

*Technical Documentation
for Non-Rotating Precision
Air Chucks*

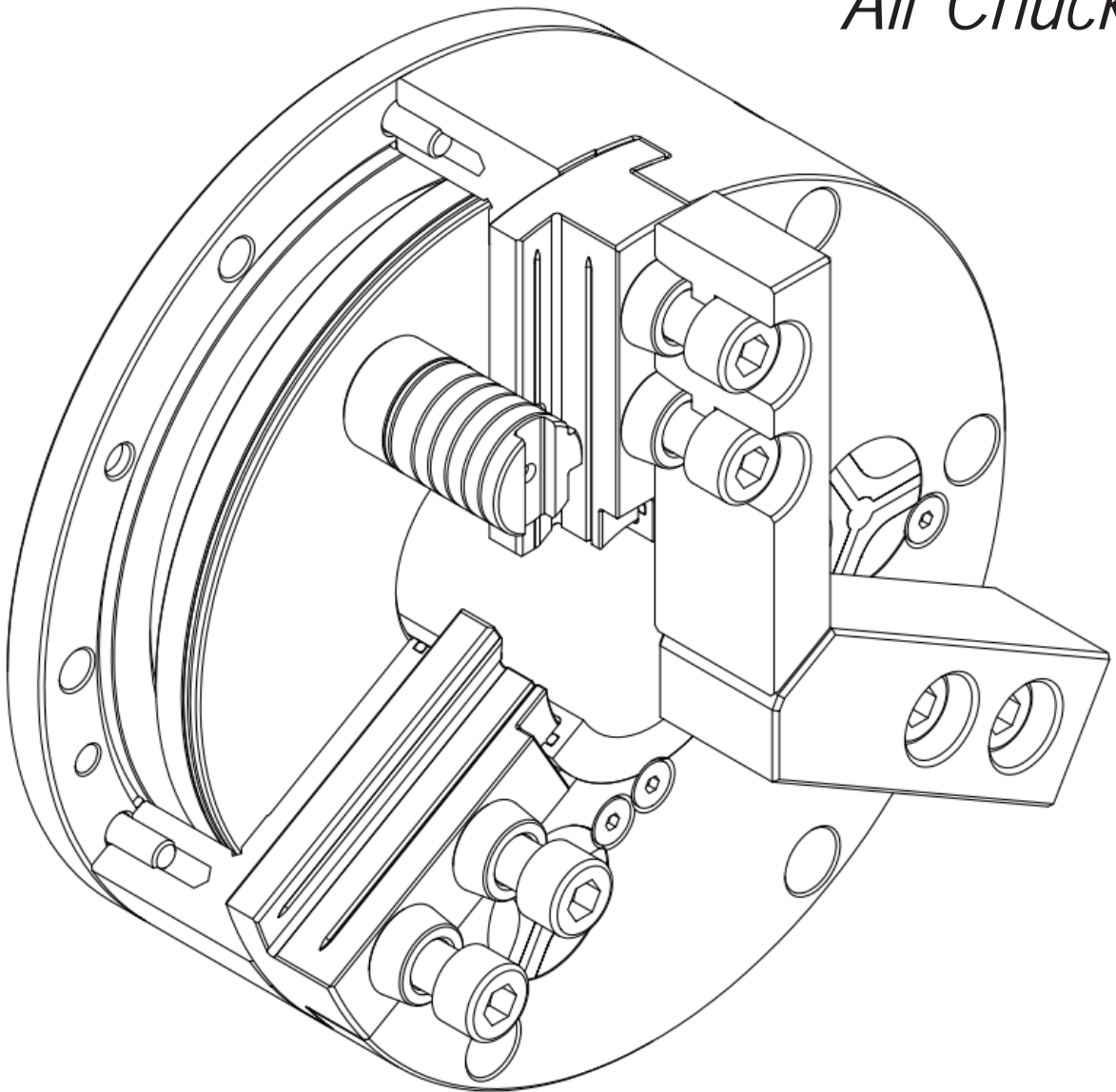


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1.0 CONTACT AND SERVICE INFORMATION

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2.0 INTRODUCTION

The ultimate high precision air chuck, MicroCentric air chucks offer unmatched accuracy and long term performance. Their advanced design, high quality hardened alloy steels, and MicroCentric's renowned precision manufacturing capability result in a chuck of unmatched quality.

The information contained in this manual will enable you to obtain the best possible accuracy and long term performance from your MicroCentric air chuck. This manual is also available for download at microcentric.com.

	SAFETY ALERT SYMBOL
	This symbol is used to call attention to items that could be dangerous to you or persons using this equipment. Please read these messages and follow these instructions and safety regulations before use.
	 DANGER
	Indicates an imminent hazardous condition which, if not avoided, could result in serious injury or death.
	 WARNING
	Indicates a potentially hazardous condition which, if not avoided, could result in serious injury or death.
	 CAUTION
	Indicates a potentially hazardous condition which, if not avoided, could result in injury.
	IMPORTANT
	Instructions for optimum performance and avoiding errors or misuse of chuck.

3.0 PRECAUTIONS FOR SAFE OPERATION



DANGER



Switch off power to the machine before installing or changing the chuck.

- The machine may inadvertently be switched on, and the turret indexed or jogged, potentially causing serious injury to the operator.



DANGER



Do not operate the control valve (foot pedal) or solenoid valve during machine operation.

- The workpiece will be thrown from the chuck, potentially causing serious injury to the operator.



DANGER



Always lift the chuck by using an eyebolt or lifting belt, and stand clear of suspended loads.

- The operator can be injured and the chuck can be damaged if the chuck is dropped.



DANGER



Never wear gloves, loose clothing, or ties while operating a machine tool. Secure long hair.

- Gloves, loose clothing, ties, and long hair can become caught in the chuck causing serious injury to the operator.



WARNING



Do not start the machine with the door open.

- The operator could be injured by cutting chips or other flying debris.



WARNING



Do not exceed the maximum recommended air pressure for a specific chuck model.

- The workpiece can be thrown from the chuck as a result of damage to the chucks actuating mechanism.



WARNING



Make certain the mounting bolts are securely tightened to the recommended torque values.

- The chuck could become loose during operation causing damage to the chuck and potentially throwing the workpiece from the chuck.



WARNING



Disassemble and clean chuck according to Section 12.0.

- Failure to properly disassemble and clean the chuck can lead to insufficient clamping force, and the workpiece can be thrown from the chuck.



WARNING



Never attempt to operate a machine tool while under the influence of drugs or alcohol.

- Damage to the machine, tooling, and chuck, or serious injury to the operator could result.



