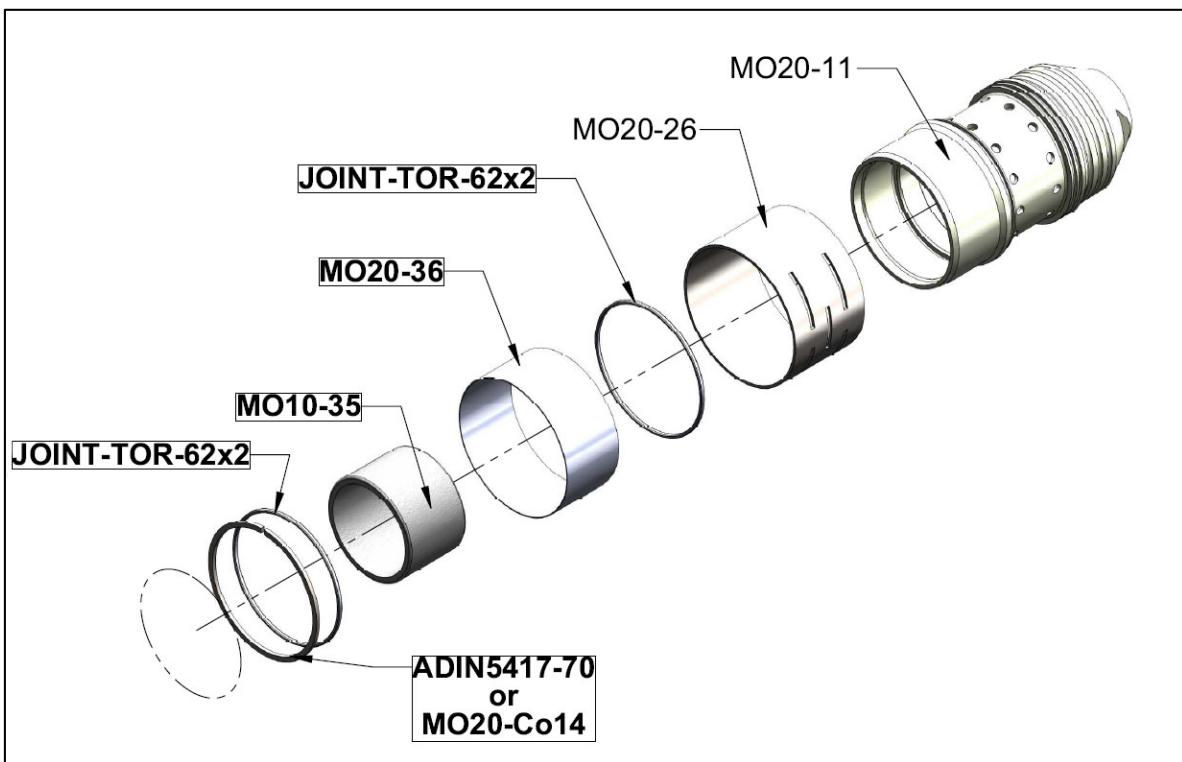
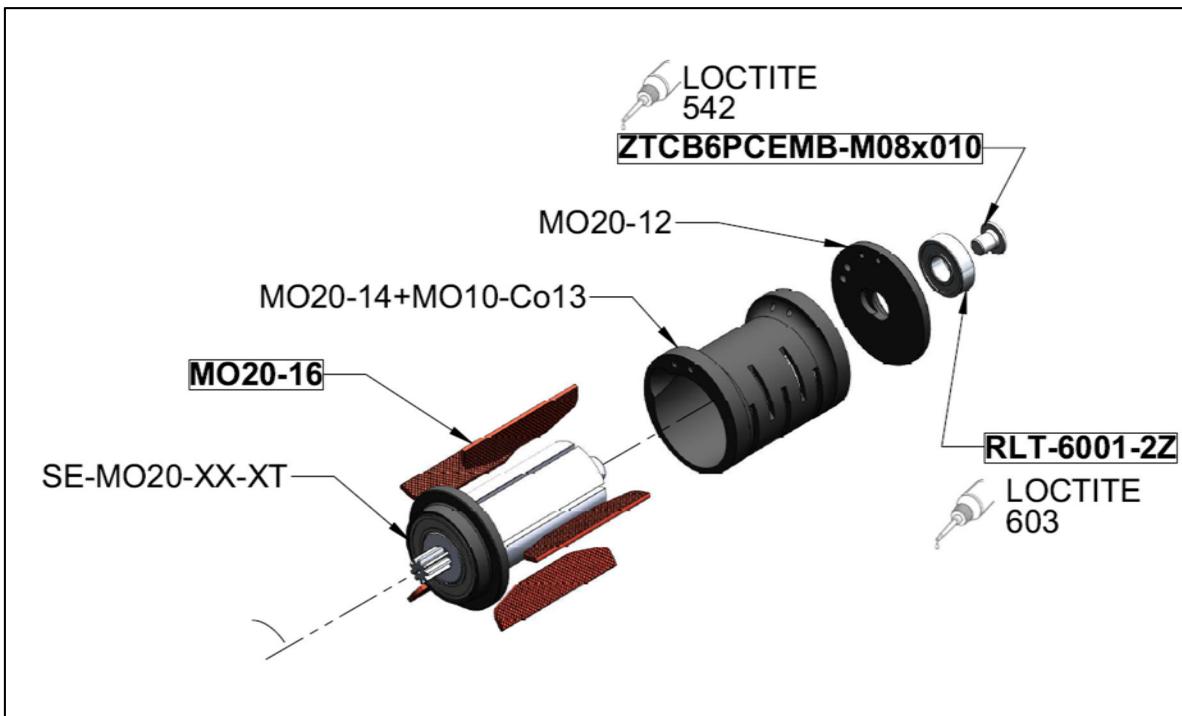
1. Rotate the handwheel on the tool post to remove the skateboard component;
2. Loosen the screws, remove the nut and replace it;
3. Reinstall the nut and tighten the screw, then install the skateboard component back into the tool post, the installation sequence is opposite to the disassembly sequence.





