FF5300 OPERATING MANUAL







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1 INTRODUCTION

IN THIS CHAPTER:

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1.1 How to use this manual

This manual describes information necessary for the setup, operation, maintenance, storage, shipping, and decommissioning of the FF5300.

The first page of each chapter includes a summary of the chapter contents to help you locate specific information. The appendices contain supplemental product information to aid in setup, operation, and maintenance tasks.

Read this entire manual to familiarize yourself with the FF5300 before attempting to set it up or operate it.

1.2 SAFETY ALERTS

Pay careful attention to the safety alerts printed throughout this manual. Safety alerts will call your attention to specific hazardous situations that may be encountered when operating this machine.

Examples of safety alerts used in this manual are defined here¹:

A DANGER

indicates a hazardous situation which, if not avoided, *WILL* result in death or severe injury.

WARNING

indicates a hazardous situation which, if not avoided, *COULD* result in death or severe injury.

1. For more information on safety alerts, refer to ANSI/NEMA Z535.6-2011, Product safety Information in Product Manuals, Instructions, and Other Collateral Materials.



indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

indicates a hazardous situation which, if not avoided, could result in property damage, equipment failure, or undesired work results.

1.3 GENERAL SAFETY PRECAUTIONS

CLIMAX leads the way in promoting the safe use of portable machine tools and valve testers. Safety is a joint effort. You, the end user, must do your part by being aware of your work environment and closely following the operating procedures and safety precautions contained in this manual, as well as your employer's safety guidelines.

Observe the following safety precautions when operating or working around the machine.

- **Training** Before operating this or any machine tool, you should receive instruction from a qualified trainer. Contact CLIMAX for machine-specific training information.
- **Risk assessment** Working with and around this machine poses risks to your safety. You, the end user, are responsible for conducting a risk assessment of each job site before setting up and operating this machine.
- **Intended use –** Use this machine in accordance with the instructions and precautions in this manual. Do not use this machine for any purpose other than its intended use as described in this manual.
- **Personal protective equipment** Always wear appropriate personal protective gear when operating this or any other machine tool. Flame-resistant clothing with long sleeves and legs is recommended when operating the machine. Hot chips from the workpiece may burn or cut bare skin.
- **Work area** Keep the work area around the machine clear of clutter. Restrain cords and hoses connected to the machine. Keep other cords and hoses away from the work area.
- **Lifting –** Many CLIMAX machine components are heavy. Whenever possible, lift the machine or its components using proper hoisting equipment and rigging. Always use designated lifting points on the machine. Follow lifting instructions in the setup procedures of this manual.
- **Lock-out/tag-out** Lock-out and tag-out the machine before performing maintenance.
- Moving parts CLIMAX machines have numerous exposed moving parts

and interfaces that can cause severe impact, pinching, cutting, and other injuries. Except for stationary operating controls, avoid contact with moving parts by hands or tools during machine operation. Remove gloves and secure hair, clothing, jewelry, and pocket items to prevent them from becoming entangled in moving parts.

- **Sharp edges –** Cutting tools and workpieces have sharp edges that can easily cut skin. Wear protective gloves and exercise caution when handling a cutting tool or workpiece.
- **Hot surfaces** During operation, motors, pumps, HPUs, and cutting tools can generate enough heat to cause severe burns. Pay attention to hot surface labels, and avoid contact with bare skin until the machine has cooled.

1.4 MACHINE-SPECIFIC SAFETY PRECAUTIONS

- **Eye hazard** This machine produces metal chips during operation. Always wear eye protection when operating the machine.
- **Sound level** This machine produces potentially harmful sound levels. Hearing protection is required when operating this machine or working around it. During testing, the machine produced the sound levels¹ listed in Table 1-1.

	Motor
Sound power	87.7 dBA
Operator sound pressure	88.6 dBA
Bystander sound pressure	81.2 dBA

TABLE 1-1. SOUND LEVELS

- **Hazardous environments** Do not operate the machine in environments where potentially explosive materials, toxic chemicals, or radiation may be present.
- Machine mounting Do not operate the machine unless mounted to a workpiece in accordance with this manual. If mounting the machine in an overhead or vertical position, do not remove hoist rigging until the machine is mounted to the workpiece in accordance with this manual.

^{1.} Machine sound testing was conducted in accordance with European Harmonized Standards EN ISO 3744:2010 and EN 11201:2010.

1.5 RISK ASSESSMENT AND HAZARD MITIGATION

Machine Tools are specifically designed to perform precise material-removal operations.

Stationary Machine Tools include lathes and milling machines and are typically found in a machine shop. They are mounted in a fixed location during operation and are considered to be a complete, self-contained machine. Stationary Machine Tools achieve the rigidity needed to accomplish material-removal operations from the structure that is an integral part of the machine tool.

In contrast, Portable Machine Tools are designed for on-site machining applications. They typically attach directly to the workpiece itself, or to an adjacent structure, and achieve their rigidity from the structure to which it is attached. The design intent is that the Portable Machine Tool and the structure to which it is attached become one complete machine during the material-removal process.

To achieve the intended results and to promote safety, the operator must understand and follow the design intent, set-up, and operation practices that are unique to Portable Machine Tools.

The operator must perform an overall review and on-site risk assessment of the intended application. Due to the unique nature of portable machining applications, identifying one or more hazards that must be addressed is typical.

When performing the on-site risk assessment, it is important to consider the Portable Machine Tool and the workpiece as a whole.

1.6 RISK ASSESSMENT CHECKLIST

The following checklist is not intended to be an all inclusive list of things to watch out for when setting up and operating this Portable Machine Tool. However, these checklists are typical of the types of risks the assembler and operator should consider. Use these checklists as part of your risk assessment:

Before set-up	
I took note of all the warning labels on the machine.	
I removed or mitigated all identified risks (such as tripping, cutting, crushing, entan- glement, shearing, or falling objects).	
I considered the need for personnel safety guarding and installed any necessary guards.	
I read the machine assembly instructions (Section 3) and took inventory of all the items required but not supplied (Section 2.5).	
I created a lift plan, including identifying the proper rigging, for each of the setup lifts required during the setup of the support structure and machine.	
I located the fall paths involved in lifting and rigging operations. I have taken pre- cautions to keep workers away from the identified fall path.	
I considered how this machine operates and identified the best placement for the controls, cabling, and the operator.	
I evaluated and mitigated any other potential risks specific to my work area. These may include confined space, hot work considerations, materials that are hazardous to health, hot surfaces, noisy work areas and other hazards.	

TABLE 1-3. RISK ASSESSMENT CHEC	KLIST AFTER SET-UP
---------------------------------	--------------------

	After set-up	
	I checked that the machine is safely installed (according to Section 3) and the potential fall path is clear. If the machine is installed at an elevated position, I checked that the machine is safeguarded against falling.	
	I identified all possible pinch points, such as those caused by rotating parts, and informed the affected personnel.	
I planned for containment of any chips or swarf produced by the machine		
	I followed the required maintenance checklist (Section 5.1) with the recommende lubricants (Section 5.2).	
	I checked that all affected personnel have the recommended personal protective equipment, as well as any site-required or regulatory equipment.	
	I checked that all affected personnel understand and are clear of the danger zone.	
	I evaluated and mitigated any other potential risks specific to my work area.	

1.7 LABELS

1.7.1 Label identification

The following warning and identification labels should be on your machine. If any are defaced or missing, contact CLIMAX immediately for replacements.



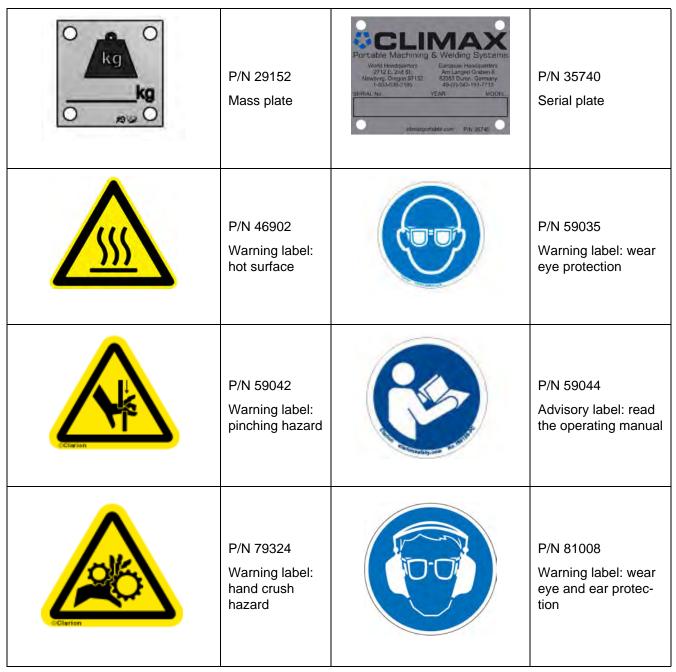


TABLE 1-4. FF5300 LABELS (CONTINUED)

IMAX LANGE FACER	
---------------------	--

1.7.2 Label location

The following figures display the location of the labels on each of the components of the FF5300. For further identification of location placement, refer to the exploded views in Appendix A.



FIGURE 1-1. TOP LABEL LOCATIONS

Label P/N: 29152, 35740, 46902, 59035, 59042, 59044, 79324, 91585

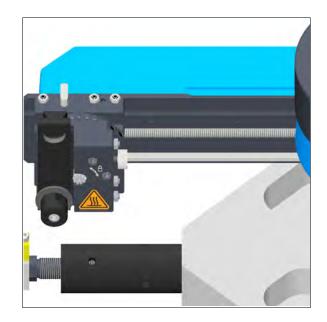


FIGURE 1-2. LABEL LOCATION

Label P/N: 46902

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2 OVERVIEW

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2.2 Controls
2.3 DIMENSIONS
2.4 Specifications
2.4.1 Temperature
2.4.2 Pressure
2.4.3 ROTATIONAL SPEED
2.4.4 Feed adjustments
2.4.5 Weights
2.5 ITEMS REQUIRED BUT NOT SUPPLIED

2.1 FEATURES AND COMPONENTS

The FF5300 flange facing machine is designed for facing, beveling, and grooving operations.

Principle components include:

- **High precision in a compact design –** The FF5300's precision rotating assembly incorporates two large tapered roller bearings on a spindle. This design provides the maximum machine rigidity in a compact package.
- **Operator safety** There is no need to touch moving parts during machine operation. A mechanically-powered reversible feed box controls both the radial and axial (vertical) feeds and has an adjustable feed rate control on a non-rotating part of the machine. Feed rate is cam-controlled to match machine RPM. Manual feeding for rapid positioning is also possible.
- Face to swing diameter The machining diameter can exceed the swing diameter.
- **Simple rigging** The machine quickly separates into smaller components that can be moved by hand.
- **Easy setup** The turning and counterweight arms are adjustable for the desired swing clearance and machining range. The counterweight can be adjusted easily to achieve near-perfect rotational balance.
- **Ability to machine grooves and bevels** The swivel tool head rotates 360° and has a tool holder that also rotates 360° independently. It accepts up to 1/2" (12 mm) square shank tools.
- **Smooth high-torque machining** The low-backlash worm gear drive allows smooth high-torque machining even during interrupted cuts.
- **Rigid chucking** The tubular chucking system with a spherical interface plate for leveling allows for quick setup. Adjustable leveling feet are also

available (sold separately).

Modular design – Many of the machine components can be removed to make setup and storage easier. For example, you can set up the chuck independently and then add the main rotary housing.

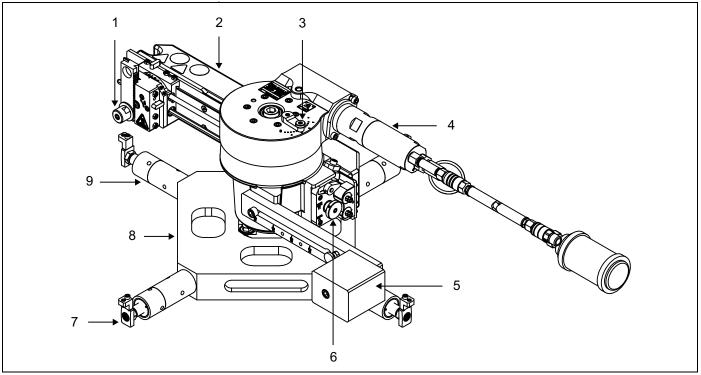


FIGURE 2-1. FF5300 ID CHUCK ASSEMBLY

Number	Component		
1	Swiveling tool holder		
2	Machining arm		
3	Axial/radial feed rate control		
4	Pneumatic drive motor		
5	Counterweight assembly		
6	Axial/radial feed selector		
7	Quick-connect chuck feet		
8	ID chuck mount		
9	ID mount leg sections		

2.2 CONTROLS

WARNING

Always stop the machine and lock-out/tag-out the pneumatic unit (PCU) before making adjustments to controls or machine components. Failure to follow this safety precaution may result in severe injury.

Emergency shutdown

To stop machine operation immediately, press the emergency stop button on the PCU.

Before restarting the FF5300, do the following:

- 1. Check that the area around the machine swing area is free from loose tools, obstructions or personnel.
- 2. Close the speed adjustment valve.
- 3. Pull the emergency stop button up.
- 4. Press the start button (repeat step 1 if necessary).

The FF5300 controls are located on the PCU, shown in Figure 2-2 on page 12.