WARNING



Remember to lubricate the chuck at regular intervals as specified in this manual.

- The workpiece can be thrown from the chuck due to a loss of gripping force caused by insufficient lubrication.



WARNING



Do not attempt to modify the chuck.

- The workpiece can be thrown from the chuck due to damage which may be caused to the chuck.



WARNING



Always make sure to keep your hands and fingers clear of the top jaws and workpiece as the chuck is clamped.

- The operator can be seriously injured if a finger or hand is clamped between the top jaw and the workpiece.



WARNING



Remove eyebolts after use.

- Operating the chuck without removing eye bolts may cause them to be thrown from the chuck, potentially causing serious injury.



CAUTION



Do not touch machined workpieces with bare hands.

- Machined workpieces may be very hot, and may cause burns.



CAUTION



Ensure workplace is clean.

- Danger of slipping and falling from a dirty floor, such as lubricants or oil.



CAUTION



Remove workpiece when stopping the machine for an extended period of time.

Clamping force may be lost unexpectedly, causing the workpiece to drop.

4.0 TIGHTENING TORQUE FOR MOUNTING SCREWS

SOCKET HEAD CAP SCREW SIZE (CLASS 12.9)	M5	M6	M8	M10	M12	M14	M16	M20
TIGHTENING TORQUE [N*m]	7.5	13	33	73	107	171	250	402
TIGHTENING TORQUE [lb*ft]	5.5	9.6	24	54	79	126	184	297

5.0 NON-ROTATING AIR CHUCK SPECIFICATIONS

Chuck Size	Chuck Model	No. of Jaws	Chuck Accuracy	Jaw Stroke	Maximum Clamp Force	Maximum Air Pressure	Through Hole Dia.	Chuck Weight
3 inch 80mm	3-50NR-3	3	.00005" 0.0012mm	.050" 1.3mm	920 lb 4.1 kN	100 psi 0.7 Mpa	N/A	3.0 lb 1.4 kg
	3-50NR12-3	3	.00005" 0.0012mm	.050" 1.3mm	920 lb 4.1 kN	100 psi 0.7 Mpa	.475" 12mm	3.0 lb 1.4 kg
4 inch 100mm	4-120NR-3	3	.00005" 0.0012mm	.120" 3.0mm	1,520 lb 6.8 kN	100 psi 0.7 Mpa	N/A	6.9 lb 3.1 kg
	4-120NR19-3	3	.00005" 0.0012mm	.120" 3.0mm	1,485 lb 6.6 kN	100 psi 0.7 Mpa	.750" 19.1mm	6.8 lb 3.1 kg
6 inch 150mm	6-120NR-3	3	.00005" 0.0012mm	.120" 3.0mm	3,820 lb 17.0 kN	100 psi 0.7 Mpa	N/A	15.9 lb 7.2 kg
	6-120NR34-3	3	.00005" 0.0012mm	.120" 3.0mm	3,550 lb 15.8 kN	100 psi 0.7 Mpa	1.330" 33.8mm	15.4 lb 7.0 kg
8 inch 200mm	8-120NR-3	3	.00005" 0.0012mm	.120" 3.0mm	6,570 lb 29.2 kN	100 psi 0.7 Mpa	N/A	42.2 lb 19.1 kg
	8-120NR50-3	3	.00005" 0.0012mm	.120" 3.0mm	5,730 lb 25.2 kN	100 psi 0.7 Mpa	2.000" 50.8mm	40.5 lb 18.4 kg
10 inch 250mm	10-220NR-3	3	.00005" 0.0012mm	.220" 5.6mm	10,330 lb 46.0 kN	100 psi 0.7 Mpa	N/A	75.2 lb 34.1 kg
	10-220NR77-3	3	.00005" 0.0012mm	.220" 5.6mm	8,670 lb 38.6 kN	100 psi 0.7 Mpa	3.000" 76.2mm	69.0 lb 31.3 kg

6.0 MAXIMUM STATIC CLAMPING FORCE

The static clamping force developed by air chucks will vary depending on several variables including the state of lubrication of the chuck, the type of grease used, the height of the top jaws, among other factors. MicroCentric's standard specifications for air chucks are based on the following conditions:

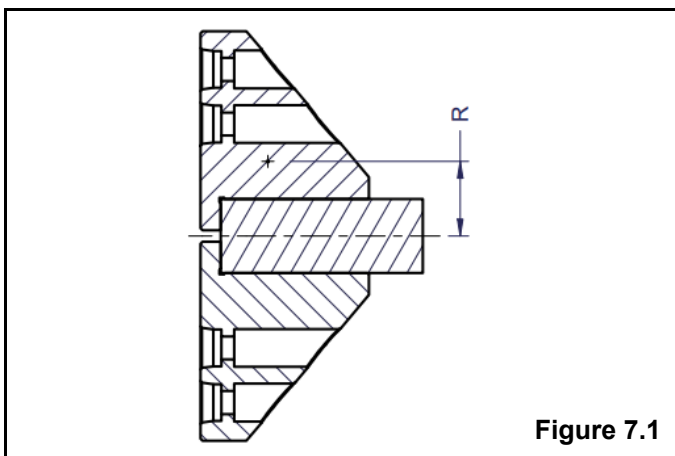
1. A standard height top jaw is used.
2. Jaw force is measured at the mid point (in height) of a standard jaw blank, at mid stroke with a jaw force gage.
3. MicroCentric's recommended grease is used to obtain maximum efficiency of the chuck.
4. The mounting bolts on the top jaws are tightened to the specified torque.
5. The recommended air pressure is applied to the chuck.

7.0 DESIGN AND MACHINING OF TOP JAWS

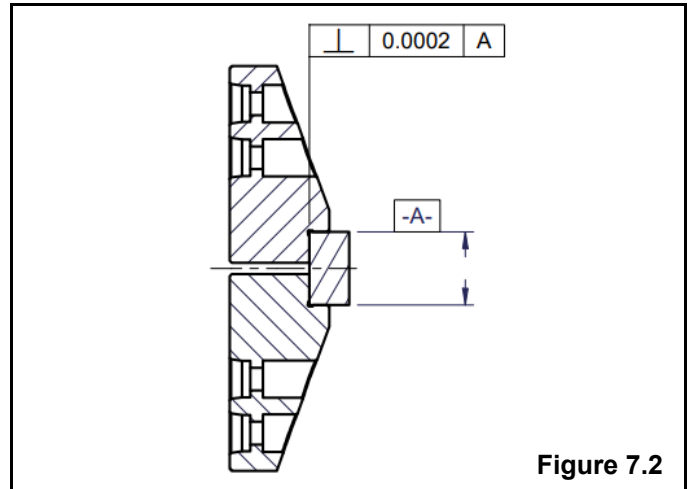
7.1 TOP JAW DESIGN

Top jaw design is one of the most important elements in the overall performance, accuracy, and efficiency of a workholding system. To achieve the maximum possible accuracy, as well as optimize the chuck's clamping capability, the following points should be considered in the design and machining of top jaws.