## 8.4 Motor Blades







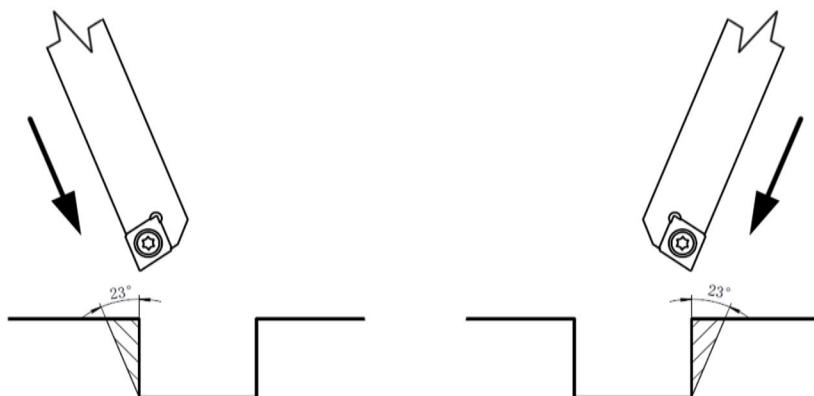
## 9. Cutting Tools as Applied to Portable Machines

As the flange facing machine is portable and thus lighter and less rigid than its workshop counterpart, the choice of tooling and the rate at which metal can be removed will differ from that used in the workshop.

### Tool pack

12mm inserted tool holder, LH,90°	
12mm inserted tool holder, RH,90°	
12mm inserted tool holder	
12mm HSS Tool Bit	
Carbide Insert	

Tools for V groove plunge machining





## 10. Maintenance

### Recommended lubricants

Lubricant	Brand	Where used
Gear grease	UNOBA EP #2	Gearbox gears, thrust bearings
Light oil	WD-40	Unpainted surfaces
Cutting oil	UNOCAL KOOLKUT	Tool bits, work piece
Lubricating oil	Almo 525	Lubricator oil cup

### Feed Screw maintenance

Lightly oil the assembly every time it is used.

### Mounting Base Unit maintenance

The base unit needs no maintenance. Adjustment leg with light oil before every use.

### Main body assembly maintenance

The main body bear is sealed and lubricated for the life of the machine. Grease the bull gear every 100 hours by removing the counterweight plate and inserting grease into the hole with a flexible-hose grease gun.

### Gearbox assembly maintenance

Every 100 hours, remove the gearbox assembly from the main body and generously grease all parts.

Gearbox parts need not be disassembled for servicing.

### Cutting Tool assembly maintenance

Lightly oil the cutting tool every time the flange facer is used.



## 11. Fault Diagnosis

Symptom	Possible cause	Action
The machine will not rotate	1. Air supply not available	Check supply
	2. Air supply is below the minimum required to operate the machine	Check supply
	3. Drive motor faulty	Remove motor and check operation
	4. Damage to drive gear train	Remove motor and check free rotation
The machine does not traverse	1. The feed selector is not correctly positioned and the facing feed gears are not engaged	Check position
	2. The direction selector is in neutral or not correctly engaged –if both gears are engaged this should not rotate	Check position and ensure there is no rotation
	3. Drive key problem	Remove and check gearbox assembly operation
	4. Carriage has been run off the lead screw	Check lead screw nut and screw are engaged
Poor surface finish on the flange	1. Machine out of balance	Check balance
	2. Machine base incorrectly installed	Check installation
	3. Machine installation bolts not tightened	Check bolts
	4. Turning tool not ground correctly or worn	Check tool & replace
	5. Depth of cut too deep	Reduce depth of cut
	6. Too much play in tool post gib strip or carriage	Adjust tool post & carriage
	7. Too much play in main drive bearings	Adjust drive dampener's
	8. Worn drive motor	Check motor
	9. Poorly adjusted surfacing arm	Check and adjust
	10. General poor machine condition	Refer to DTH



## 12. Maintenance –Corrective

### 15.1 Rotation arm

1. Remove the main arm bolts. Slacken off the adjuster screws in the arm support unit which clamps the surfacing arm perpendicular to the hub and remove clamping plate.
2. Arm should then slide backwards to release
3. Insert 2 x M16 eye bolts into arm, remove arm using vertical lift

The procedure for installation is the reverse of the removal ensuring that the PTO box fits into the gearbox opening and it is in mesh with the output gear in the gearbox.

To check the correct installation -lift in the surfacing arm should be no more than 0.15mm (0.005").

### 15.2 Tool post gib strip

1. Slacken lock nuts on the gib strip adjusters and slacken grub screws.
2. Working from one end adjust grub screws only when there is sufficient location on the slide way to prevent over tightening. To adjust tighten fully then back off one quarter of a turn and tighten the lock nut.
3. Check the tool post movement along its stroke to ensure free sliding movement and no sideways movement

### 15.3 Slide way Carriage

1. Slacken lock nuts on the gib strip adjusters and slacken grub screws.
2. Working with the hand wheel ensure the carriage will slide whilst tightening the grub screws and then use the lock nuts to fix the adjustment.

To check the correct installation –there should be no free play in the carriage slide assembly.