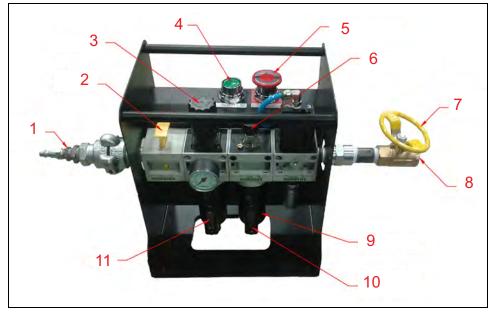


FIGURE 2-2. PCU COMPONENTS

TABLE 2-2. PCU CONTROLS IDENTIFICATION

Number	Component	Function
1	Air hose quick dis- connect ¹	Connects the PCU to the operator's compressed air source.
2	Air supply lock-out	Isolates air pressure from the machine and provides the ability to lock the valve closed before performing maintenance.
3	Regulator	Controls the air pressure supplied to the machine. The regulator is preset at the factory and does not require adjustment.
4	START (system reset)	Resets the low-pressure dropout.
5	Emergency STOP	Isolates the supply air and vents the downstream air. Press down to stop the machine; pull up to reset.
6	Oil drip rate dial	Controls the air lubricator drip rate. For more information, see Section 5.4.1 on page 49.
7	Speed adjustment valve	Controls the machine's rate of rotation and is located on the exhaust of the pneumatic assembly (see Figure 2-3).
8	Air hose to the machine	Supplies the air to the machine.
9	Oil reservoir	Holds lubricating oil AW-32 for the machine air motor.
10	Oil reservoir sight glass	Shows the amount of oil in the reservoir.
11	Filter	Removes foreign particulates from the air supply and protects the downstream valves and motor.

1.Figure 2-2 shows the H&S quick disconnect. Your disconnect may look different.

WARNING

Always stop the machine and lock-out/tag-out the PCU before making adjustments to controls or machine components. Failure to follow this safety precaution may result in severe injury.

The ball valve in the pneumatic assembly (see Figure 2-3) is used to throttle the air flow to adjust the machine speed. Note that it controls the exhaust from the air motor.



Always stop the machine using the e-stop button on the PCU. This removes all pressure from the FF5300 drive motor.



FIGURE 2-3. PNEUMATIC ASSEMBLY

The air plumbing includes an exhaust muffler to reduce the noise level and also to trap oil mist in the motor exhaust.



The motor can operate unexpectedly when the air hose is connected. Close the valve to the pneumatic motor before connecting the air hose.

2.3 DIMENSIONS

The following figures show the machine and operating dimensions.

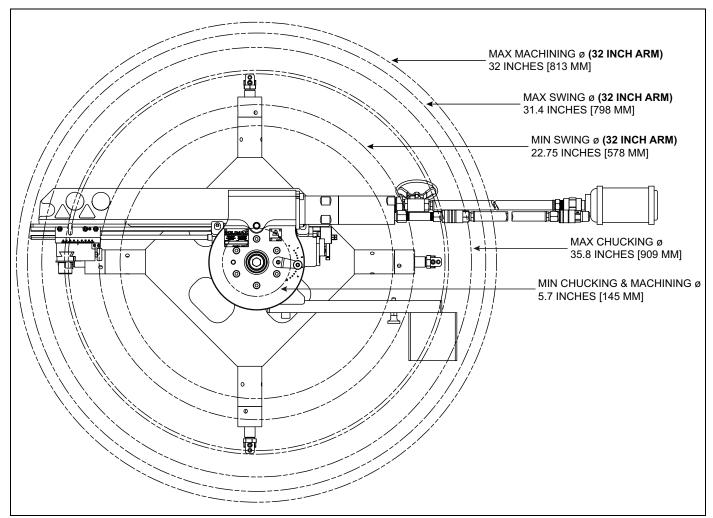


FIGURE 2-4. DIMENSIONS FOR 32" (813 MM) MACHINING ARM

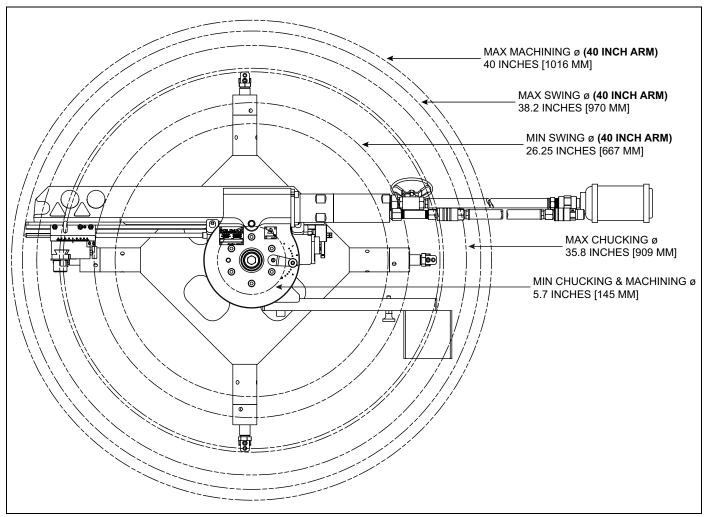


FIGURE 2-5. DIMENSIONS FOR 40" (1,016 MM) MACHINING ARM

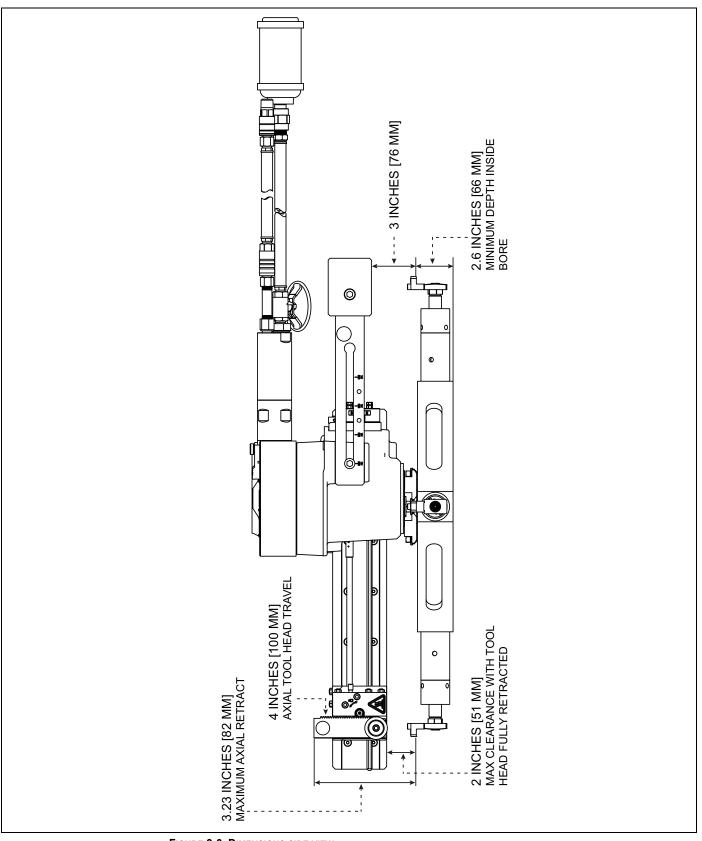


FIGURE 2-6. DIMENSIONS SIDE VIEW

2.4 SPECIFICATIONS

2.4.1 Temperature

The suggested machine ambient operating temperature is $-4 - 135^{\circ}F(-20 - 57^{\circ}C)$.

TIP:

During operation, individual machine components will exceed these temperatures.

During normal use, the temperature of the machine housing normally increases to about $5^{\circ}F(3^{\circ}C)$ above the ambient temperature. It is good practice to make critical final machining cuts after the machine has been running continuously for at least 15 minutes.

CAUTION

Machining metal raises the temperature of components and can generate hot chips that burn. Use caution when changing inserts and handling or adjusting the cutting tool after use.

2.4.2 Pressure

The recommended air pressure is 90 psi (6.2 bar) at 71 cubic feet per minute (2.0 cubic meters per minute).

2.4.3 Rotational speed

The operational rotating speed is 6–40 RPM.

2.4.4 Feed adjustments

The feed is mechanically driven by the machine rotation.

Radial cutting tool feed is variable from 0–0.032" (0.81 mm) per revolution.

Vertical cutting tool feed is variable from 0 to 0.040" (1 mm) per revolution.

The feed directions are marked on the feed direction selector on the side of the main body (see Figure 3-22 on page 38):

- Radial feed "+" = OUT and "-" =IN
- Axial feed "+" = DOWN (with the tool slide on the outboard side of the feed pinion) and "-" = UP (with the tool slide on the outboard side of the feed pinion)

TIP:

For manual feed, the feed direction selector must be in the neutral position or the same direction that you are making the manual adjustment.

The feed speed is set by the lever on the main drive flange with the markings 1 to 4 in twelve increments (see Figure 2-7). This control does not move while the machine is rotating. The feed speed can be set or adjusted at any time after the machine has started.

Refer to Table 2-3 when setting the feed rate.

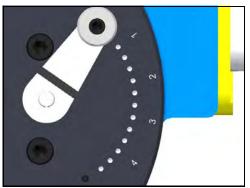


FIGURE 2-7. FEED RATE POSITIONS

Feed rate lever position	Approximate radial feed rates per revolution of the turning arm in/rev (mm/rev)	Approximate vertical feed rates per revolution of the turning arm in/rev (mm/rev)
1	0.002 (0.05)	0.005 (0.13)
1.1	0.004 (0.10)	0.008 (0.20)
1.2	0.006 (0.15)	0.011 (0.28)
2	0.008 (0.20)	0.015 (0.38)
2.1	0.013 (0.33)	0.018 (0.46)
2.2	0.016 (0.40)	0.020 (0.51)
3	0.018 (0.46)	0.024 (0.61)
3.1	0.023 (0.58)	0.027 (0.69)
3.2	0.025 (0.64)	0.030 (0.76)
4	0.028 (0.71)	0.034 (0.86)
4.1	0.030 (0.76)	0.036 (0.91)
4.2	0.032 (0.81)	0.040 (1.02)

TABLE 2-3. FEED RATE ADJUSTMENT

NOTICE

The feed rates provided in Table 2-3 are approximate and based on a free-spinning RPM of more than 40. Different RPMs, cubic feet per minute of supply air, flange material, cutting tool geometry, depth of cut, or other heavier cutting forces will reduce these feed rate values.

CAUTION

If the feed direction selector does not move smoothly, do not force it. Stop the machine and gently work the arm back and forth while jogging the feed mechanism with the manual feed crank handle. Forcing the arm will damage the feed system, and may misalign the feed system.

Setting the feed direction

Do the following to set the feed direction:

- 1. Select the feed direction after positioning the tool manually. Select either positive or negative (see Figure 3-22 on page 38).
- 2. Move the feed speed adjustment lever to ZERO (that is, counter-clockwise past position 1 until the lever stops).
- 3. Start the machine.
- 4. Move the feed speed adjustment arm to the desired feed rate position. The feed rate can be increased, decreased, or set to zero at any time during machine operation.

WARNING

To protect yourself from flying chips and machine noise, wear eye and ear protection while operating the machine.

WARNING

During normal machine use, it may be necessary to occasionally rotate the machining arm counterclockwise. Only rotate the machining arm counterclockwise when the feed direction selector is in the neutral position or the feed speed adjustment lever is at zero. **Do not manually rotate the machining arm counterclockwise with the feed direction selector is engaged and/or with the feed speed adjustment lever in a position other than 0.** This will cause serious damage to the feed mechanism and void the warranty.

2.4.5 Weights

TABLE 2-4. WEIGHTS

	lbs	kg
Total machine weight ID chuck ¹ and 40" (1,016 mm) machining arm	196.7	89
Total machine weight ID chuck ² and 32" (813 mm) machining arm	192	87
ID chuck	65	29
Main body assembly	58	26
40" (1,016 mm) machining arm with tool holder	38	17
32" (813 mm) machining arm with tool holder	34	15
Counterweight arm	22	10
Pneumatic motor	9	4
Metal shipping container	135	61

1. Machine weights are operating weights.

2. Machine weights are operating weights.

TABLE 2-5. SHIPPING WEIGHTS

	lbs	kg
Machine in metal container	332	151

TABLE 2-6. SHIPPING DIMENSIONS

	Width ¹	Depth	Height
Metal container	53" (1346 mm)	27.5" (699 mm)	20" (508 mm)

1. All dimensions include handles and latches, if applicable.

2.5 ITEMS REQUIRED BUT NOT SUPPLIED

The following items are required but not supplied in your CLIMAX product kit:

- Measuring equipment such as tape measures, micrometers, dial indicators, calipers
- Cleaning supplies such as rags, brushes or pliers for removing chips and cleaning solutions
- Personal protective equipment
- Cutting lubricants

3 SETUP

IN THIS CHAPTER:

3.1 RECEIPT AND INSPECTION
3.2 Preparing the machine for use
3.2.1 PRE-SETUP CHECK
3.2.2 Assessing the work area
3.3 LIFTING AND RIGGING
3.4 INSTALLATION HAZARDS
3.5 Configuring the ID chuck
3.6 INSTALLING THE ID CHUCK
3.7 INSTALLING THE MACHINE TO THE CHUCK
3.8 INSTALLING THE MACHINING ARM
3.9 INSTALLING THE COUNTERWEIGHT ARM
3.10 CENTERING AND LEVELING THE MACHINE TO THE WORKPIECE
3.11 ROTATING THE TOOL HEAD
3.12 INSTALLING THE CUTTING TOOL AND ADJUST POSITION
3.13 Adjusting the feed direction, axis, and amount
3.14 CONNECTING THE AIR MOTOR TO THE MAIN BODY, THE PCU, AND AIR SOURCE

This section describes the setup and assembly procedures for the FF5300 flange facer.