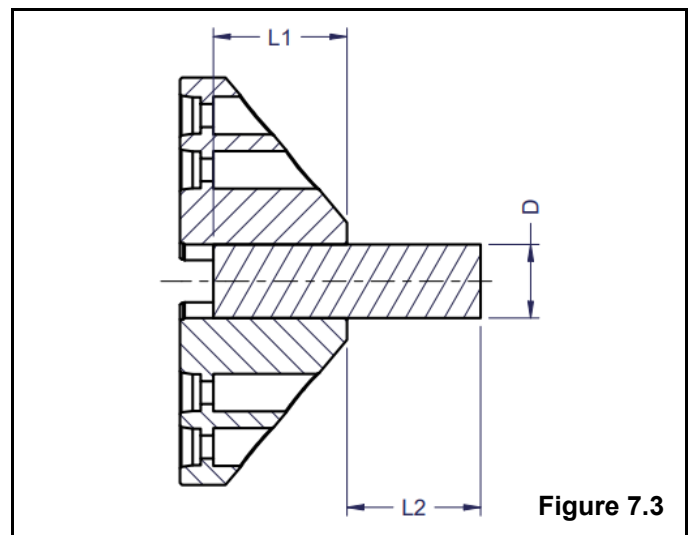
1. A workpiece must have an accurately machined holding diameter, in terms of size tolerance, roundness, and perpendicularity to the locating surface, for precise chucking.
2. When chucking thin walled workpieces, the size and roundness tolerances of the holding diameter will determine the degree to which the workpiece is distorted during chucking, and how accurately the workpiece can be machined.
3. The workpiece should be clamped as close to the face of the chuck as possible.
4. The clamping surfaces of the workpiece and top jaws must have smooth surface finishes, and must be absolutely clean and free of burrs.
5. For external clamping applications, the mass of the top jaws should be reduced as much as possible to minimize the overall weight of the chuck. Excess weight is typically removed at the largest radius. Refer to Figure 7.1.



6. Short workpieces must have a square locating face on which they are clamped, in order to ensure the part is clamped accurately. Refer to Figure 7.2.

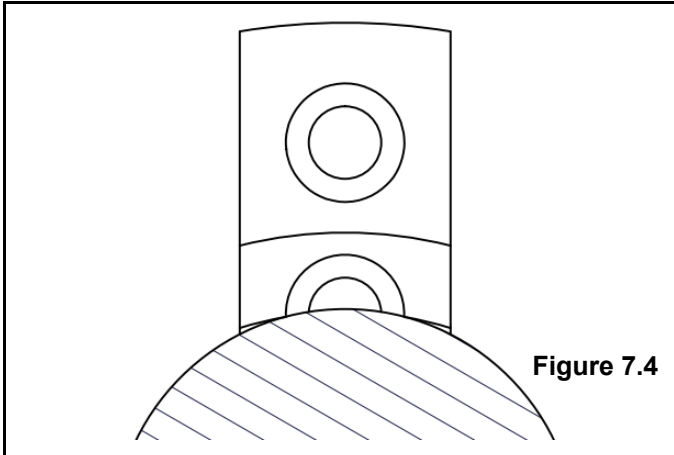


7. Workpieces with no shoulder support must be clamped on a length twice their diameter. Refer to Figure 7.3.



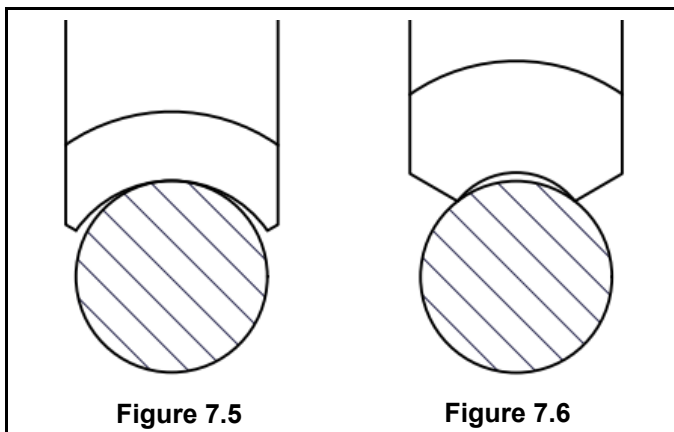
8. Long workpieces should not extend beyond the face of the top jaws more than one and one half times the length being clamped, unless an end support is used. Refer to Figure 7.3.

9. In situations where the top jaws' counter bored mounting bolt holes interfere with the clamping diameter, it is very important that the top jaw's clamping diameter is machined to the exact diameter of the workpiece diameter. Otherwise two-line contact occurs during clamping as shown in Figure 7.4, which will result in a loss of chucking accuracy.



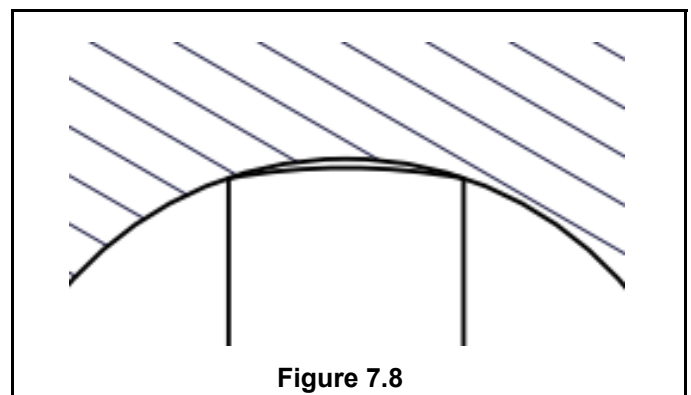
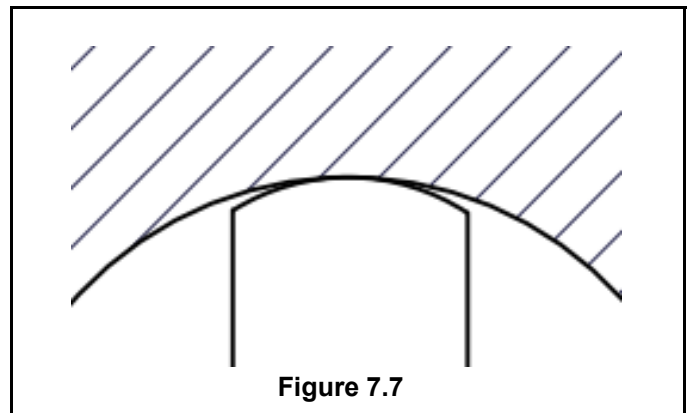
7.2 EXTERNAL CHUCKING TOP JAWS