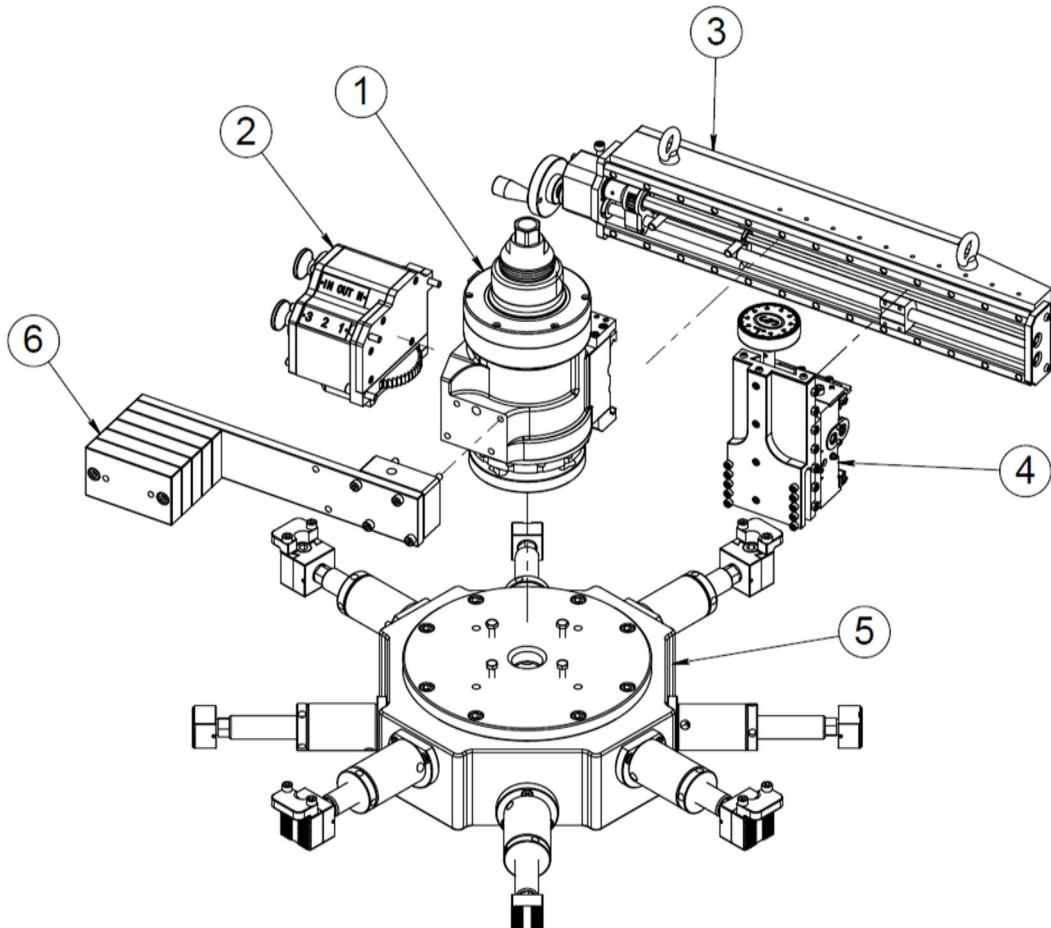
## Exploded View Drawings and Parts Lists

The following diagrams and parts lists are for your reference purposes only. The machine Limited Warranty is void if the machine has been tampered with by anyone who has not been authorized in writing by Shenzhen JOYSUNG Machinery Co. Ltd. to perform service on the machine.

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## General Assembly Drawing



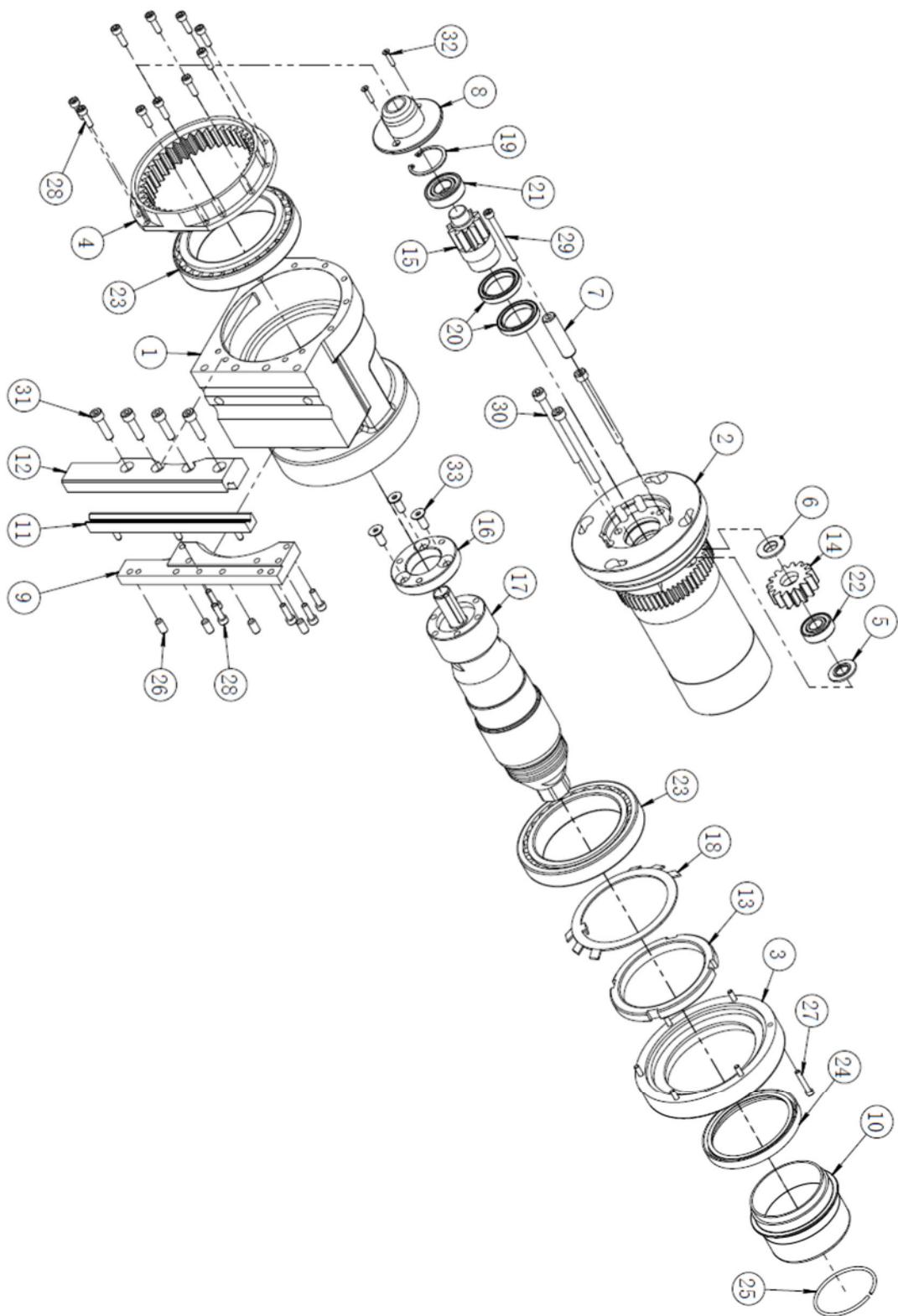
FDG1000 Flange Facer General Assembly Drawing