3.1 RECEIPT AND INSPECTION

Your CLIMAX product was inspected and tested prior to shipment, and packaged for normal shipment conditions. CLIMAX does not guarantee the condition of your machine upon delivery.

When you receive your CLIMAX product, perform the following receipt checks:

- 1. Inspect the shipping containers for damage.
- 2. Check the contents of the shipping containers against the included invoice to make sure that all components have been shipped.
- 3. Inspect all components for damage.

Contact CLIMAX immediately to report damaged or missing components.

NOTICE

Keep the shipping container and all packing materials for future storage and shipping of the machine.

The machine ships from CLIMAX with a heavy coating of LPS 3. The recommended cleaner is LPS PreSolve Orange Degreaser. All parts must be cleaned before use.

3.2 PREPARING THE MACHINE FOR USE

3.2.1 Pre-setup check

The FF5300 can be set up and mounted in many ways. Before setting up the flange facer, check the following:

- The machine assemblies are positioned correctly.
- There is enough room to position the entire machine on or near the work piece.
- All connections are correctly attached.

3.2.2 Assessing the work area

The FF5300 often is used in dangerous locations (in elevated positions, near other operating equipment, overhead, etc.). Climax cannot foresee where this machine will be used; therefore, you must perform a site-specific risk assessment (Section 1.5 on page 6 and Section 1.6 on page 7) for each job before starting work.

The FF5300 machine has remote operation features that enable you to choose the optimum location to operate the machine (Section 2.3 on page 21).

WARNING

Always follow safe work practices, including site-specific safety requirements. It is your responsibility to perform a risk assessment before you set up the machine and each time before you operate the machine.

3.3 LIFTING AND RIGGING

A DANGER

The FF5300 can weigh 196.7 lbs (89 kg) when fully assembled in the largest configuration.

Use caution and follow all site rigging procedures such as a lift plan and never allowing anyone under the load. Falling or uncontrolled swinging of machinery can cause serious injury or death.

The FF5300 tool kit includes two M12 lifting eyes each rated for 749 lbs (340 kg). The machine can be lifted by either lifting eye alone or by using both lifting eyes for a more balanced rigging arrangement.



Lift the machine only by the M12 lifting eyes seen in Figure 3-1.

Connect the appropriate lifting equipment to the lifting eyes located on top of the main body when lifting the entire assembly. Never lift the machine by the drive motors, pneumatic lines, or hoses.

A DANGER

Lifting the assembled machine by loose slings can cause the machine to fall from the rigging.

When lifting the machine, pay special attention to the location of the center of gravity when lifting. Always check that all machine parts are tightened properly to prevent hazards.



FIGURE 3-1. 59626 M12 LIFTING EYES

The machine can be broken down quickly into smaller sections if needed. The maximum weight of the heaviest individual module is 65 lbs (29.5 kg).

3.4 INSTALLATION HAZARDS

The installation stage can be dangerous, as it relies on the operator and other personnel following the recommended safety precautions. Consider the following warnings carefully before undertaking the assembly process.



Swinging or falling machinery could seriously injure or be fatal to personnel who are near the machine. Secure all components to the machine before lifting.

WARNING

If not properly secured, this machine can fall and cause fatal injuries to personnel. Pay special attention to vertical flange installations.

• Chucking feet must be secured to the workpiece.

• Setup fingers or other measures to retain the machine should be utilized when possible.

To avoid the risk of a falling machine, secure the machine by tack-welding safety blocks over the upper jaws or by using clamps bolted to the underside of the leveling feet

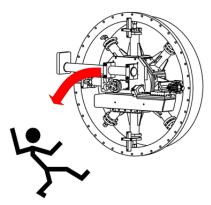


FIGURE 3-2. VERTICAL HAZARD WARNING

(safety blocks and clamps not included with the machine).

WARNING

Do not remove the crane until at least one of the securing methods is in place and the jacking screws are tightened to 30 ft-lb (40 Nm).

NOTICE

If the torque value cannot be achieved without acceptable workpiece deformation, the operator must apply their own secondary support and restraint devices.

WARNING

Do not extend the jacking screws past the full-extension groove in the threaded screw (Figure 3-12), as that may cause the jacking screw to be overloaded and result in damage to the screw. If needed, add additional leg extensions to minimize the length of the threaded jacking screw that is exposed.

3.5 CONFIGURING THE ID CHUCK

Do the following to configure the ID chuck:

- 1. Measure the bore ID (Figure 3-3).
- 2. Refer to Table 3-1 for ID chuck configuration.



FIGURE 3-3. MEASURING THE BORE DIAMETER

	Number of chuck components						
Diameter range	Small chuck	Large chuck	Short jacking	Standard jacking	Short tube	Long tube	
5.68–7.68" (144–195 mm)	1	0	1	0	0	0	
7.32–9.32" (186–237 mm)	1	0	0	1	0		
9.18–12.68" (233–322 mm)	1	0	0	1	1	0	
12.54–16.04" (319–407 mm)	1	0	0	1	0	1	
15.9–19.4" (404– 493 mm)	1	0	0	1	1	1	
18.92–22.42" (481–569 mm)	0	1	0	1	0	0	
22.28–25.78" (566–655 mm)	0	1	0	1	1	0	
25.64–29.14" (651–740 mm)	0	1	0	1	0	1	
29–32.5" (737–826 mm)	0	1	0	1	1	1	
32.36–35.86" (822–911 mm) ^a	0	1	0	1	2	1	

a. Leg extensions that enable the FF5300 to reach the maximum diameter range are provided regardless of the machining arm selected.

- 3. Move the spherical interface plate to the correct chuck hub as needed. Remove and replace the four hex head cap screws (HHCS).
- 4. Assemble the ID chuck (Figure 3-4).
- 5. Adjust the four HHCS to approximately level the interface plate to the chuck.



FIGURE 3-4. ASSEMBLED CHUCK ID (LARGE CHUCK SHOWN)

6. Apply the anti-seize compound (provided in the tool kit) to the threads and contacting faces of each leg section (see Figure 3-5).



FIGURE 3-5. APPLYING ANTI-SEIZE COMPOUND

7. Install the appropriate leg spacers (see Figure 3-6).

TABLE 3-2. STANDARD ID CHUCK LEG IDENTI-FICATION

Number	Component			
1	Captive screw			
2	Setup finger			
3	Swivel gripper			
4	Chuck foot			
5	Jacking screw			
6	Full extension groove (not shown)			

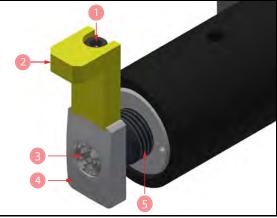


FIGURE 3-6. STANDARD ID CHUCK LEG COMPONENTS

- 8. Install the jacking nut.
- 9. Install the jacking screw. Use the short jacking screw for 5.7–7.7 (145–196 mm) diameter.
- 10. Install the standard ID chuck foot or optional adjustable leveling foot (see Figure 3-6 and Figure 3-7).

TABLE 3-3. OPTIONAL ADJUSTABLE LEVELING FOOT IDENTIFICATION

Number	Component				
1	Captive screw				
2	Setup finger				
3	Adjusting setscrew				
4	Washer				
5	Quick connect adjuster base				
6	Chuck foot				

11. Install the setup finger.

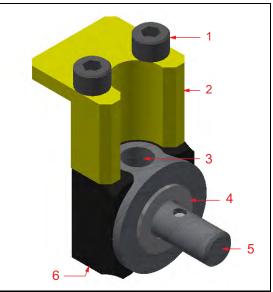


Figure 3-7. Optional adjustable leveling foot (P/N 91589), sold separately, for bores 8– 35.8" (203–909 mm)

3.6 INSTALLING THE ID CHUCK

Do the following to install the ID chuck:

- 1. Adjust the jacking screws to be approximately 0.2" (5 mm) smaller than the ID dimension. All the jacking screws should be equally extended.
- 2. Place the chuck into the flange and extend the jacking screws equally to clamp to the bore ID.

TIP:

The standard ID chuck foot swivel gripper allows a maximum of 6° of taper on the mounting surface.

3. Tighten the jacking screws to a minimum of 20 ft-lbs (27 Nm) to retain the chuck.



Failure to check that the chuck is secure could result in the machine falling out of or into the workpiece, causing personnel injury or damage.

3.7 INSTALLING THE MACHINE TO THE CHUCK

Do the following to install the machine to the chuck:

- 1. If the lifting eye was removed, re-attach it to the main body.
- 2. Lift the machine onto the chuck, aligning the dowel pin in the end of the main machine spindle with one of the four holes in the chuck interface plate.



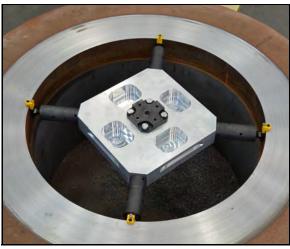


FIGURE 3-8. CHUCK CENTERED IN THE FLANGE

The FF5300 is heavy and

can cause personnel injury or damage if dropped. Use supplemental rigging when mounting the machine, in case it falls out or through the chucking diameter.

TIP:

Rotate the machine to place the air motor and control valve in the most convenient orientation based on the dowel pin location.

NOTICE

Check that the bottom of the spindle and the top of the interface plate are clean for a proper fit.

3. Thread in the M20 drawbolt to the chuck interface plate to 16 ft-lbs (22 Nm) and torque to 100 ft-lbs (135 Nm).

NOTICE

Check that the machine is securely mounted for best machining results.

3.8 INSTALLING THE MACHINING ARM

TIP:

The FF5300 is available with two optional machining arms, as described in Table 3-4.

 TABLE 3-4. OPTIONAL MACHINING ARMS

Machine P/N	Arm assembly P/N	Applicable diameter range	Minimum swing diameter			
90792	89920	5.7–40" (145–1,016 mm)	26.25" (667 mm)			
90791 90030		5.7–32" (145–813 mm)	22.75" (578 mm)			

Do the following to install the machining arm:

1. Lift the handle and the control end of the machining arm and set it into the lower dovetail clamp plate (see Figure 3-9).

NOTICE

Slide the gear interface plate so the gearing meshes with the feed gear in the machine. Rotating the feed selector knob slightly may help with meshing the gears.

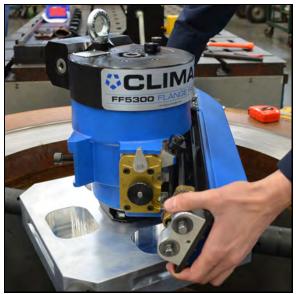


FIGURE 3-9. INSTALLING THE MACHINING ARM

- 2. Rotate the arm on the lower dovetail clamp plate, checking that the feed gears properly engage. Loosely secure the top dovetail clamp plates so that the arm is retained against the body.
 - 3. Slide the arm to the desired location and tighten the M8 clamp screws on the top dovetail clamp plate until the arm is secured (see Figure 3-10).



Failure to secure the machining arm could result in the arm coming loose from the machine and swinging or falling, causing personnel injury or damage.



FIGURE 3-10. SLIDING THE MACHINING ARM INTO PLACE

3.9 INSTALLING THE COUNTERWEIGHT ARM

Do the following to install the counterweight arm:

1. Lift and place the counterweight arm in the mounting position on the main body.

2. Pull back on the detent plunger to allow the arm to engage the M12 socket head cap screw (SHCS) in the keyhole slot.



FIGURE 3-11. DETENT PLUNGER IN COUNTERWEIGHT ARM

3. Slide the arm to the desired location and tighten the M12 clamp screw plate until the arm is secured (see Figure 3-12).

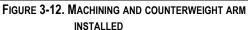




Failure to secure the counterweight arm could result in the arm coming loose from the machine and swinging or falling, causing personnel injury or damage.

 TABLE 3-5. ID CHUCK LEG IDENTIFICATION

Number	Component				
1	M12 screw for clamping the arm				
2	Clearance hole				
3	Detent plunger				
4	Screw for holding the counter- weight to the arm				



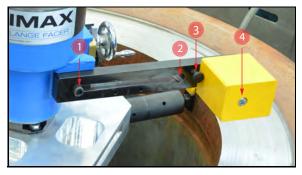


FIGURE 3-13. LOCATION OF LOCKING SCREWS

TIP:

The counterweight arm is not required on smaller machining diameters when the machine is used horizontally. However, using the counterweight arm enhances flatness accuracy and improves speed regulation.

TIP:

Use the engraved scale markings to adjust the arm to the correct diameter. Note that for the minimum swing diameter, the counterweight block should be removed and moved to an intermediate position on the counterweight arm. See Figure 3-14 and Table 3-6.

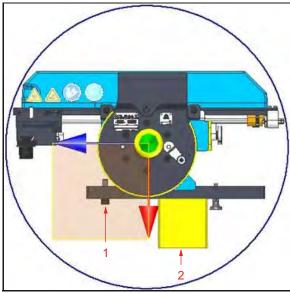


FIGURE 3-14. FF5300 WITH SHORT MACHINING ARM

TABLE 3-6. FF5300 with short machining arm identification

Number	Component
1	M12 SHCS to be removed
2	Counterweight to be removed from the arm and bolted directly to the main housing with M12 x 140 mm SHCS (P/N 50492).