1. For external chucking applications, the clamping diameter of the top jaws should be equal to or slightly larger than the upper tolerance limit of the workpiece's clamping diameter.
2. When the workpiece's clamping diameter is smaller than the top jaws' clamping diameter, line contact occurs during clamping as illustrated in Figure 7.5. This condition is acceptable and will produce accurate and concentric workholding.
3. If the workpiece's clamping diameter is larger than the top jaw's clamping diameter, a two-line contact occurs during clamping as shown in Figure 7.6. This condition is beneficial for high clamping force applications, but usually results in a loss of chucking accuracy.



7.3 INTERNAL CHUCKING TOP JAWS

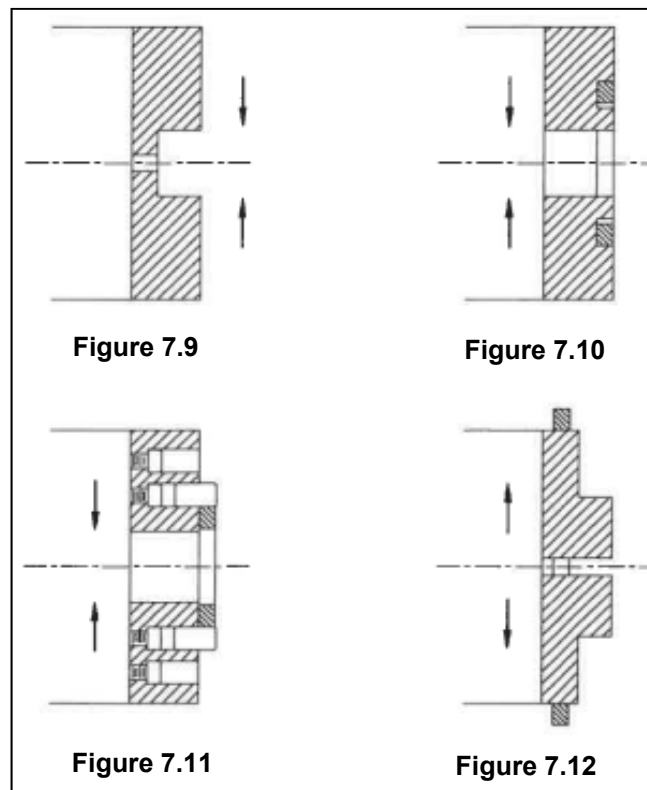
1. For internal clamping applications, the clamping diameter of the top jaws should be equal to or smaller than the lower tolerance limit of the workpiece's clamping diameter.
2. When the workpiece's clamping diameter is larger than the top jaws' clamping diameter, a line contact occurs during clamping as shown in Figure 7.7. This condition is acceptable and will produce accurate and concentric workholding.
3. If the workpiece's clamping diameter is smaller than the top jaws' clamping diameter, two line contact occurs during clamping as shown in Figure 7.8. This condition is beneficial for high clamping force applications, but results in a loss of chucking accuracy.



7.4 MACHINING OF TOP JAWS

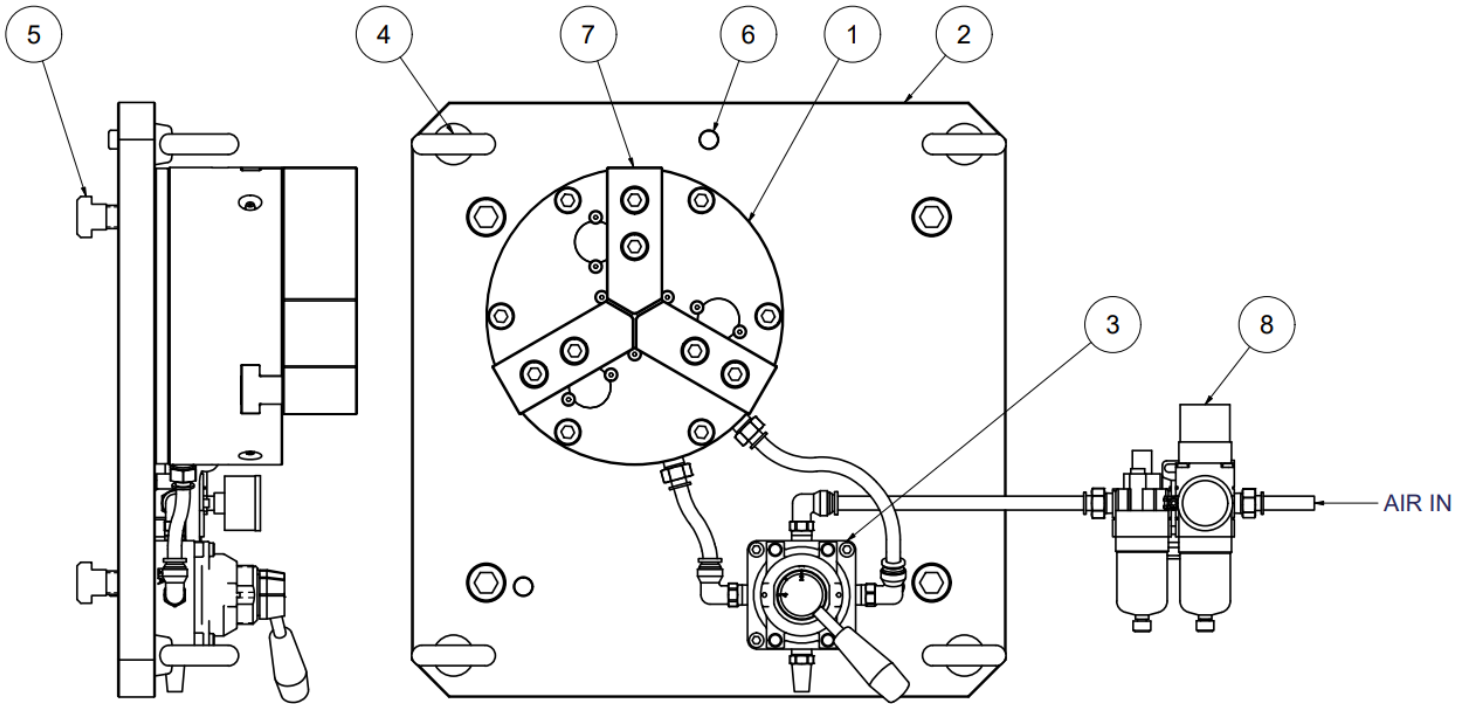
To achieve the best possible chucking accuracy, it is necessary to finish machine the clamping diameter and locating face of the top jaws on the chuck, under load. The method by which the jaws are loaded, together with the surface finish of the clamping and locating surfaces, as well as the size of the clamping diameter, will determine the overall accuracy and clamping capability of the chuck. Consider the following when machining top jaws:

1. Always load the chuck in the same direction the chuck is clamping. For OD holding applications the chuck must be closed on a loading pin or ring. For ID applications the chuck must open on a loading ring.
2. The position at which the chuck is loaded during machining of the top jaws, determines the position within the total stroke of the chuck that the workpiece will be clamped. Top jaws should be machined at the upper end of the chuck's stroke (closer to full open) to permit re-boring of the jaws. Re-boring of the jaws can be accomplished by loading the chuck further down in the stroke with a smaller diameter pin or ring.
3. Loading the top jaws further down in the chuck's stroke (near fully closed) allows greater clearance for applications where the workpiece is automatically loaded. An opening of .040" (1mm) on diameter is recommended for automatic loading.
4. Top jaws should be machined at the same air pressure which will be used to clamp the workpiece during production. In instances where either the loading ring or the top jaws are subject to deflection during loading, it is recommended that the top jaws be machined at an air pressure lower than that to be used during production.
5. Several recommended loading configurations are illustrated in Figures 7.9, 7.10, and 7.11 for OD clamping applications and 7.12 for ID clamping. The loading configuration shown in 7.10 should not be used with top jaws exceeding 2.00" (50mm) in height.
6. Carefully clean the mounting surfaces of the master jaws and top jaws before mounting the top jaws to the chuck. The top jaws should fit snugly on the locating pins or QC buttons. On dowel pin located jaws, first tighten the jaw mounting screws lightly, then clamp the loading pin or ring several times with light air pressure to assure that the top jaws are



7. properly seated. With the chuck clamped on the loading pin, tighten the mounting bolts to the torque specifications given in Section 4.0. On QC located jaws just tighten the mounting bolts after they are installed on the chuck.
7. Top jaws can be rough machined on a turning fixture, but should be finish machined under load on the chuck to achieve best chucking accuracy.
8. Dowel pin located top jaws must be re-machined when they are reinstalled on the chuck to achieve best chucking accuracy.
9. When top jaws are finished on a machine other than the one used in production, it is necessary to establish a true reference diameter and face which is to be indicated when mounting the chuck.

8.0 NON-ROTATING AIR CHUCK SYSTEM ASSEMBLY



ITEM	QTY	TITLE
1	1	NON-ROTATING AIR CHUCK
2	1	MOUNTING PLATE*
3	1	CONTROL VALVE (MANUAL/ELECTRONIC)
4	4	LIFTING EYE BOLT*
5	4	T-NUT*
6	3	DOWEL*
7	3	TOP JAW BLANK
8	1	FILTER REGULATOR LUBRICATOR

*IF MOUNTING PLATE IS ORDERED

9.0 MOUNTING OF CHUCK

Non-rotating air chucks are typically mounted to a table with an adapter or mounting plate. Refer to the chuck assembly drawing to familiarize yourself with the chuck's components before mounting the chuck.

9.1 MOUNTING PLATE INSTALLATION

1. Make certain that the table and mounting plate are clean and free of nick, burrs, and foreign materials which would prevent the proper seating of the adapter plate.
2. Mount the adapter plate to the table. Tighten the mounting bolts alternately to the torque specifications given in Section 4.0.
3. Indicate the lateral runout of the face of the mounting plate. Ensure the lateral runout does not exceed .0002" (.005mm).
4. If the face runout exceeds .0002" (0.005mm), remove the mounting plate and verify that the adapter plate is seating properly and is clean and free of nicks and burrs. A skim cut can be taken on the mounting face of the mounting plate once it is mounted to the table to assure the face is running true.

9.2 MOUNTING CHUCK ASSEMBLY

1. Secure the chuck to the mounting plate by tightening the mounting bolts alternately, but do not fully tighten them at this point.
2. Indicate the OD of the chuck body and adjust the runout to within .0002" (0.005mm) TIR.
3. After the runout of the chuck's OD has been adjusted, tighten the mounting bolts to the torque specifications given in Section 4.0.

9.3 MOUNTING TOP JAWS

1. Make certain that the mating faces are clean and free of nick, burrs, and foreign materials which would prevent the proper seating of jaws.
2. Be sure to assemble the correct numbered top jaw to each corresponding master jaw.
3. Tighten the mounting bolts alternately, to the torque specifications given in Section 4.0.
4. Ensure that the bottom surface of each top jaw is flush to the top surface of each master jaw.

9.4 AIR CONTROLS INSTALLATION

1. An air filter-regulator-lubricator unit must be installed to assure proper operation.
2. Recommended lubricant is light spindle oil: (Mobil Velocite no. 6 or equivalent).
3. Connect control valve, air hoses, and air filter regulator lubricator unit as illustrated. Again, the use of an air filter-regulator is essential, as line pressure will damage the chuck. Moisture and impurities will contaminate and clog air passages. The valve may be a hand valve, a foot pedal, or an electromagnetic valve. It's function must be 4-way.

IMPORTANT

The runout of the mounting plate should not exceed .0002" (.005mm) laterally. The runout of the OD of the chuck body should not exceed .0002" (.005mm).

IMPORTANT

Make sure that the air pressure is set within the specified limits of the chuck model.

IMPORTANT

Minimum rate of lubrication within filter regulator lubricator is 1 drop per minute.