Item.	Name	Spec.
1	Drive Hub Assembly	FDG1000-01
2	Gearbox Assembly	FDG1000-02
3	Rotation Arm	FDG1000-03
4	Tool Post	FDG1000-04
5	Mounting Base unit	FDG1000-05
6	Counterweight Plate	FDG1000-06 / FDG1000-06A

General assembly exploded List



## Drive Hub Assembly



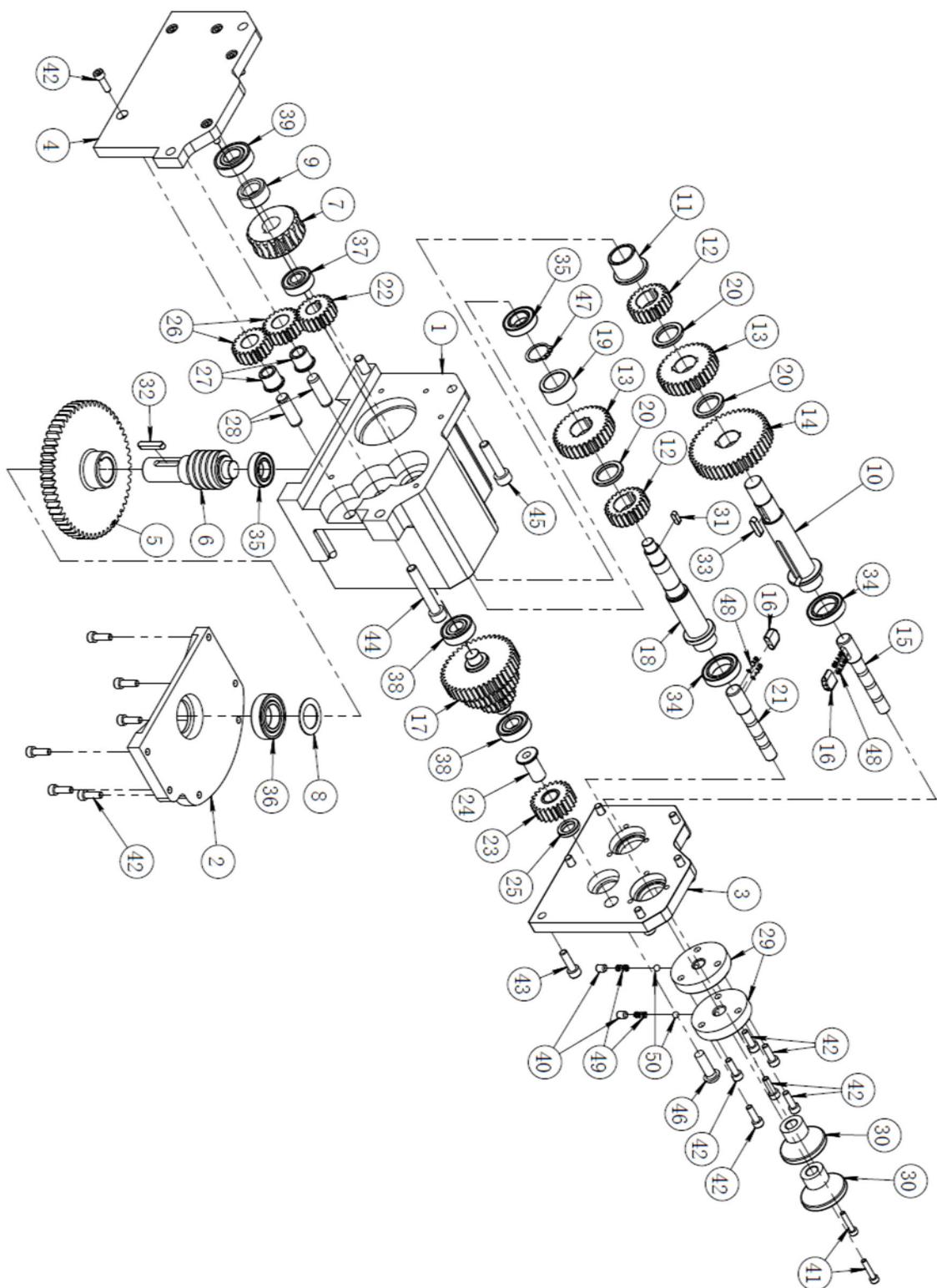


Item.	Name	Spec.
1	Spindle Cover	FDG1000-01-01
2	Spindle	FDG1000-01-02
3	Spindle Topper Cover	FDG1000-01-03
4	Internal gear	FDG1000-01-04
5	Copper washer	FDG1000-01-07
6	Copper washer	FDG1000-01-08
7	Pin	FDG1000-01-09
8	Lower cap	FDG1000-01-10
9	Clamp plate	FDG1000-01-11
10	Dust cover	FDG1000-01-14A
11	Slider	FDG1000-01-16
12	Guide block	FDG1000-01-17
13	Round Nut	
14	Transition gear	FDG1000-01-30
15	Drive gear	FDG1000-01-31
16	Air Motor Mounting Plate	FDG1000-01-50
17	Motor	
18	Snap Washers for Round Nut	
19	Circlip for hole	
20	Deep groove ball bearing	
21	Deep groove ball bearing	
22	Deep groove ball bearing	
23	Tapered Roller Bearing	
24	Skeleton type Vacuum Rubber Seal	
25	Wire snap rings	
26	Screw	
27	Screw	
28	Screw	
29	Screw	
30	Screw	
31	Screw	
32	Screw	
33	Screw	