TIP:

There is a longer M12 screw when the counterweight is attached directly to the main body.

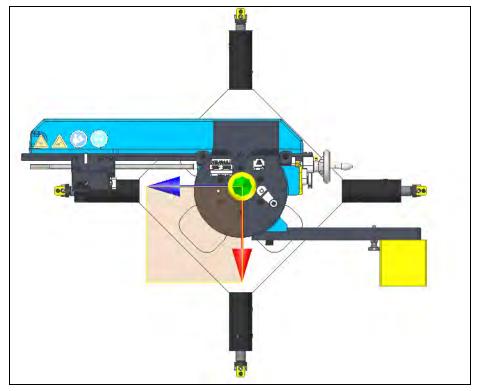


FIGURE 3-15. FF5300 (40" [1,016 MM] ARM) MAXIMUM SWING DIAMETER

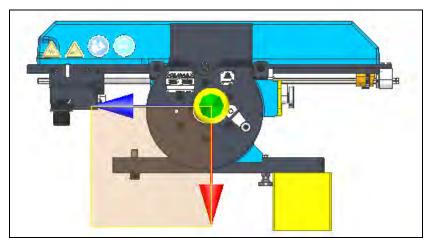


FIGURE 3-16. FF5300 (40" [1,016 MM] ARM) MINIMUM SWING DIAMETER (26.25" [667 MM])

3.10 CENTERING AND LEVELING THE MACHINE TO THE WORKPIECE

Do the following to center and level the machine to the workpiece:

1. Check that power to the machine drive is isolated and locked out.

- 2. Mount a dial indicator or other probe in the tool holder (see Figure 3-17).
- 3. Adjust the four HHCS to level the interface plate to the chuck.
- 4. Adjust the jacking feet to center the machine, if required.
- 5. Once the machine is centered, tighten the jacking screws to a minimum of 30 ft-lbs (40 Nm) to retain the chuck.



FIGURE 3-17. DIAL INDICATOR MOUNTED



Failure to check that the chuck is secure could result in the machine falling out of or into the workpiece, causing personnel injury or damage.

TIP:

Use the supplied 3/4" (19 mm) end wrench to hold the setup fingers vertical while tightening the jacking screws.

6. Remove the setup fingers if necessary.

NOTICE

M6 screws are captive to the setup finger. Remove the setup fingers only if they will interfere with the machining cut.

There are also additional M6 holes on the bottom of the jacking foot that can be used to secure the machine in a vertical flange or overhead mounting configuration.

3.11 ROTATING THE TOOL HEAD

Do the following to rotate the tool head:

1. Loosen the swivel head locking screws on the front of the tool post (see Figure 3-18).

CAUTION

Do not loosen the tool head rapidly. Keep your hand on the tool head for stability. Quick disengagement of tool head can cause it to swing unexpectedly, and may result in personnel injury or machine damage.

2. Loosen the tool holder swivel if necessary to adjust the tool head angle.

TIP:

There are detents located at 0°, 23°, and 45° to assist in setting the desired angle.

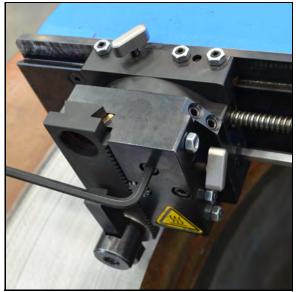


FIGURE 3-18. SWIVEL HEAD LOCKING SCREW ON THE FRONT OF THE TOOL POST

TIP:

Note that when the tool slide is on the outboard side of the feed pinion, as shown in Figure 3-19 on page 35, the feed in the + direction is down.

When the tool slide is rotated 180° so it is on the inboard side of the feed pinion, then the feed in the – direction is down.

3. Position the tool head.

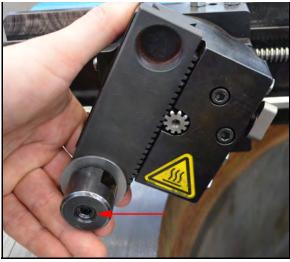


FIGURE 3-19. LOCATION OF SWIVEL CLAMPING SCREW

3.12 INSTALLING THE CUTTING TOOL AND ADJUST POSITION

Do the following to install the cutting tool and adjust position:

1. Install a 1/2" (13 mm) square cutting tool in the tool holder.

NOTICE

The machine rotates clockwise when viewed from above. Take this into consideration when orienting the cutting tip.

2. Adjust the tool position by turning the hex shafts (upper for radial or lower for axial) at the control end of the machining arm.



FIGURE 3-20. TOOL BIT INSTALLATION

TIP:

See Section 3.13 on page 37 when making adjustments. The feed system will only allow movement in the feed direction on the selected axis. Setting the feed direction lever in neutral (that is, vertical) position allows adjustment in either direction.

3.13 ADJUSTING THE FEED DIRECTION, AXIS, AND AMOUNT

Do the following to adjust the feed direction, axis, and amount:

1. Use the feed selection knob to set the feed axis. Pull out for radial (that is, for facing) or push in for axial (that is, for boring or tapers).

TIP:

It may be necessary to gently rotate the knurled knob when shifting. Do <u>not</u> use a hammer or pry bar to shift it.



FIGURE 3-21. FEED ADJUSTMENT COMPONENTS

TABLE 3-7. FEED ADJUSTMENT COMPONENTS IDENTIFICATION

Number	Component
1	Feed adjustment lever
2	Feed direction level (see Figure 3-22 on page 38)
3	Feed axis selector (also called the knurled knob)

- 2. Use the feed direction lever to set the feed direction, using the following guidelines (see Figure 3-22 on page 38):
 - When the + symbol is exposed, the feed will be out for radial or down for axial.
 - When the lever is in the neutral (that is, vertical) position, it is the most convenient position for adjusting the tool radial and axial position.
- 3. Use the feed adjustment lever on top of the machine to set the feed rate.

TIP:

Setting the feed adjustment lever to zero will stop the feed. The feed can be adjusted or set to zero anytime the machine is operating.



During normal machine use, it may be necessary to occasionally rotate the machining arm counterclockwise. Only rotate the machining arm counterclockwise when the feed direction selector is in the neutral position or the feed speed adjustment lever is at zero. **Do not manually rotate the machining arm counterclockwise when the feed direction selector is engaged and/or with the feed speed adjustment lever in a position other than 0.** This will cause serious damage to the feed mechanism and void the warranty.

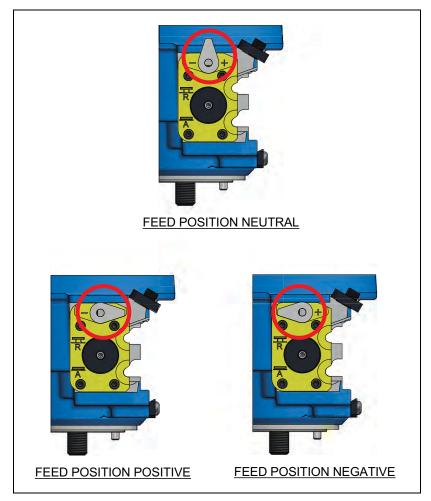


FIGURE 3-22. FEED POSITIONS

3.14 CONNECTING THE AIR MOTOR TO THE MAIN BODY, THE PCU, AND AIR SOURCE

Do the following to connect the air motor to main body, the PCU, and air source:

1. Install the air motor into the main body. Tighten the screws to a minimum of 20 ft-lbs (27 Nm) to secure the motor.

NOTICE

Check that the worm bore and motor shaft are clean and that the drive key is in place and aligned with the keyway in the worm.

- 2. Connect the air hose from the PCU to the air motor.
- Connect the PCU to a air source with 90 psi (6 bar) pressure using a minimum 1/2" 12-mm air hose.



Only install the air motor with the control handle in an upright position. If the control handle is down,



FIGURE 3-23. AIR HOSE CONNECTION

the machining arm or tool holder may strike the operator making the adjustment. See Figure 3-24.



FIGURE 3-24. INCORRECT (LEFT) AND CORRECT (RIGHT) EXAMPLES OF CONTROL HANDLE ORIENTATION

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4 OPERATION

IN THIS CHAPTER:

4.1 PRE-OPERATION CHECKS	 	 	-	 -	 -	 	-	-	-41
4.2 MACHINING	 	 	-	 -	 -	 	-	-	-42
4.3 Adjusting the machine when the cut is completed -	 	 	-	 -	 -	 	-	-	-43
4.4 DISASSEMBLY	 	 	-	 -	 -	 	-	-	-44

4.1 **PRE-OPERATION CHECKS**

Do not operate this machine without adequate training to fully understand safe setup, operation, and maintenance.

WARNING

Rotating machinery can cause serious injuries. Turn off and lock out the machine before making the pre-start checks.

The FF5300 often is used in dangerous locations (in elevated positions, near other operating equipment, overhead, etc.). CLIMAX cannot foresee where this machine will be used; therefore, you must perform a site-specific risk assessment (Section 1.5 on page 4) for each job before starting work.

The FF5300 machine has remote operation features that enable you to choose the optimum location to work from.

WARNING

Always follow safe work practices, including site-specific safety requirements. It is your responsibility to perform a risk assessment before you set up the machine and each time before you operate the machine.

Do the following checks before operating the machine:

- 1. Complete the risk assessment checklist in Table 1-3 on page 5.
- 2. Check that all preventative maintenance is complete (Section 5) and the drip rate is set correctly on the pneumatic conditioning unit (PCU). Refer to Section 5.4.1 on page 49.
- 3. All energy supplies are <u>off</u> and the emergency reset button is released.
- 4. Check that the work area is clear of non-essential personnel and equipment.
- 5. Check that the machine control/observation area will not be in the path of hot flying chips during machine operation.
- 6. Check the machine is securely mounted to the workpiece.

- 7. Check that all the machine parts are secure, including the tool head, tool bit, chucks, and clamps.
- 8. Check that the feed direction and rate are set correctly (Section 3.13 on page 37).

Check the machining arm is securely clamped to the main body and that it will not hit any obstructions around the workpiece. Check that there is clearance by manually rotating the machine one full revolution.

9. Check that all the lines, cables, and hoses are properly connected and secured away from moving parts.

WARNING

Broken air lines can whip around, striking the operator or bystanders. Always check that the supply lines to the machine are secure and cannot be hit by moving parts.

- 10. Check the tool condition and sharpness.
- 11. Check that the tool head is set at the desired angle and is tight.
- 12. Check all hand tools are removed from inside the machine and the work area.



Metal chips and other debris can damage the machine and degrade its performance. Ensure all metal chips and other debris are removed from the machine before and after each use.

4.2 MACHINING

The machine will rotate clockwise when viewed from above. Follow all normal flange facer operating procedures and pre-run checks.

See Section 2.2 on page 11 for information on the location and function of the controls. See Section 3.13 on page 37 for information on the feed box.

A DANGER

To avoid serious injury to hands or arms, do not reach inside the swing of the machining arm during operation or while the machine is energized.

CAUTION

If the machine stops moving unexpectedly, de-pressurize and lock out the pneumatic safety valve located on the PCU before performing any troubleshooting.

Refer to the PCU controls described in Section 2.2 on page 11.

Do the following to operate the machine after the setup steps are complete:

- 1. Push the START button on the PCU.
- 2. Use the SPEED ADJUSTMENT VALVE to turn on the drive motor and to adjust the drive motor speed to achieve the desired rotation rate.
- 3. Open the air control valve counter-clockwise until the machine is rotating at the desired RPM.
- 4. Move the feed speed adjustment arm to the desired feed rate setting.
- 5. Allow the flange-facing machine to complete facing the flange.
- 6. Repeat step 1 through step 5 as necessary.

WARNING

Rotating machinery can cause serious injury. Turn off the air control valve and disconnect the air line before removing chips. Remove chips with a brush.

TIP:

When the cut is complete, the best practice is to first stop the feed and then stop the machine rotation.

4.3 ADJUSTING THE MACHINE WHEN THE CUT IS COMPLETED

Do the following to adjust the machine when the cut is completed:

1. Check that all power sources to the machine drive are isolated and locked out.



The cutting tools can get hot during machining. Wear gloves or other protective personal protective equipment and be careful of hot surfaces to avoid burns.

- 2. Adjust the machine direction, depth of cut, or tool position as needed.
- 3. Start the machine and feed again to start a new cut.
- 4. Repeat until the desired surface is achieved.

4.4 DISASSEMBLY

WARNING

If not properly secured, this machine can fall and cause fatal injuries to personnel. Pay special attention to vertical flange installations.

The machine must be properly rigged and attached to a crane or other suitable lifting apparatus before beginning any disassembly steps. Use supplemental rigging as a precaution.

Do the following to remove the machine from the workpiece:

- 1. De-energize the machine.
- 2. De-pressurize the air system by disconnecting the air supply to the PCU.
- 3. Disconnect the air hoses from the machine.
- 4. Retract the tool from the work piece.
- 5. Remove the tool bit, being careful of hot surfaces.
- 6. Using the supplied hoist ring, attach lifting equipment to the machine.
- 7. Install setup fingers to each ID chuck foot.
- 8. Loosen and retract the ID chuck feet.
- 9. Remove the machine from the work piece.