10.0 QC JAW LOCATING SYSTEM

10.1 QC SYSTEM OVERVIEW

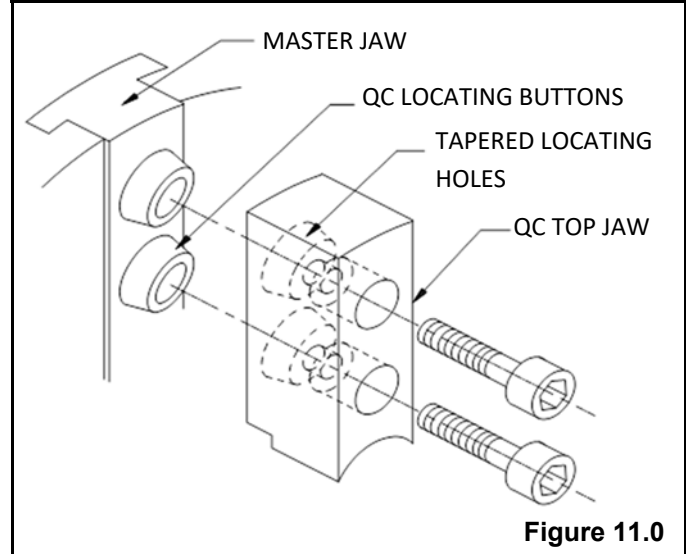
The QC system locates each top jaw on two tapered buttons mounted in each master jaw. The top jaw is located on both the taper and the face of the master jaw to effectively eliminate any clearances between the master jaw and the top jaw. This feature assures accurate relocation of the top jaw when repositioned on the chuck.

10.2 QC JAW INSTALLATION

1. First make sure that the locating surfaces of the top jaws, master jaws, and QC buttons are completely clean and free from nicks, burrs, or any foreign matter which would prevent proper seating of the top jaws.
2. It is advised that each top jaw be stamped or marked 1, 2, and 3 so that they can be mounted to the correspondingly marked master jaw for later reference.
3. Mount the top jaw no. 1 onto master jaw no. 1.
4. Insert the mounting screws into the top jaw and tighten each screw to the torque specifications given in Section 4.0.

10.3 QC JAW REMOVAL

1. First loosen the mounting screws from jaw no. 1 and then remove the screws completely from the top jaw.
2. The top jaw may remain locked onto the tapered buttons on the master jaw. To break the top jaw free, tap the end of the top jaw lightly with a soft hammer. Tap the jaw toward the center of the chuck while holding the sides of the top jaw.
3. Repeat this procedure for the other top jaws.



IMPORTANT

The mounting surfaces of the top jaws, master jaws, and QC buttons must be clean and be free of nicks or any foreign matter, otherwise the top jaws will not seat properly which will result in excessive runout.

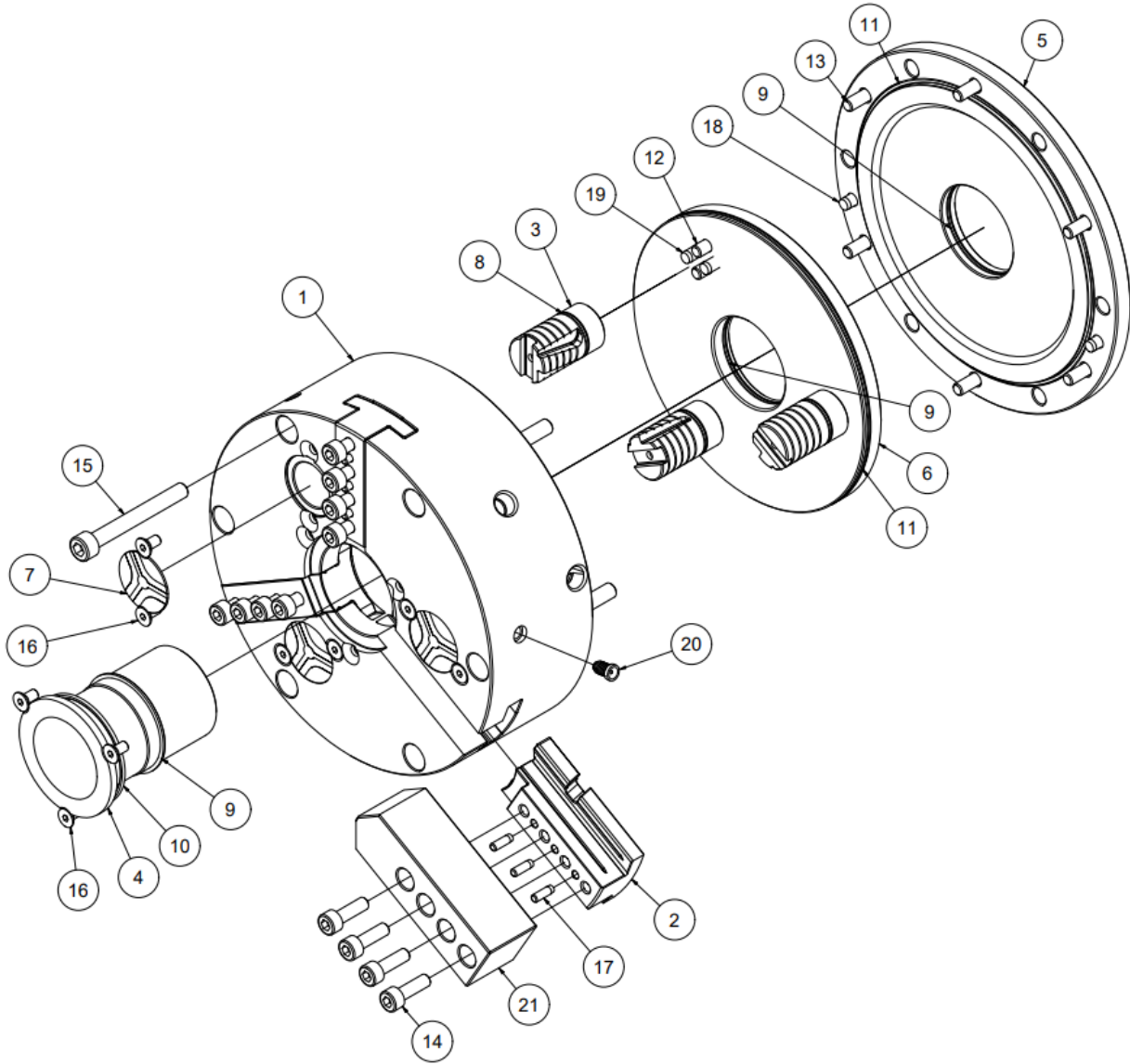


CAUTION

In order to minimize jaw runout, it is critical that the mounting screws of the top jaws are tightened to the torque specifications given in Section 4.0