#### Drive Hub list



## Gearbox Assembly





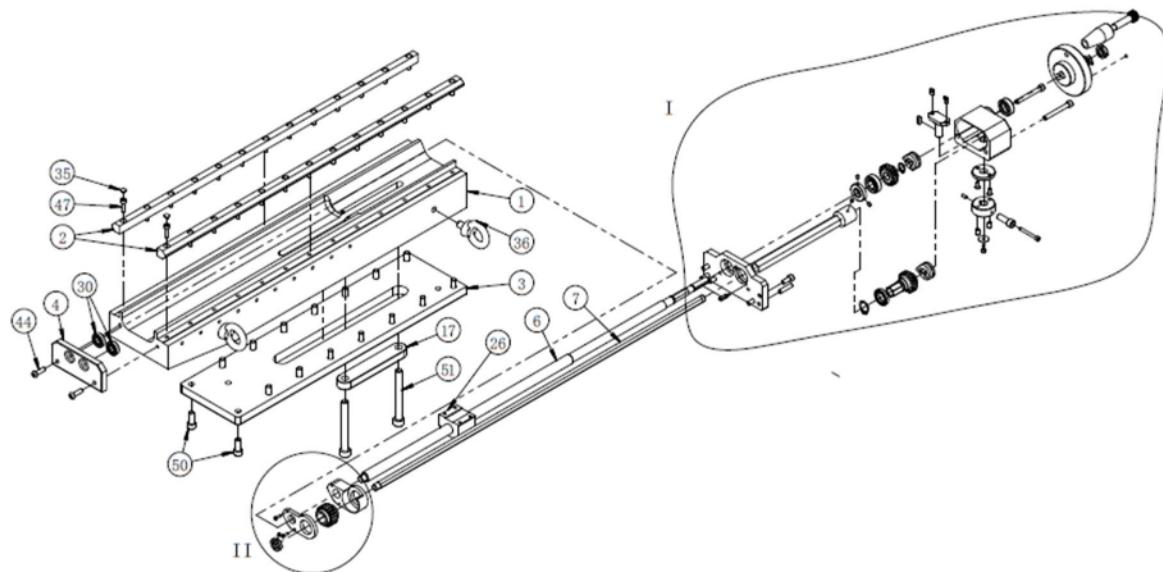
Item.	Name	Spec.
1	Gearbox casing	FDG1000-02-01
2	Lower Gearbox cover	FDG1000-02-43
3	Gearbox cover pate	FDG1000-02-17
4	Gearbox cover plate	FDG1000-02-26
5	Input gear	FDG-02-24
6	Worm	FDG-02-18
7	Worm gear	FDG-02-17
8	Worm washer	FDG-02-14
9	Worm gear washer	FDG-02-08
10	Shift shaft	FDG-02-01
11	Copper bush	FDG-02-06
12	Shift gear	FDG-02-19
13	Shift gear	FDG-02-20
14	Shift gear	FDG1000-02-41
15	Shift lever	FDG-02-04
16	Gear key	FDG-02-07
17	Gear tower	FDG1000-02-10
18	Reversing shaft	FDG-02-09
19	Copper bush	FDG-02-11
20	Gasket	FDG-02-05
21	Reversing lever	FDG-02-10
22	Reversing gear	FDG-02-21
23	Transition gear	FDG1000-02-42
24	Transition gear shaft	FDG-02-15
25	Washer	FDG-02-16

Item.	Name	Spec.
26	Output gear	FDG-02-22
27	Copper bush	FDG-02-13
28	Pin	
29	Shaft cover	FDG-02-03
30	handwheel	FDG-02-02
31	Key	
32	Key	
33	Key	
34	Deep groove ball bearing	
35	Deep groove ball bearing	
36	Deep groove ball bearing	
37	Deep groove ball bearing	
38	Deep groove ball bearing	
39	Deep groove ball bearing	
40	Screw	
41	Screw	
42	Screw	
43	Screw	
44	Screw	
45	Screw	
46	Screw	
47	External Circlips	
48	Spring	
49	Spring	
50	Steel ball	