5 MAINTENANCE

IN THIS CHAPTER:

5.1 MAINTENANCE CHECKLIST
5.2 LUBRICATING THE MACHINE
5.3 APPROVED LUBRICANTS
5.4 MAINTENANCE TASKS
5.4.1 CHECK THE PCU OIL RESERVOIR LEVELS
5.4.2 Empty the Air Filter water trap
5.4.3 PCU EMERGENCY STOP CHECK
5.4.4 PCU drop-out circuit check
5.4.5 DOVETAIL WAYS MAINTENANCE
5.4.6 Leadscrew maintenance
5.4.7 Adjust the dovetail ways gib screws
5.5 TROUBLESHOOTING
5.5.1 The machine isn't turning
5.5.2 The machine isn't feeding
5.5.3 The machine is performing poorly
5.5.4 The machine is not cutting flat
5.6 DECOMMISSIONING

5.1 MAINTENANCE CHECKLIST

This chapter explains periodic maintenance intervals and tasks and provides troubleshooting guidance.



Failure to properly clean and maintain the machine can result in machine damage and void the warranty.

Always keep moving machine parts clear of metal chips.

Following the required maintenance schedule is critical to obtaining normal machine life.

Keep all machine components in clean, working condition.

Check that parts such as the mounting surfaces, hydraulic fittings, and the tools themselves are free of metal chips, nicks, and burrs.

To prevent corrosion, thoroughly rinse with fresh, clear water any machine parts that are exposed to salt water.

Table 5-1 lists maintenance intervals and tasks, along with the section where each task is described.

TABLE 5-1. MAINTENANCE INTERVALS AND TASKS

Interval	Task	See section
	Check the pneumatic conditioning unit (PCU) oil reservoir levels.	5.4.1
Before each use	Check the pneumatic lines for damage and wear.	
Delore each use	Perform a PCU emergency stop check.	5.4.3
	Perform a PCU drop-out circuit check.	5.4.4
Before and after each use	Remove debris, oil, and moisture from machine surfaces.	
Delore and alter each use	Perform leadscrew maintenance.	5.4.6
After each use	Perform dovetail maintenance.	5.4.5
Periodically	Empty the air filter water trap.	5.4.2
	Perform leadscrew maintenance.	5.4.6
As needed	Adjust the dovetail gib screws.	5.4.7
	Lubricate the worm gear interface.	

5.2 LUBRICATING THE MACHINE

Table 5-3 on page 48 provides information on recommended lubricants.



The more frequently oil is used to lubricate the leadscrew and nuts, the longer they will last.

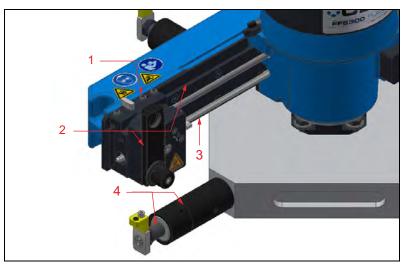


FIGURE 5-1. LUBRICATION LOCATIONS

TABLE 5-2. LUBRICATION LOCATIONS IE	DENTIFICATION
-------------------------------------	---------------

Number	Component	Function	
1	Thrust bearings	The thrust bearings are lubricated at the factory and should not need further lubrication.	
2	Dovetail ways	Lubricate the rectangle and dovetail ways daily during machine use, with AW 32 or equivalent.	
3	Leadscrew	Lubricate the leadscrew weekly during machine use, with Nook E-100 spray lube or equivalent.	
4	Mount legs and jacking screws	Lubricate the mount legs and jacking screws weekly during machine use and before storage, with Moly Grade Anti-Seize or equivalent.	

5.3 APPROVED LUBRICANTS

CLIMAX recommends using the following lubricants at the locations indicated. Failure to use the appropriate lubricants can result in damage and premature machine wear.



Avoid damage, premature machine wear, and protect your warranty by using only approved lubricants.

TABLE 5-3. APPROVED LUBRICANT	ſS
-------------------------------	----

Application Area	Lubricant	Biodegradable Lubri- cant	Viscosity (cSt)	Quantity
		Frequently		
Dovetail and square-	AW 32 hydraulic oil	CONOCO Ecoterra 32 or Castrol BioBar 32	32 @ 40 °C	As required
ways			6 @ 100 °C	
Unpainted surfaces	LPS 2	N/A	38 @ 25 °C	As required
		Each Use		
	AWS-46 hydraulic oil	CONOCO Ecoterra 46	46 @ 40 °C	As required to fill
Hydraulic power unit	(summer)	or Castrol BioBar 46	8 @ 100 °C	reservoir to mid-sight glass
	AWS-32 hydraulic oil	CONOCO Ecoterra 32	32 @ 40 °C	level. Replace oil
	(winter)	or Castrol BioBar 32	6 @ 100 °C	every two years. ^a
		Weekly		
PCU	AMA 22 hudroulie eil	N/A	32 @ 40 °C	Refill oil lubricator
FCO	AW 32 hydraulic oil		6 @ 100 °C	
	Dry film graphite lubricant ^b	N/A	N/A	Light coating applied by hand
Leadscrew	AW 32 hydraulic oil	CONOCO Ecoterra 32 or Castrol BioBar 32	32 @ 40 °C	
			6 @ 100 °C	
Chuck jacking screws	Moly Grade Anti-Seize	N/A	N/A	1 cc per screw
		Yearly		
Main body gear drive	Moblith SHC 460	N/A	460 @ 40 ℃	As required
Feed drive gearbox	Moblith SHC 460	N/A	129 @ 40 ℃	5 cc
Lower spindle bear- ing	Moblith SHC 460	N/A	414 @ 40 °C	As required
Storage				
Unpainted surfaces	LPS 2	N/A	7 @ 25 °C	As required
Unpainted surfaces	LPS 3	N/A	N/A	As required
Chuck jacking screws	Moly Grade Anti-Seize	N/A	N/A	1 cc per screw

 TABLE 5-3. APPROVED LUBRICANTS

Application Area	Lubricant	Biodegradable Lubri- cant	Viscosity (cSt)	Quantity
Machine surfaces	LPS PreSolve Orange degreaser (cleaner to remove LPS 3)	N/A	N/A	As required

a. Always replace hydraulic filters when replacing hydraulic oil. Never assume that oil in drums is clean. Always pump oil through a 5 micron hydraulic filter before/while filling reservoir.

b. Dry film graphite lubricant is preferred on the leadscrew because wet lubricants can attract debris and particulates.

5.4 **MAINTENANCE TASKS**

5.4.1 Check the PCU oil reservoir levels

Do the following to check the PCU oil reservoir levels:

- 1. Check the PCU oil reservoir levels.
- 2. Refill as necessary. See Table 5-3 for information on recommended lubricants.
- 3. Check that the oil drip rate is set at six drops per minute (Figure 2-2 on page 12).

5.4.2 Empty the air filter water trap

Check and drain the water from the air filter water trap.

5.4.3 PCU emergency stop check

Do the following to check the PCU emergency stop:

- 1. With the machine running, press the emergency stop button (Figure 2-2 on page 12).
- 2. Check that the machine stops.
- 3. Reset the emergency stop by pulling the button up.
- 4. Check the machine doesn't restart.

5.4.4 PCU drop-out circuit check

The PCU drop-out circuit prevents the machine from restarting unexpectedly after air supply to the PCU is lost and restored.

Do the following to check the PCU drop-out circuit:

- 1. Check that the PCU is connected to an air supply and to the FF5300.
- 2. Check that the air-supply lock-out is open (pulled up).
- 3. Press the START button.

- 4. Slowly open the PCU speed adjustment valve until the rotary drive engages.
- 5. Close (press down) the lock-out valve.
- 6. Check that the FF5300 stops.
- 7. Open the lock-out valve.
- 8. Check that the machine does not automatically restart when the lock-out valve is re-opened in step 7.



Do not operate the machine if the PCU starts in step 8. Contact Climax for service recommendations.

5.4.5 Dovetail ways maintenance

Lightly lubricate the dovetail ways after cleaning and after each work session. This helps protect the machine precision surfaces from corrosion. See Figure A-7 on page 62 and Figure A-11 on page 66 for the locations of the dovetail ways.

5.4.6 Leadscrew maintenance

Do the following to maintain the leadscrew:

- 1. Lightly lubricate the leadscrew after cleaning, after each work session, and periodically during operation to ensure smooth travel. For leadscrew locations, see Figure A-7 on page 62 and Figure A-11 on page 66.
- 2. During operation, clean ball screws and ACME leadscrews frequently to prevent thread damage to nut and leadscrew.

5.4.7 Adjust the dovetail ways gib screws

Adjusting the dovetail slide on the tool head is done using three M6 x 1.0 gib screws. For screw locations, see Figure A-11 on page 66.

Adjusting the dovetail ways on the machining arm is done using three M6 x 1.0 gib screws. For screw locations, see Figure A-11 on page 66.

The radial slide (gib screws) must be snug for the best cutting performance. Approximately 10 in-lbs (1.13 Nm) of torque is necessary to turn the radial travel leadscrew.

Adjustment should be necessary only after many hours of use and only if the machine is no longer producing a good finish.

If a slide is visibly loose and causing machining problems, tighten the gib screws in small increments. There should be 10 in-lbs (1.13 Nm) of drag on the radial leadscrew and a slight drag on the manual feed handle.

5.5 **TROUBLESHOOTING**

This section is intended to help you solve basic machine performance problems. For serious maintenance or if you have questions on the following procedures, contact Climax.

5.5.1 The machine isn't turning

If the machine is not rotating, check the following:

- 1. The power source is connected and energized.
- 2. The emergency stop is reset (Section 5.4.3 for PCU).
- 3. The air regulator is open and not broken (Figure 2-2 on page 12).
- 4. There is air pressure entering and leaving the PCU. Check the air pressure by disconnecting the hose quick disconnects and checking for air bleed (Figure 2-2 on page 12).
- 5. The throttle valve is open (Figure 2-3 on page 13).
- 6. All the quick disconnects are fully engaged (Figure 2-2 on page 12, Figure 2-3 on page 13).
- 7. Check machine movement by first making sure that the power to the machine drive is isolated and locked out, then manually rotate the pneumatic machine clockwise by pushing on the end of the machining arm.

5.5.2 The machine isn't feeding

If the machine isn't feeding properly, do the following:

- 1. Check that the gibs are not locked down on the axis that isn't feeding. It should take about 10 in-lbs (1.13 Nm) to rotate each drive shaft at the end of the arm.
- 2. Check that the shear pins on the feed gear to the hex driver on the machining arm are intact. These are intended to protect the feed mechanism in the event of an overload.

5.5.3 The machine is performing poorly

Check the following if the machine is performing poorly:

- 1. The tool is installed correctly (Section 3.11 on page 34).
- 2. The machine is tight to the chuck and the mount (see Section 3.6 on page 28).
- 3. The machining arm clamp screws are tight (Figure 3-10 on page 30).
- 4. The gib screws on the radial slide and the tool head are adjusted correctly (Section 5.4.7) and the axis that is not being used is locked using the handle.

- 5. The tool head is tight and the adjustable clamp on the tool head (Figure A-11 on page 66) is locked on the axis that is not being used (Section 3.11 on page 34).
- 6. The tool head swivel is tight (Figure 3-18 on page 35).
- 7. The cutting tool or insert is sharp and has the correct geometry for the material and type of cut.
- 8. The speed and feed rates are set correctly. If necessary, experiment with different speeds and feed rates. Typically, slower speeds and shallower cuts produce less tool chatter.

5.5.4 The machine is not cutting flat

Do the following if the machine is not cutting flat:

- 1. Before making a critical finish pass, run the machine continuously for at least 15 minutes to check that the machine is warmed up to operating temperature.
- 2. Check the machine for level (Section 3.10 on page 33).
- 3. Check that the machining arm is seated securely in the lower clamp blocks and that there is no debris between the arm and the clamps.

5.6 **DECOMMISSIONING**

Do the following to decommission the FF5300 before disposal:

- 1. Drain the oil from the PCU for disposal or recycling through appropriate channels and according to local regulations.
- 2. Dispose of or recycle machine parts according to local regulations.

6 STORAGE AND SHIPPING

IN THIS CHAPTER:

5.1 Storage
6.1.1 Short-term storage
6.1.2 LONG-TERM STORAGE
5.2 Shipping
5.3 Decommissioning

6.1 STORAGE

Proper storage of the flange facer will extend its usefulness and prevent undue damage.

Before storing, do the following:

- 1. Clean the machine with solvent to remove grease, metal chips, and moisture.
- 2. Drain all liquids from the pneumatic conditioning unit.

Store the flange facer in its original shipping container. Keep all packing materials for repackaging the machine.

6.1.1 Short-term storage

Do the following for short-term storage (three months or less):

- 1. Retract the tool head from the workpiece.
- 2. Remove the tooling.
- 3. Remove hoses.
- 4. Remove the machine from the workpiece.
- 5. Clean the machine to remove dirt, grease, metal chips, and moisture.
- 6. Spray all unpainted surfaces with LPS-2 to prevent corrosion.
- 7. Store the flange facer in its original shipping box.

6.1.2 Long-term storage

Do the following for long-term storage (longer than three months):

- 1. Follow the short-term storage instructions, but use LPS-3 instead of LPS-2.
- 2. Add a desiccant pouch to the shipping container. Replace according to manufacturer instructions.
- 3. Store the shipping container in an environment out of direct sunlight with temperature $< 70^{\circ}$ F (21°C) and humidity < 50%.