11.0 ASSEMBLY DRAWING AND PARTS LIST

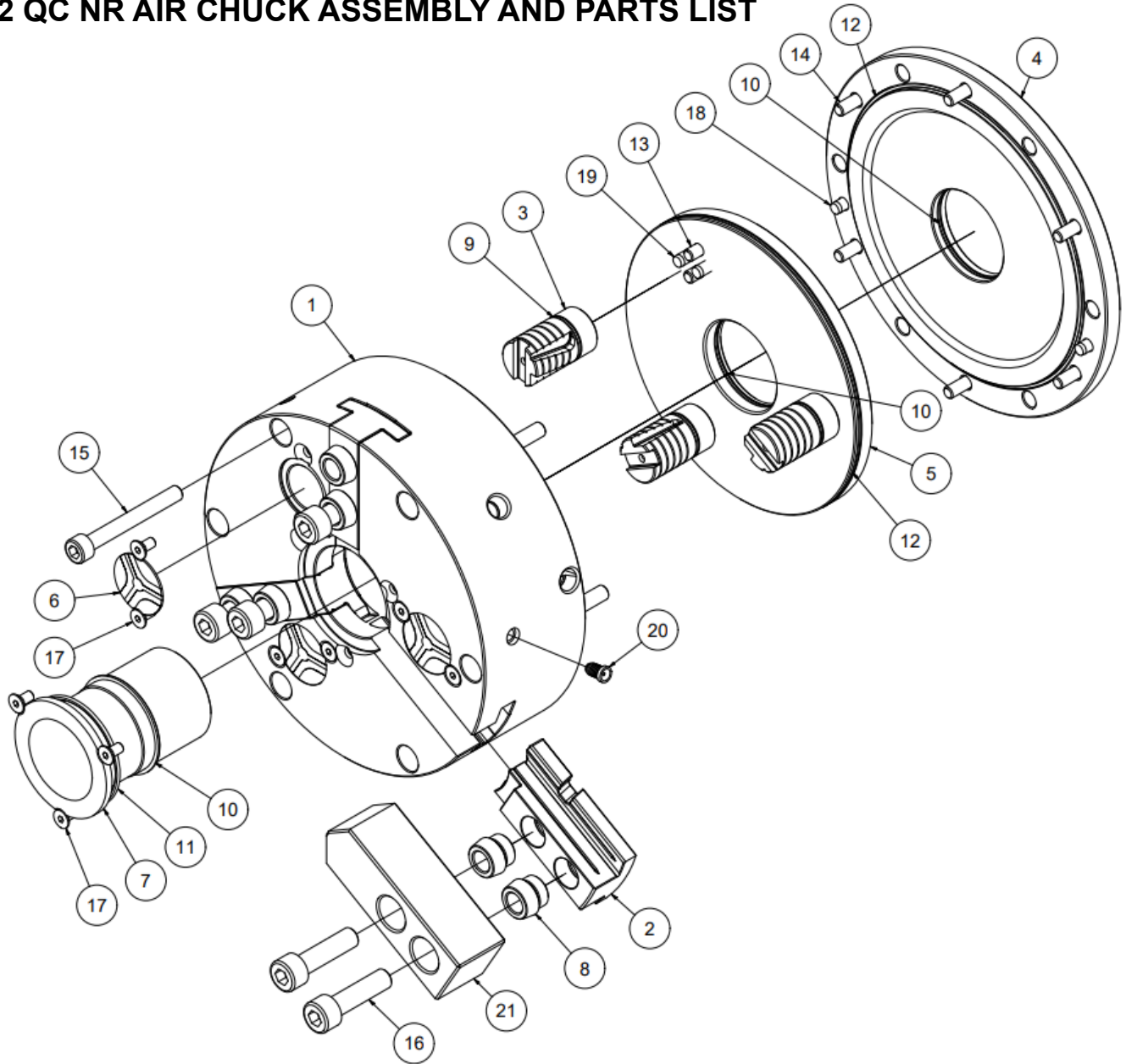
11.1 DOWEL PIN NR AIR CHUCK ASSEMBLY AND PARTS LIST



ITEM NO.	QTY	TITLE
1	1	BODY
2	3	MASTER JAW
3	3	ACTUATOR
4	1	CENTER SEAL
5	1	BACK COVER
6	1	PISTON
7	3	ACTUATOR DISK
8	3	O-RING
9	3	O-RING
10	1	O-RING
11	2	O-RING

ITEM NO.	QTY	TITLE
12	6	SOCKET HEAD CAP SCREW
13	6	SOCKET HEAD CAP SCREW
14	12	SOCKET HEAD CAP SCREW
15	6	SOCKET HEAD CAP SCREW
16	9	FLAT HEAD CAP SCREW
17	9	DOWEL PIN
18	2	DOWEL PIN
19	6	DOWEL PIN
20	3	LUBRICATION FITTING
21	3	TOP JAW

11.2 QC NR AIR CHUCK ASSEMBLY AND PARTS LIST



ITEM	QTY	TITLE
1	1	BODY
2	3	MASTER JAW BLANK
3	3	ACTUATOR
4	1	BACK COVER
5	1	PISTON
6	3	ACTUATOR DISK
7	1	CENTER SEAL
8	6	QC BUTTON
9	3	O-RING
10	3	O-RING
11	1	O-RING

ITEM	QTY	TITLE
12	2	O-RING
13	6	SOCKET HEAD CAP SCREW
14	6	SOCKET HEAD CAP SCREW
15	6	SOCKET HEAD CAP SCREW
16	6	SOCKET HEAD CAP SCREW
17	9	FLAT HEAD CAP SCREW
18	2	DOWEL PIN
19	6	DOWEL PIN
20	3	LUBRICATION FITTING
21	3	TOP JAW

12.0 AIR CHUCK MAINTENANCE

12.1 LUBRICATING AIR CHUCKS

1. Before applying lubrication to the chuck, the chuck should be actuated and set in the unclamped (jaws fully open) position.
2. Recommended lubricant: Kluber Altemp QN B 50
3. Apply lubricant with a grease gun (3 to 5 cc) to each grease fitting on the OD of the chuck body.
4. After applying lubricant to all fittings, cycle the chuck (open and close the chuck) several times to distribute the lubricant to all sliding surfaces.
5. Wipe away any excess grease which has seeped out of the master jaw slots.

12.2 FREQUENCY OF LUBRICATION

1. Air chucks should be lubricated at least once daily.
2. Chucks exposed to a high volume of water soluble cutting oil should be lubricated several times each day.
3. Chucks which are installed on machines running around the clock, should be lubricated at the start of each shift .