#### Gearbox list



## Rotation Arm Assembly





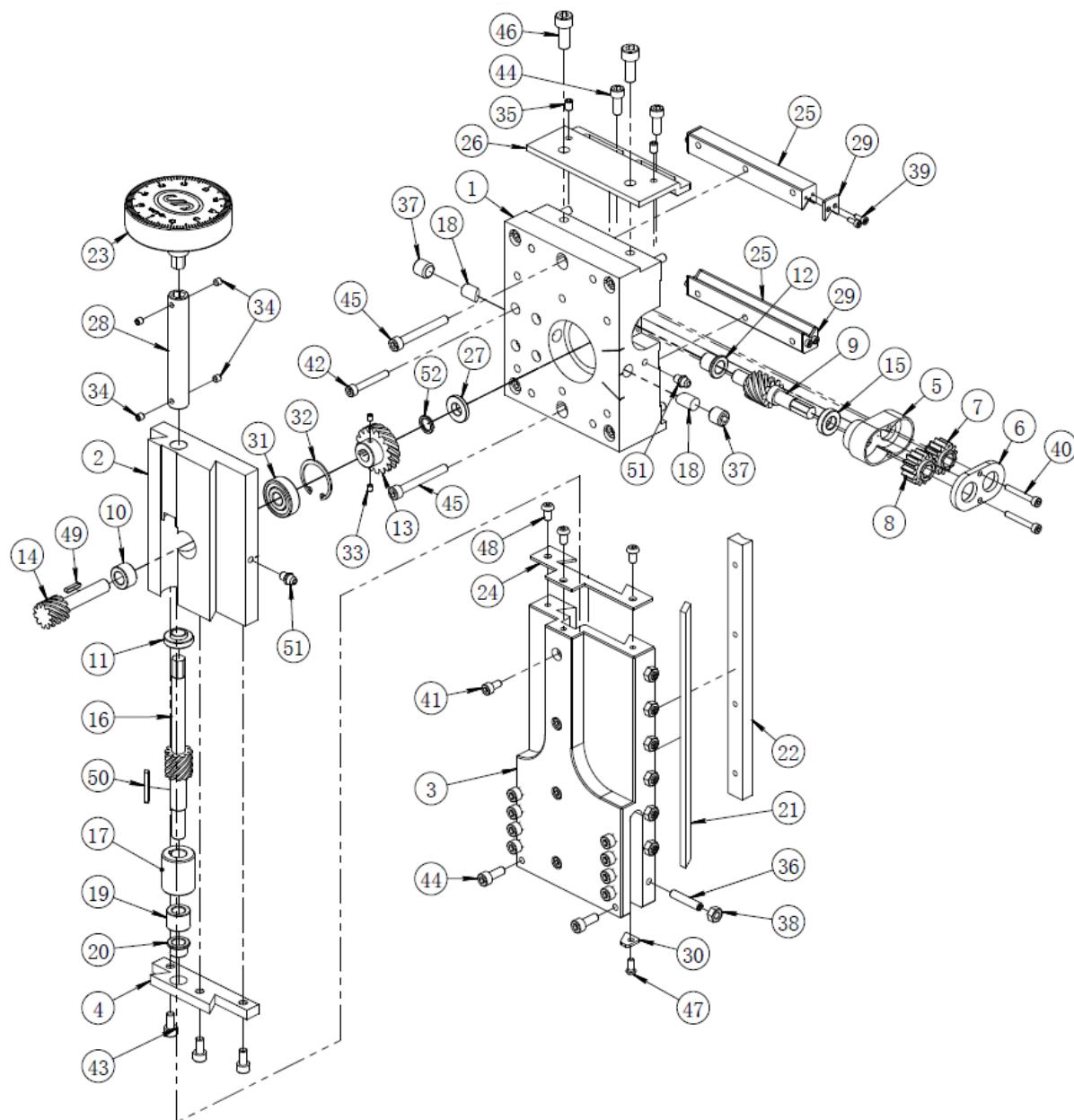
Item.	Name	Spec.
1	Rotation arm	FDG1000-03-01
2	Guideway	FDG1000-03-02A
3	Strengthening plate	FDG1000-03-04
4	Cover plate	FDG1000-03-05
5	Fixed plate	FDG1000-03-08A
6	Leadscrew	FDG1000-03-32
7	Hexagonal bar	FDG1000-03-12
8	Connecting rod	FDG1000-03-13
9	Fixed block	FDG1000-03-09
10	Fixed cover plate	FDG1000-03-10
11	Transmission gear	FDG1000-03-11
12	Gearbox	FDG1000-03-16
13	Reversing gear	FDG1000-03-14
14	Reversing gear	FDG1000-03-15
15	Clutch wheel	FDG1000-03-18
16	Shift fork	FDG1000-03-17
17	Spacer	FDG1000-03-23
18	Handwheel	FDG-03-01
19	Retaining ring	FDG-03-15
20	Handle	FDG-01-03
21	Shift lever	FDG-03-04
22	Conversion gasket	FDG-03-06
23	Shift pin	FDG-03-03
24	Shift wheel	FDG-03-05
25	Retaining ring	FDG-03-13
26	leadscrew nut	
27	Round nut	
28	Tab washers	
29	bearing	

Item.	Name	Spec.
30	bearing	
31	bearing	
32	bearing	
33	External Circlips	
34	External Circlips	
35	Dust cover	
36	Lifting ring	
37	Positioning screw	
38	Flat gasket	
39	Screw	
40	Screw	
41	Screw	
42	Screw	
43	Screw	
44	Screw	
45	Screw	
46	Screw	
47	Screw	
48	Screw	
49	Screw	
50	Screw	
51	Screw	
52	Screw	
53	Shoulder screw	
54	Pin	
55	Key	
56	Key	
57	Screw	