6.2 SHIPPING

The flange facer can be shipped in its original shipping container.

6.3 **DECOMMISSIONING**

To decommission the flange facer prior to disposal, remove the drive assembly from the RDU and dispose of the drive assembly separately from the rest of the machine components. Refer to Appendix A for component assembly information.

APPENDIX A ASSEMBLY DRAWINGS

Drawing list

Table A-1. P/N 90337 revision identification by serial number
Figure A-1. FF5300 assembly 1 (P/N 89900)
Figure A-2. FF5300 assembly 2 (P/N 89900)
Figure A-3. FF5300 assembly detail A (P/N 89900)
Figure A-4. FF5300 assembly 3 (P/N 89900)
Figure A-5. FF5300 assembly parts list 1 (P/N 89900)
Figure A-6. FF5300 assembly parts list 1 (P/N 89900)61
Figure A-7. Machining arm assembly (P/N 90337 revision D)
FIGURE A-8. MACHINING ARM ASSEMBLY PARTS LIST (P/N 90337 REVISION D)
Figure A-9. Machining arm assembly (P/N 90337 revision E)
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Figure A-11. Tool holder assembly (P/N 89940)66
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Figure A-13. ID Chuck assembly (P/N 89990)68
Figure A-14. ID chuck assembly parts list (P/N 89990)
Figure A-15. Counterweight assembly (P/N 90252)
Figure A-16. PNEUMATIC MOTOR ASSEMBLY (P/N 90060)
Table A-2. Two-year spare parts kit P/N 91597 (sold separately)
Table A-3. Tool kit P/N 90350
TABLE A-4. ACCESSORIES

NOTICE

For the machining arm assembly (P/N 90337), there are two versions shown (D and E) that apply based on your machine's serial number.

Take note of the serial number plate (P/N 35740) on your machine part, then use Table A-1 to determine which revision applies to your machine.

TABLE A-1. P/N 90337 R	REVISION IDENTIFICATION BY SERIAL NUMBER
------------------------	--

Machine part number	Machine part description	Serial number identification	Applicable 90337 revision
91789	MODEL FF5300 FLANGE FACER 5.7 TO 32 & 5.7 TO 40 (DUAL ARMS) AIR	SN20000505 and below	90337 revision D
		SN20000506 and above	90337 revision E
90791	MODEL FF5300 FLANGE FACER 5.7 TO 32 AIR	SN20000491 and below	90337 revision D
		SN20000492 and above	90337 revision E
90792	MODEL FF5300 FLANGE FACER 5.7 TO 40 AIR	SN20000683 and below	90337 revision D
		SN20000684 and above	90337 revision E

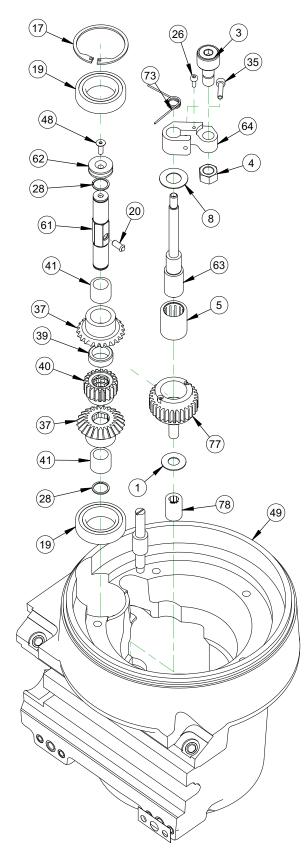


FIGURE A-1. FF5300 ASSEMBLY 1 (P/N 89900)

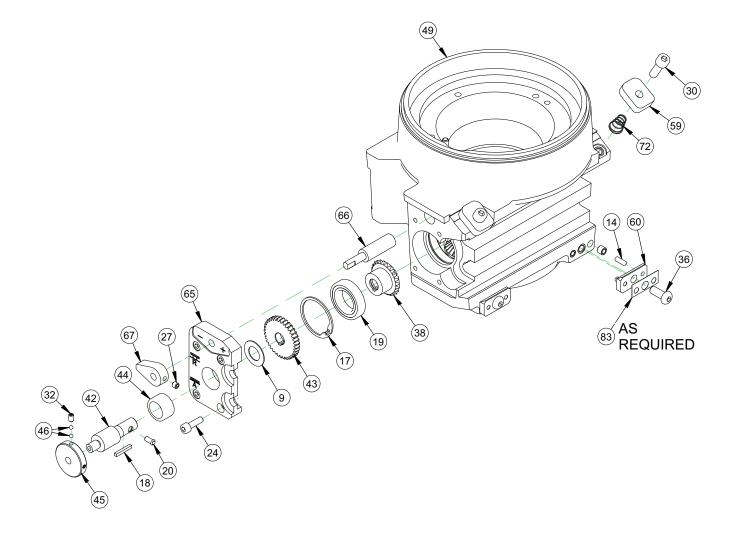


FIGURE A-2. FF5300 ASSEMBLY 2 (P/N 89900)

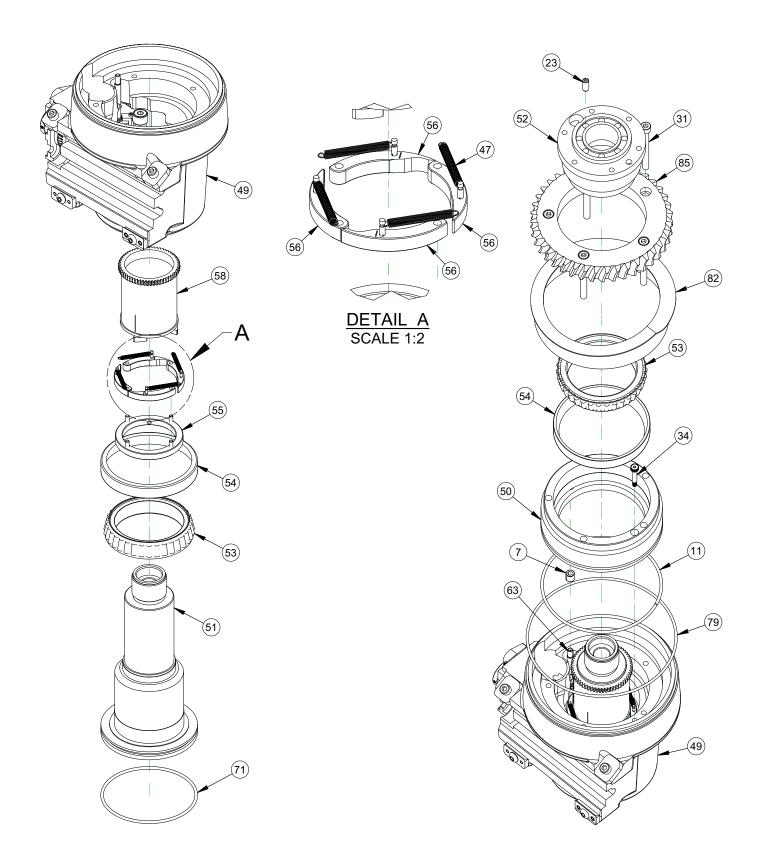


FIGURE A-3. FF5300 ASSEMBLY DETAIL A (P/N 89900)

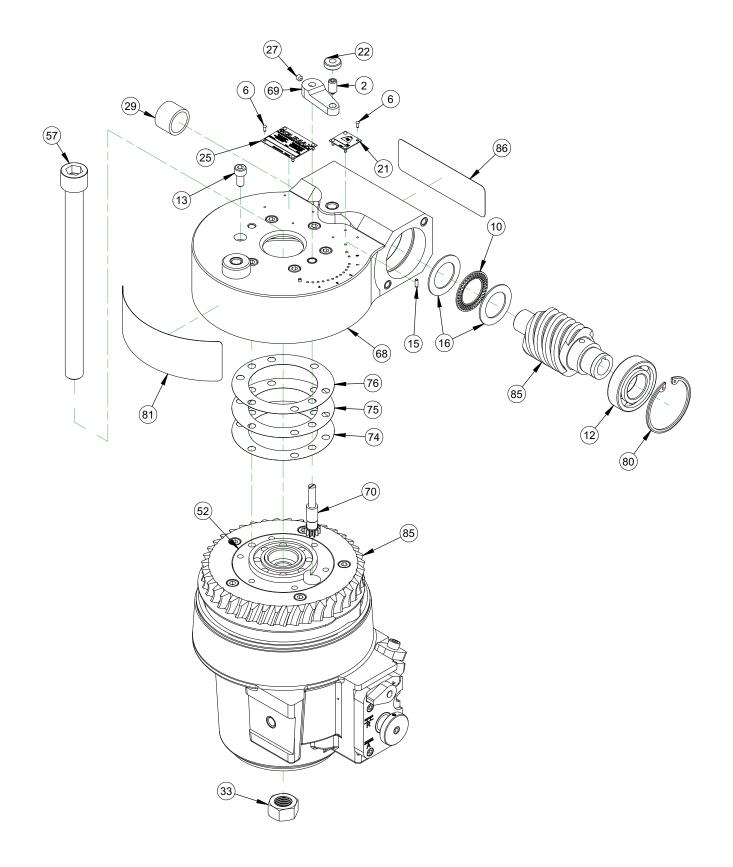


FIGURE A-4. FF5300 ASSEMBLY 3 (P/N 89900)

ITEM	QTY	P/N:	DESCRIPTION		
1	1	10058			
2	1	10038	WASHER THRUST .375 ID X .812 OD X .032 SPRING PLUNGER 3/8-16 HEAVY FORCE		
3	1	10535	BRG CAM FOLLOWER .750 OD X .500 WIDE W/ STUD		
4	1	10536	NUT 3/8-24 STDN		
5	1	10539	3RG ROLLER CLUTCH 5/8 ID X 7/8 OD X 1.000		
6	8	10539	SCREW DRIVE #2 x 1/4 HOLE SIZE .089		
7	0 1				
8	1	11047 11736	BRG NEEDLE 1/4 ID X 7/16 OD X .438 OPEN WASHER THRUST .500 ID X .937 OD X .030		
9	1	11823	WASHER THRUST .500 ID X .337 OD X .030		
10	1	12387	BRG THRUST 1.259 ID X 1.937 OD X .0781		
10	18.5	12387	RING O 1/8 CROSS SECTION MATERIAL (CUT 18.5 LG)		
12	1	13078	BRG BALL 1.1811 ID X 2.4409 OD X .6299 2 SEALS		
13	6	13787	SCREW M8 X 1.25 X 16mm		
14	4	13948	PIN DOWEL 3/16 DIA X 1/2		
15	2	14248	PIN DOWEL HARDENED .125 X 3/8		
16	2	16666	WASHER THRUST 1.250 ID X 1.937 OD X .060		
17	2	17857	RING SNAP INT. 42MM X .062		
18	1	17862	KEY 1/8 SQ X .87 BOTH ENDS		
19	3	21295	BRG BALL .9843 ID X 1.6535 OD X .3543 W/SEALS		
20	2	26828	PLUNGER BALL PUSHFIT		
21	1	29152	PLATE MASS CE		
22	1	30558	NUT 3/8-16 FINGER CHECK NUT		
23	8	30596	SCREW 5/16-24 X 3/4 SSSFP		
24	4	35009	SCREW M6 X 1.0 X 20 SHCS		
25	1	35740	PLATE SERIAL YEAR MODEL 1.5 X 2.0		
26	1	35994	SCREW M3 X 0.5 X 8mm SHCS		
27	2	36150	SCREW M6 X 1.0 X 6mm SSSCP		
28	2	38648	RING SNAP 1/2 OD X .035 TH SPIRAL HEAVY DUTY (VMI)		
29	1	41171	BRG NEEDLE 1 ID X 1-1/4 OD X .875 SEALED		
30	2	42494	SCREW M8 X 1.25 X 25mm SHCS		
31	5	52936	SCREW M8 X 1.25 X 80MM SHCS		
32	2	54724	SCREW M5 X 0.8 X 8MM SSSFP		
33	1	56502	NUT M20 X 2.5 X 16mm HIGH		
34	1	57581	SCREW 6MM DIA X 25MM X M5 X 0.8 SHLDCS		
35	1	58672	SCREW M4 X 0.7 X 16MM SHCS		
36	2	59184	SCREW M8 X 1.25 X 20 MM BHSCS ZINC COATED		
37	2	74253	GEAR BEVEL 16 DP 24T 1:1 20PA STL KEYWAY MODIFIED HEX BORE		
38	1	74255	GEAR BEVEL 16DP 24T 1:1 20PA STL MODIFIED KEYWAY		
39	1	74262	SPACER GEAR .85 IN HEX BORE		
40	1	74266	GEAR SPUR 20DP 20T 20PA 1/2 FACE MODIFIED .75LG HEX ID		
41	2	74277	BRG NEEDLE 1/2 ID X 11/16 OD X .562 ONE SEAL		
42	1	74280	SHAFT RADIAL AXIAL SHAFT		
43	1	74299	GEAR SPUR 20 DP 35T 20PA MODIFIED .25 FACE		
44	1	74633	BRG NEEDLE 3/4 ID X 1 OD X .562 ONE SEAL		
45	1	76756	KNOB KNURLED 1.5 OD X 3/8-16 ID THDS		
46	4	76945	BALL NYLON 5/32 DIA		
47	4	79528	SPRING EXT .188 OD X .023 WIRE X 1.75 LONG		
48	1	82934	SCREW M4 X 0.7 X 12MM FHSCS ZINC		