12.3 DISASSEMBLY OF AIR CHUCKS

1. After removing the chuck from the machine, set the chuck face down on blocks (or parallels) and remove back cover. Make note of the letter stamped on the face of the piston. It must align with jaw slot no. 1 when reassembling.
2. Remove manifold-piston assembly. If the chuck is in good working order this can be done by pulling upward. However, if the slides are binding and the chuck does not operate freely, it will be necessary to remove the 3 actuator covers on the face of the chuck and with a soft plug, alternately tap each actuator until the assembly is free. **DO NOT** disassemble actuators from piston, as they are position pinned in place.
3. Once the piston assembly has been removed from the chuck body, remove each master jaw.
4. If the master jaws are tight, use a soft plug to tap each jaw out of the chuck body.



WARNING

Air chucks must be lubricated on a regular basis to maintain long term accuracy and performance. Inadequate lubrication reduces gripping force and affects the chuck's repeating accuracy. Inadequate lubrication will also cause excessive wear and seizure.

IMPORTANT

Do not disassemble actuators from the piston, as they are position pinned in place.

IMPORTANT

Before applying lubrication to the chuck, the chuck should be actuated and set in the unclamped (jaws fully open) position.



CAUTION

Air chucks should be disassembled, cleaned, lubricated, and reassembled at least once every 6 months or every 100,000 cycles. Chucks that are used to machine cast iron or sintered parts should be disassembled more frequently (at least every 2 to 3 months).

12.4 CLEANING OF AIR CHUCKS

1. After the chuck has been disassembled, remove all sludge and buildup on the sliding surfaces of the chuck body, actuators, and master jaws.
2. Clean off any buildup with fine emery paper.
3. Degrease all components in mineral spirits or other solvent.
4. Remove all residue of the solvent and keep each component clean until reassembly.

12.5 REASSEMBLY OF AIR CHUCKS

1. After all the chuck's components have been thoroughly cleaned, set the chuck face up on a bench.
2. Inspect all O-Rings and replace any which exhibit signs of wear. It is recommended to lubricate all O-rings with a lubricant such as Parker Super O-Lube.
3. Apply a liberal amount of grease such as Kluber Altemp QN B 50 to all surfaces of master jaw no.1. Slide master jaw no. 1 into the jaw slot which is marked slot no.1. The jaw should slide freely into the jaw slot with only hand pressure. If the jaw is tight going into the jaw slot remove the jaw, and make sure any buildup has been removed from both the jaw slot and master jaw. After cleaning, degrease the chuck body and master jaw again with a solvent. Apply lubricant to the master jaw and insert the jaw into the chuck body as outlined above.
4. Repeat this procedure for the other master jaws.
5. Turn the chuck face down with jaw slot no. 1 at 12 o'clock.
6. Apply an even coat of grease to the ID of the piston bore.
7. Liberally coat each actuator with grease. Coat the OD and both sides of the key which engages into the master jaw.
8. Turn the piston so that the rear side is facing up. Rotate the piston to align the letter stamped on its rear face with jaw slot no. 1.
9. Insert the piston assembly into the chuck by first inserting the 3 actuators into the bores in the chuck body. Then slide the piston assembly towards the face of the chuck until the actuators contact the master jaws.
10. Turn the chuck body over and support it on the blocks (or parallels) used to disassemble the chuck.

IMPORTANT

All components must be thoroughly cleaned and degreased before reassembly. Perform all assembly work on a clean bench in clean surroundings to prevent dirt and other contaminants from getting into the chuck.



CAUTION

When reassembling air chucks make sure each master jaw is mounted into the jaw slot with a corresponding number. Also make sure to align the piston assembly correctly so that the letter stamped on the back face of the piston is in line with jaw slot no. 1.

11. Looking into the three actuator bores on the face of the chuck, engage the slot of each master jaw into the actuator key.
12. Take the chuck off the blocks and push the piston assembly fully into the chuck body. The piston should slide into the chuck body freely, however, it may be necessary to tap the rear face of the piston assembly with a soft hammer to bring the assembly fully into the chuck body. Tap the rear face of the piston in a circular motion to prevent the piston from cocking.
13. Replace the back cover, and 3 actuator disks on the face of the chuck. Secure each disk with a flat head cap screw. Make sure the top face of the screws are below the face of the chuck.

13.0 TROUBLE SHOOTING GUIDE

If your air chuck malfunctions, immediately stop the machine and refer to this trouble shooting guide for possible causes and ways to remedy the problem.

PROBLEM	POSSIBLE CAUSE	SUGGESTED REMEDY
The chuck does not operate.	A component inside the chuck (master jaw or actuator) is broken.	Disassemble chuck and contact MicroCentric for replacement or repair of the component or chuck.
	The master jaw slides or actuators are seized.	Disassemble the chuck to free the seized components by cleaning the chuck and removing buildup that has embedded itself onto the chuck's components and lubricate the chuck.
The master jaws do not stroke fully.	Swarf or dirt has built up inside the chuck.	Disassemble, clean, and lubricate the chuck.
	Improper assembly.	Ensure all parts have been reassembled correctly.
Workpiece slips.	Insufficient master jaw stroke.	Rebore top jaws so that the workpiece is clamped in the middle of the chuck's total jaw stroke.
	Insufficient clamping force.	Increase the air pressure within recommended limits.
	Restricted air flow.	Check air lines. Make sure valve and pressure regulator are correctly installed. Old piping and hoses sometimes have restricted air flow.
	Machined clamping diameter in top jaw does not match workpiece diameter.	Rebore top jaws accordingly.
	Cutting force is too high.	Reduce cutting force.
	Insufficient lubrication to the chuck.	Lubricate the chuck according to the schedule and procedure outlined in Section 12.1 & 12.2.
Air leaks from the chuck.	Broken O-ring.	Replace O-Rings as needed.
	Broken tubing or fittings.	Replace tubing or fittings as needed.
Excessive workpiece runout (concentricity) after machining.	OD of chuck is running out, (mounting screws not tight).	Indicate OD of chuck and true chuck to within specifications given in Section 9.0. Also make sure mounting screws are tightened properly.
	Chips, dirt, or other foreign material is embedded in clamping surface of top jaw.	Remove foreign material and/or rebore top jaws.
	Mounting screws of top jaws have not been adequately tightened.	Tighten mounting screws to torque specifications given in Section 4.0.
	Top jaws have not been properly machined (loaded).	Check that the loading ring or plug is not being deformed due to high clamping force. Review procedures outlined in Section 7.4.
	Top jaw is deformed during clamping due to excessive height and/or excessive clamping force.	Review the design of the top jaw, reducing the height of the jaw and lowering air pressure.
	Workpiece is deformed during clamping by excessive clamping force.	Reduce air pressure. Also evaluate the design of the top jaws to reduce jaw height and jaw mass to reduce effects of centrifugal force.



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