#### Rotation Arm list



## Tool Post Assembly





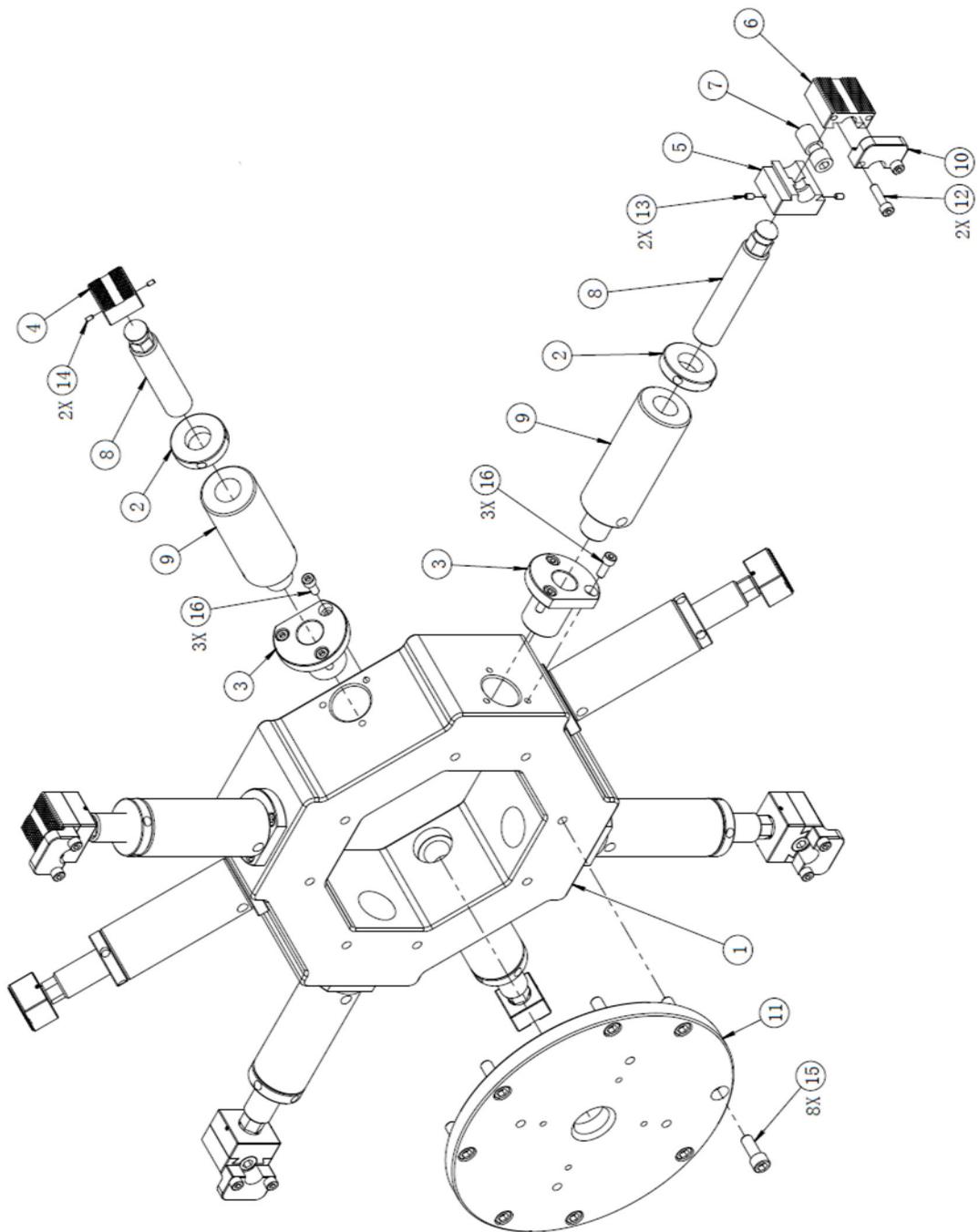
Item.	Name	Spec.
1	Sliding plate	FDG1000-04-01A
2	Rotating plate	FDG1000-04-10A
3	Sliding plate	FDG1000-04-22A
4	Baffle	FDG1000-04-11
5	Gearbox	FDG1000-04-05A
6	Gearbox cover	FDG1000-04-04A
7	Transmission gear	FDG1000-04-08
8	Transmission gear	FDG1000-04-07
9	Transmission shaft	FDG1000-04-03A
10	Retaining ring	FDG1000-04-28A
11	Copper bush	FDG1000-04-29
12	Copper bush	FDG-04-06
13	Transmission gear	FDG1000-04-04
14	Transmission shaft	FDG1000-04-17B
15	Retaining ring	FDG-04-07
16	Feed shaft	FDG1000-04-16A
17	Threaded sleeve	FDG-04-01
18	Pin	FDG-04-11
19	Washers	FDG1000-04-02
20	Copper bush	FDG-04-12
21	Inlay strip	FDG1000-04-23A
22	Half round nut	FDG1000-04-25A
23	Hand wheel	FDG-04-23A
24	Blocking plate	FDG1000-04-26A
25	Slider	FDG1000-04-30
26	Limit plate	FDG1000-03-30

Item.	Name	Spec.
27	Copper bush	FDG-04-08
28	Extension rod	FDG-04-05
29	Blocking plate	FDG1000-04-27
30	Blocking plate	FDG1000-04-24C
31	bearing	
32	Circlips for hole	
33	Screw	
34	Screw	
35	Screw	
36	Screw	
37	Screw	
38	Nut	
39	Screw	
40	Screw	
41	Screw	
42	Screw	
43	Screw	
44	Screw	
45	Screw	
46	Screw	
47	Screw	
48	Screw	
49	Key	
50	Key	
51	Oil nozzle	
52	Washers	FDG1000-04-31