FIGURE A-5. FF5300 ASSEMBLY PARTS LIST 1 (P/N 89900)

ITEM	QTY	P/N:	DESCRIPTION
49	1	89899	HOUSING FF5300
50	1	89901	RING BRG SUPPORT
51	1	89902	SPINDLE FF5300
52	1	89903	PLATE SPINDLE TOP
53	2	89904	BRG CONE 3.500 ID X .8125 WIDE
54	2	89905	BRG CUP 4.8750 OD X .6563 WIDE
55	1	89906	RING CAM PIVOT
56	2	89907	CAM SEGMENT PAIR
57	1	89908	SCREW M20 X 2.5 X 260MM SHCS CLASS 12.9
58	1	89912	SPOOL CAM OUT GEARED
59	2	89913	CLAMP BAR TURNING ARM TOP
60	2	89914	CLAMP BAR TURNING ARM BOTTOM
61	1	89915	SHAFT BEVEL GEAR FEED DIRECTION
62	1	89916	WASHER GROOVED
63	1	89917	SHAFT CAM GEAR
64	1	89918	ARM CAM FOLLOWER
65	1	89919	COVER PLATE FEED CONTROL
66	1	89921	SHAFT DIRECTION SHIFTER
67	1	89922	LEVER SHIFTER
68	1	89984	HOUSING COVER FF5300
69	1	89989	LEVER FEED ADJUST
70	1	89992	PINION FEED ADJUST 20DP 12T
71	1	90016	RING O 1/8 X 4-5/8 ID X 4-7/8 OD
72	2	90019	SPRING COMP CONICAL .6 OD X .323 ID X .026 WIRE X .75 LONG SS
73	1	90051	SPRING TORSION .453 OD X .045 WIRE LEFT HAND
74	A/R	90262	SHIM 3.03 ID X 4.5 OD .002 THICK
75	A/R	90263	SHIM 3.03 ID X 4.5 OD .005 THICK
76	A/R	90336	SHIM 3.03 ID X 4.5 OD .010 THICK
77	1	91012	GEAR SPUR FEED CLUTCH
78	1	91019	BRG ROLLER CLUTCH 8MM ID X 14MM OD X 20MM
79	1	91021	RING O 1/8 X 7-3/8 ID X 7-5/8 OD
80	1	91022	RING SNAP 2-7/16 ID BEVELED X .078 TH
81	1	91585	LABEL FF5300 HOUSING 2-1/8 X 7
82	1	91807	WIPER RING GREASE FF5300
85	1	91978	SET WORM GEAR 10:1 FF5300 1PC WORM
86	1	95399	LABEL FF5300 HOUSING 5.38 X 1.66
84	4	91972	BUSHING DRILL 3/16 (.1890) ID X 5/16 OD X 1/4
83	A/R	91971	SHIM TURNING ARM CLAMP

FIGURE A-6. FF5300 ASSEMBLY PARTS LIST 1 (P/N 89900)

NOTICE

Figure A-7 and Figure A-8 only refer to serial numbers <u>equal to or below</u> SN20000505 for machine part number 97189, <u>equal to or below</u> SN20000491 for machine part number 90791, or <u>equal to or below</u> SN20000683 for machine part number 90792. See Table A-1 on page 55 for more information.

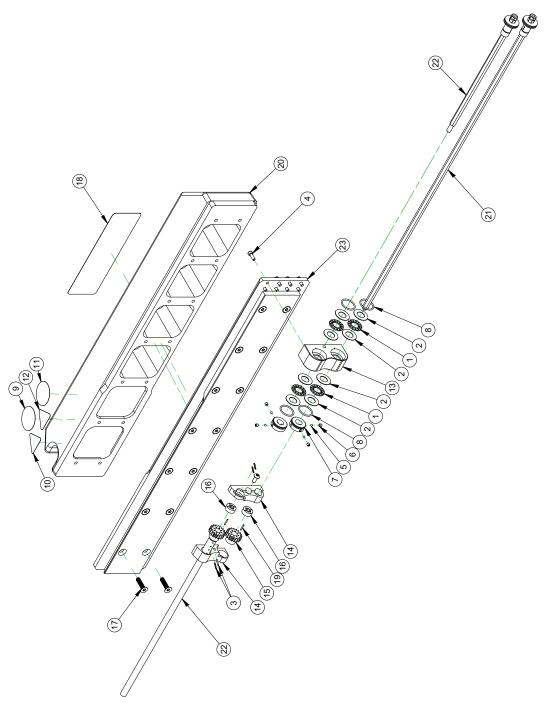


FIGURE A-7. MACHINING ARM ASSEMBLY (P/N 90337 REVISION D)

|--|

FIGURE A-8. MACHINING ARM ASSEMBLY PARTS LIST (P/N 90337 REVISION D)

 PART NO.
 DESCRIPTION

 90030
 ASSY TURNING ARM 32 IN MAX MACHINING DIA FF5300

 89920
 ASSY TURNING ARM 40 IN MAX MACHINING DIA FF5300

NOTICE

Figure A-9 and Figure A-10 only refer to serial numbers <u>equal to or</u> <u>above</u> SN20000506 for machine part number 97189, <u>equal to or above</u> SN20000492 for machine part number 90791, or <u>equal to or above</u> SN20000684 for machine part number 90792. See Table A-1 on page 55 for more information

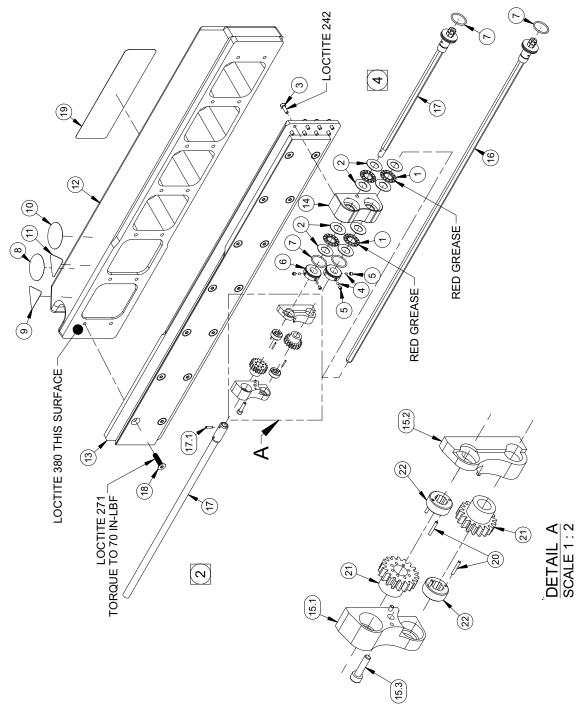


FIGURE A-9. MACHINING ARM ASSEMBLY (P/N 90337 REVISION E)

			UNFIGUE	SNULLAN					
	PART NO.	DESCRIPTION		ITEM 12	12 ITEM 13	13 ITEM 16	ITEM 17 IT	ITEM 18 QTY	
	90030	ASSY TURNING ARM 32 IN MAX MACHINING DIA FF5300	00	89962	2 89948	48 90332	90333	12	
	89920	ASSY TURNING ARM 40 IN MAX MACHINING DIA FF5300	00	89935			89946	14	
						PARI	PARTS LIST		
			ITEM	QTΥ	P/N:		DES(DESCRIPTION	
			-	4	10437	BRG THRUST .500 ID X .937 OD X .0781	500 ID X .937	OD X .0781	
			7	8	11736	WASHER THRUST .500 ID X .937 OD X .030	JST .500 ID X	.937 OD X .030	
6	/		ო	8	36233	SCREW M4 X 0.7 X 12MM SHCS	.7 X 12MM SH	tcs	
	A		4	4	43489	BALL NYLON 1/8 DIA	'8 DIA		
)		5	4	53365	SCREW M4 X 0.7 X 4 mm SSSFP	.7 X 4 mm SS	SFP	
0	U D		9	2	57214	BRG RETAININ	G NUT AXIAL	BRG RETAINING NUT AXIAL FEED LEADSCREW	ΞW
 	}		7	4	57320	RING O 1/16 X 13/16 ID X 15/16 OD	13/16 ID X 15/	16 OD	
0			8	1	59035	LABEL WARNIN	IG - WEAR EY	LABEL WARNING - WEAR EYE PROTECTION	
			6	1	59042	LABEL WARNIN	IG - HAND CR	LABEL WARNING - HAND CRUSH/MOVING PARTS	RTS
9//	0		10	-	59044	LABEL WARNIN	IG - CONSUL ⁻	LABEL WARNING - CONSULT OPERATOR'S MANUAL 1.5 DIA	IANUAL 1.5 DIA
//			11	-	79324	LABEL WARNIN	IG - HAND EN	LABEL WARNING - HAND ENTANGLEMENT/ROTATING	ROTATING
	<u> </u>					GEARS 1.13 TALL TRIANGLE YELLOW	ALL TRIANGLE	E YELLOW	
			12	1	CHART	BACKER TURNING ARM	ING ARM		
			13	-	CHART	PLATE DOVETAIL SLIDE	AIL SLIDE		
			4	-	89938	BLOCK THRUST BEARING	T BEARING		
			15	-	89939	PLATE GEAR HOLDER	OLDER		
			15.1	-	89939-1	GEAR HOLDER HALF	HALF		
			15.2	+	89939-2	GEAR HOLDER HALF	HALF		
			15.3	-	58672	SCREW M4 X 0.7 X 16MM SHCS	.7 X 16MM SH	tcs	
			16	-	CHART	HEX SHAFT ASSY	SY		
			17	-	CHART	LEADSCREW ASSY	SSY		
			17.1	e	97507	PIN SPRING 3/3	32 DIA X 7/16 I	PIN SPRING 3/32 DIA X 7/16 LG 1050-1095 STEEL	EEL
			18	CHART	90195	SCREW M6 X 1.0 X 25MM FHSCS	.0 X 25MM FH	ISCS	
			19	-	91585	LABEL FF5300 HOUSING 2-1/8 X 7	HOUSING 2-1	/8 X 7	
			20	4	94904	PIN DOWEL 1/16 DIA X 7/16 SS	6 DIA X 7/16 5	SS	
			21	2	97549	GEAR SPUR 20DP 18T 20PA .375	DP 18T 20PA	.375	
			22	2	97550	DRIVER COLLAR 5/16 HEX	R 5/16 HEX		

FIGURE A-10. N	ACHINING ARM ASSE	EMBLY PARTS LIST ((P/N 90337	REVISION E)
			(

P/N 91025, Rev. 6

AVAILABLE CONFIGURATIONS

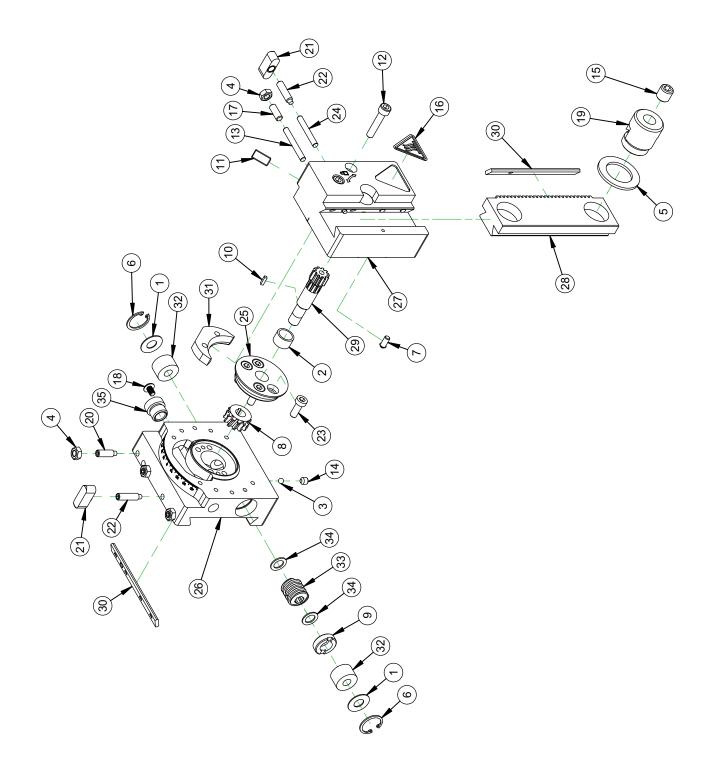


FIGURE A-11. TOOL HOLDER ASSEMBLY (P/N 89940)