#### Tool Post list



## 400 Mounting Base Assembly



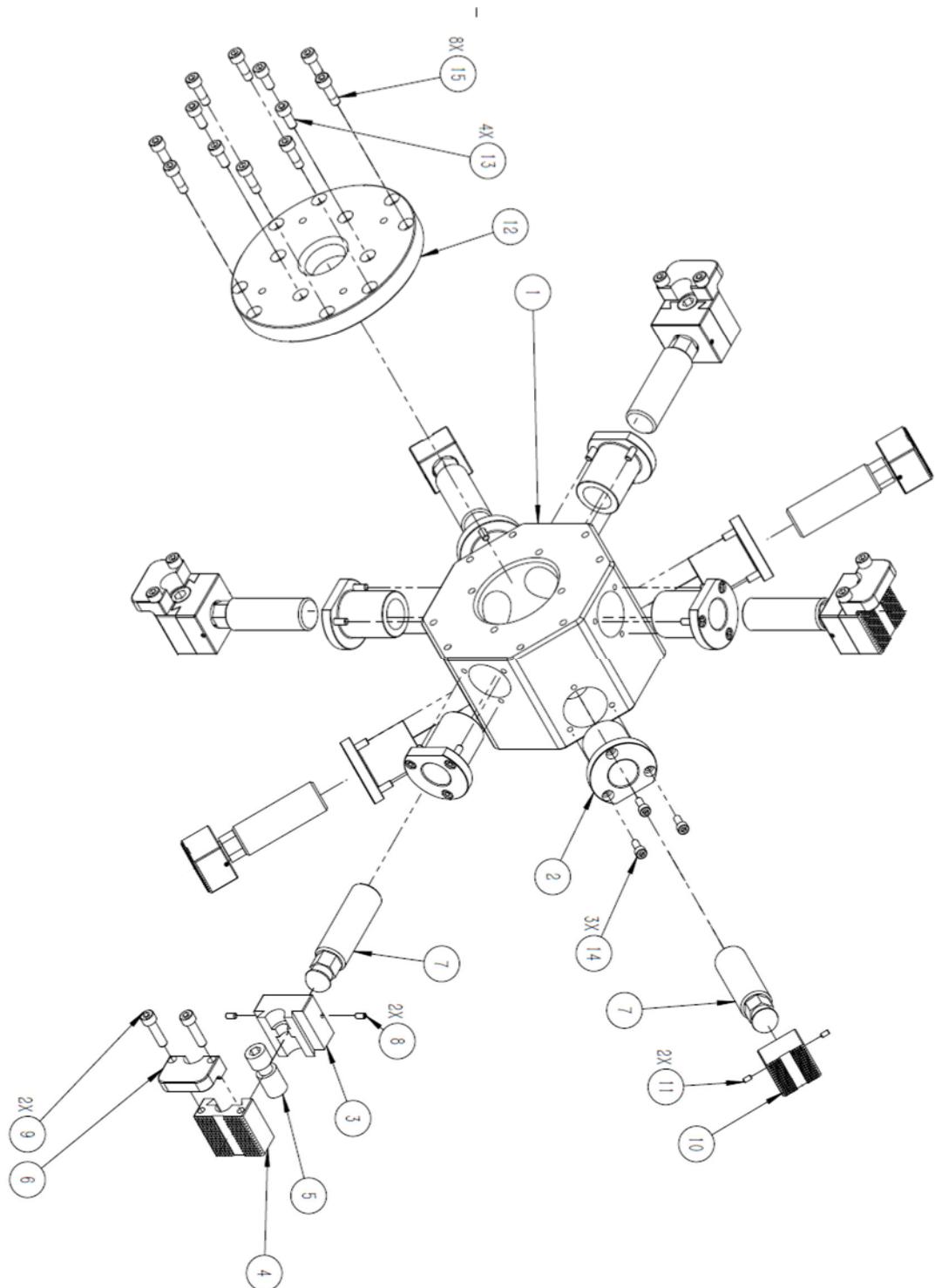


Item.	Name	Spec.
1	Mounting base	FDG1000-05-06
2	Fixing Nut	FDG-05-16
3	Fixing Nut	FDG-05-18A
4	Fixed jaw	FDG-05-21
5	Fixed block	FDG-05-26
6	Fixed jaw	FDG-05-27
7	Adjusting screw	FDG-05-28
8	Ram bolt	FDG-05-34
9	Extension leg	FDG-05-35
10	Setting strap	FDG-05-41
11	Junction plate	FDG1000-05-02C
12	Screw	
13	Screw	
14	Screw	
15	Screw	
16	Screw	

#### Large Mounting base list



## 180 Mounting Base Assembly



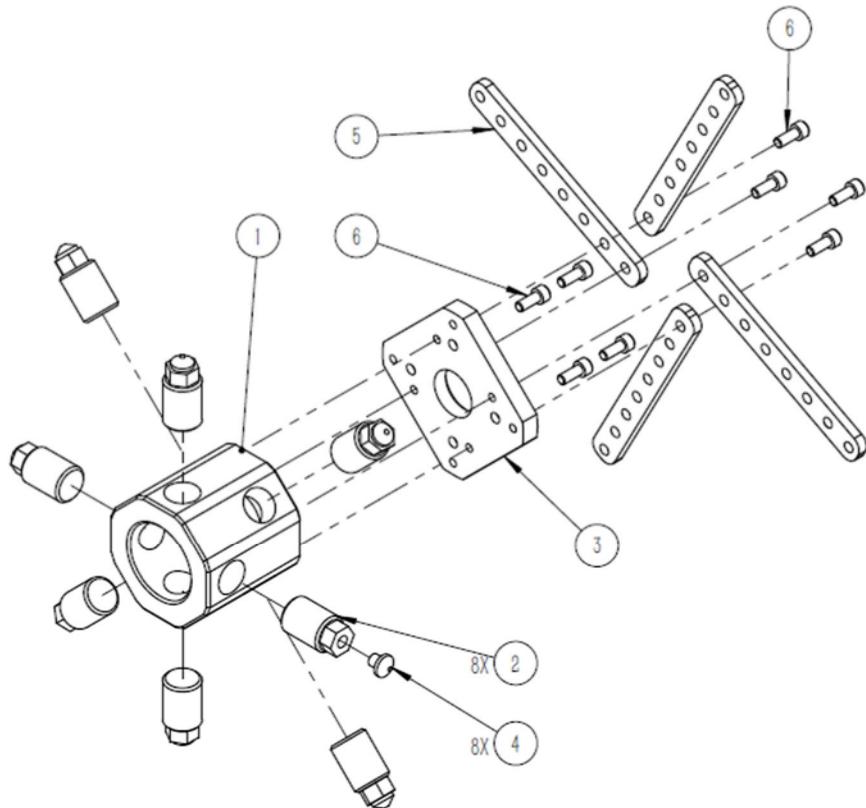


Item.	Name	Spec.
1	Mounting base	FDG1000-05-03A
2	Fixing Nut	FDG-05-18B
3	Fixed block	FDG-05-26
4	Fixed jaw	FDG-05-27
5	Adjusting screw	FDG-05-28
6	Setting strap	FDG-05-41
7	Ram bolt	FDG-05-34
8	Screw	
9	Screw	
10	Fixed jaw	FDG-05-21
11	Screw	
12	Junction plate	FDG1000-05-02B
13	Screw	
14	Screw	
15	Screw	

Middle Mounting base list



## 105 Mounting Base Assembly



Item.	Name	Spec.
1	Mounting base	FDG1000-05-01A
2	Ram bolt	FDG1000-05-07
3	Junction plate	FDG1000-05-02A
4	Copper block	FDG1000-05-08
5	Mounting bar	FDG1000-05-09
6	Screw	

Small Mounting base list



## Maintenance –General