			PARTS LIST
ITEM	QTY	P/N:	DESCRIPTION
1	2	10058	WASHER THRUST .375 ID X .812 OD X .032
2	1	14335	BUSHING OILITE 1/2 ID X 5/8 OD X 3/8
3	1	16594	BALL NYLON 3/16 DIA
4	6	20772	NUT M6 X 1.0 STDN ZINC PLATED
5	1	22402	WASHER THRUST 1.000 ID X 1.562 OD X .095
6	2	23669	RING SNAP 13/16 ID
7	1	26828	PLUNGER BALL PUSHFIT
8	1	27812	WORM GEAR .75 PD 16 DP SINGLE RH
9	1	27815	NUT WORM
10	1	29385	KEY 3/32 SQ X 11/32 SQ BOTH ENDS
11	2	35412	SCREW M8 X 1.25 X 16 SSSFP
12	2	35505	SCREW M6 X 1.0 X 30 SHCS
13	3	35600	PIN DOWEL 3/16 DIA X 1-1/2
14	1	36150	SCREW M6 X 1.0 X 6mm SSSCP
15	1	43925	SCREW M12 X 1.75 X 12 SSSFP
16	1	46902	LABEL WARNING HOT SURFACE GRAPHIC 1.13" TALL
17	3	68514	SCREW M6 X 1.0 X 16MM SSSFP
18	1	73447	SCREW M6 X 1.0 X 8MM BHSCS
19	1	74227	CLAMP TOOL BIT
20	3	74296	SCREW M6 X 1.0 X 20MM SSSHDP
21	2	74657	NUT M6 X 1.0 WING
22	2	74658	SCREW M6 X 1 X 25MM SSSDP
23	4	75433	SCREW M6 X 1.0 X 12MM LHSCS 10.9 BLACK
24	1	75817	PIN DOWEL 3/16 DIA X 1-3/8
25	1	80406	DOVETAIL CIRCULAR BOLT ON
26	1	89956	SLIDE RADIAL FEED
27	1	89957	BASE TOOL HEAD
28	1	89958	SLIDE SWIVELING TOOL HEAD
29	1	89959	PINION AXIAL FEED
30	2	89960	GIB .355 X .125 X 3.75 4 SS UNEVEN SP
31	1	89961	CLAMP CIRCULAR DOVETAIL
32	2	90242	FELT SEAL 5/16 HEX SHAFT .79 OD
33	1	90243	DRIVE WORM AXIAL FEED
34	2	90248	WASHER 10mm ID X 18mm OD X 2mm T FLTW BRASS
35	1	90380	NUT LEADSCREW ACME 3/8-8 BRONZE LH

FIGURE A-12. TOOL HOLDER ASSEMBLY (P/N 89940)

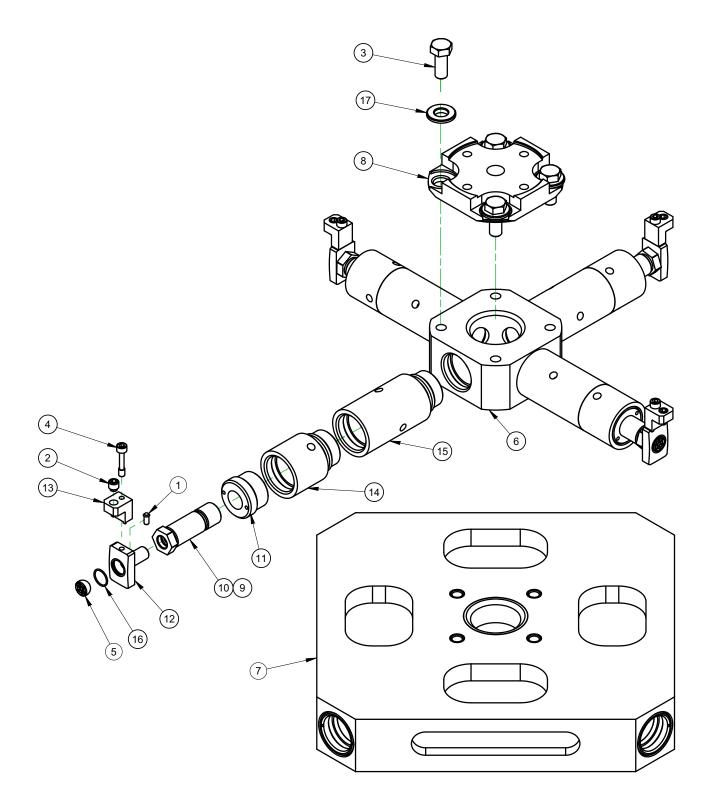
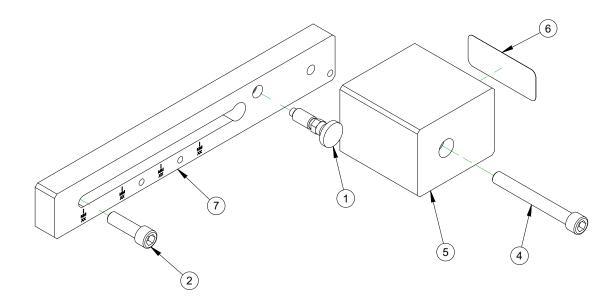


FIGURE A-13. ID CHUCK ASSEMBLY (P/N 89990)

FIGURE A-14. ID CHUCK ASSEMBLY PARTS LIST (P/N 89990)

PARTS LIST					
ITEM	QTY	P/N:	DESCRIPTION		
1	4	26828	PLUNGER BALL PUSHFIT		
	•				
2	4	35915	SCREW M10 X 1.5 X 10MM SSS SOFT TIPPED BRASS		
3	4	64635	SCREW M12 x 1.75 x 30mm HHCS		
4	4	80552	SCREW M6 X 1.0 X 30MM SHCS CAPTIVE 8 THD STAINLESS		
5	4	89943	BALL SWIVEL CONTACT		
6	1	90213	CHUCK HUB 5.7 TO 19		
7	1	90214	CHUCK HUB 16 TO 32		
8	1	90215	PLATE INTERFACE CHUCK/SPINDLE FF5300		
9	4	90216	SCREW JACKING SHORT		
10	4	90217	SCREW JACKING LONG		
11	4	90253	NUT JACKING 1-5/8-8 EXTERNAL		
12	4	90254	JACKING FOOT SWIVEL SOCKET		
13	4	90255	JACKING FOOT SETUP FINGER		
14	8	90256	LEG EXTENSION JACKING 1.70 IN		
15	4	90259	LEG EXTENSION JACKING 3.45 IN		
16	4	91042	O-RING 1.25MM X 16MM ID X 18.5MM OD BUNA N		
17	4	91050	WASHER SPHERICAL 1/2 MALE		



	AVAILABLE CONFIGURATIONS	
PART NO.	DESCRIPTION	ITEM 6
90220	ASSY COUNTERWEIGHT ARM FF5300 (32 & 40 IN TURNING ARM)	PN 90297

			PARTS LIST
ITEM	QTY	P/N:	DESCRIPTION
1	1	29207	SPRING PLUNGER HAND RETRACT 1/2 X 13
2	1	35215	SCREW M12 X 1.75 X 40mm SHCS
3	1	50492	SCREW M12 X 1.75 X 140 MM SHCS (NOT SHOWN)
4	1	58280	SCREW M12 X 1.75 X 100 MM SHCS CL12.9 ZINC COATED
5	1	90223	COUNTERWEIGHT
6	1	95402	LABEL FF5300 COUNTERWEIGHT 3-1/2 X 1-3/8
7	1	SEE CHART	ARM COUNTERWEIGHT

FIGURE A-15. COUNTERWEIGHT ASSEMBLY (P/N 90252)

CONNECT TO CONDITIONING UNIT	PARTS LIST	EM QTY P/N: DESCRIPTION	210 10310	2 1 1 10319 FTG COUPLING 1/2 NPTF X 1/2 NPTF STEEL ZINC PLATED 3 1 1 15398 FTG QUICK COUPLER 3/8B X 3/8 NPTF FEMALE AIR	1 36366	3 37749	2 50458		1 81917	1 84515	2 1 90280 MOTOR AIR 2.45HP 600 RPM FS 310 RPM MAX 42 TQ	3 1 91044 FTG NIPPLE 3/8 NPTM X 3 BRASS	3 91045	1 91127	16 1 91175 FTG ADAPTER BOND SEAL X 3/4 BSPP
CONNECT TC		ITEM ITEM		3	4	15		12	10	11	12	13	14	15	- 16
									(u						

FIGURE A-16. PNEUMATIC MOTOR ASSEMBLY (P/N 90060)

Part number	Description	Quantity
10058	WASHER THRUST .375 ID X .812 OD X .032 (VMI)	2
23669	RING SNAP 13/16 ID X .042 TH	2
35915	SCREW M10 X 1.5 X 10MM SSS SOFT TIPPED BRASS	8
64635	SCREW M12 X 1.75 X 30MM HHCS CL 10.9	8
80552	SCREW M6 X 1.0 X 30MM SHCS CAPTIVE 8 THD STAINLESS	8
89943	BALL SWIVEL CONTACT	8
90216	SCREW JACKING SHORT	2
90217	SCREW JACKING LONG	2
90242	FELT SEAL 5/16 HEX SHAFT .79 OD	2
90253	NUT JACKING 1-5/8-8 EXTERNAL	2
90255	JACKING FOOT SETUP FINGER	2
90380	NUT LEADSCREW ACME 3/8-8 BRONZE LH	1
91042	O-RING 1.25MM X 16MM ID X 18.5MM OD BUNA N	8
91050	WASHER SPHERICAL LEVELING 1/2" MALE HALF BLK OXIDE	8
91596	SP REPAIR KIT ATLAS COPCO LZB66-A007-51	1
94904	PIN DOWEL 1/16 DIA X 7/16 SS	2

TABLE A-2. TWO-YEAR SPARE PARTS KIT P/N 91597 (SOLD SEPARATELY)

TABLE A-3. TOOL KIT P/N 90350

Part number	Description	Quantity
10874	WRENCH END 3/4	1
25710	BIT TOOL HSS 1/2 X 4.0 LH & RH PRE-GROUND	1
31859	BIT TOOL HSS 1/2 X 4.0 LH FINISHING SINGLE TC	1
34866	OIL AIRTOOL COMPLETE	1
35820	WRENCH HEX 5MM X 6 T-HANDLE	1
35821	WRENCH HEX 6MM X 6 T-HANDLE	1
38678	WRENCH HEX SET 1.5 - 10MM BONDHUS BALL END	1
56550	WRENCH HEX 17mm LONG ARM	1
59626	LIFTING EYE M12 X 1.75 X 20.5 30 ID 54 OD 74 OAL 749 LBS 340 KG	2
60880	HAMMER DEAD BLOW 420Z	1

TABLE A-3. TOOL KIT P/N 90350	(CONTINUED)
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Part number	Description	Quantity
63678	HANDWHEEL 3.0 IN MODIFIED 3/8 HEX	1
65183	LUBRICANT ANTI SEIZE MOLY GRAPHITE EXTREME PRESSURE 10 OZ CAN	1
82949	BAG TOOL 14 X 5.5 X 6 POLYESTER	1
83746	WRENCH END 10MM COMBINATION	1
90357	WRENCH END 24MM THIN SINGLE OPEN END	1
90360	WRENCH 18MM X 19MM OPEN END EXTRA THIN 15 DEG	1
90436	WRENCH SPANNER FACE ADJUSTABLE 3MM PIN	1
91885	WRENCH SPANNER SIDE ADJUSTABLE 1/4 PIN	1
94904	PIN DOWEL 1/16 DIA X 7/16 SS	2

Accessories

The adjustable leveling feet kit (P/N 91590) expedites leveling of the base machine without impacting the center position of the machine. An adjusting screw located within the leveling foot moves each foot up or down for faster set-up and leveling adjustment. These feet are also quick-connect style so that they are easily installed in place of the standard FF5300 chuck feet.

TABLE A-4. ACCESSORIES

Part number	Description	
90030	FF5300 Turning Arm Assembly, Cutting Range: 5.7 to 32 (144.8 - 812.8 mm)	
89920	FF5300 Turning Arm Assembly, Cutting Range: 5.7 to 40 (144.8 - 1016 mm)	
91591	Surface Finish Comparator, 2 to 500 micro in, 22 samples, w/ case.	
91590	Adjustable Leveling Feet Kit (Includes 4EA adjustable feet, PN 91589, for bore IDs 7.5 - 35.8 in (190.5 - 909.3 mm)	
83242	Alignment Kit, Metric (includes metric dial indicator and magnetic base)	
83241	Alignment Kit, Inch (includes imperial dial indicator and magnetic base)	
91597	FF5300 2 Years Recommended Spares Kit. Contains assorted critical spare parts.	
Additional tooling		
HSS tooling		
91572	HSS Tool Bit 1/2 X 4.0 (12.7 x 101.6 mm) RH Roughing	
25710	HSS Tool Bit 1/2 X 4.0 (12.7 x 101.6 mm) LH & RH Pre-Ground	

TABLE A-4. ACCESSORIES (CONTINUED)

Part number	Description			
Carbide tooling				
91578	Carbide insert starter kit (includes 3EA Holders [left, right, neutral])			
	Recommended carbide inserts: (5EA) PN 91573 & (5EA) PN 63543			
47667	Insert Holder 40° LEAD 1/2 X 3 1/2 (12.7 x 88.9 mm) 80° Diamond 3/8 (9.5 mm) IC			
52862	Insert Holder RH 1/2 X 3 1/2 (12.7 x 88.9 mm) 80° Diamond 3/8 (9.5 mm) IC			
52863	Insert Holder LH 1/2 X 3-1/2 (12.7 x 88.9 mm) 80° Diamond 3/8 (9.5 mm) IC			
91588	Carbide Insert Replacement Kit:			
	Includes (5EA) PN 91573 & (5EA) PN 63543.			
91573	INSERT 80 DEG DIAMOND 3/8 IC 0.0079 NOSE RADIUS KC5410			
63543	INSERT 80 DEG DIAMOND 3/8 IC 1/64 NOSE RADIUS KC5010			

APPENDIX B SDS

Contact CLIMAX for the latest Safety Data Sheets.

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