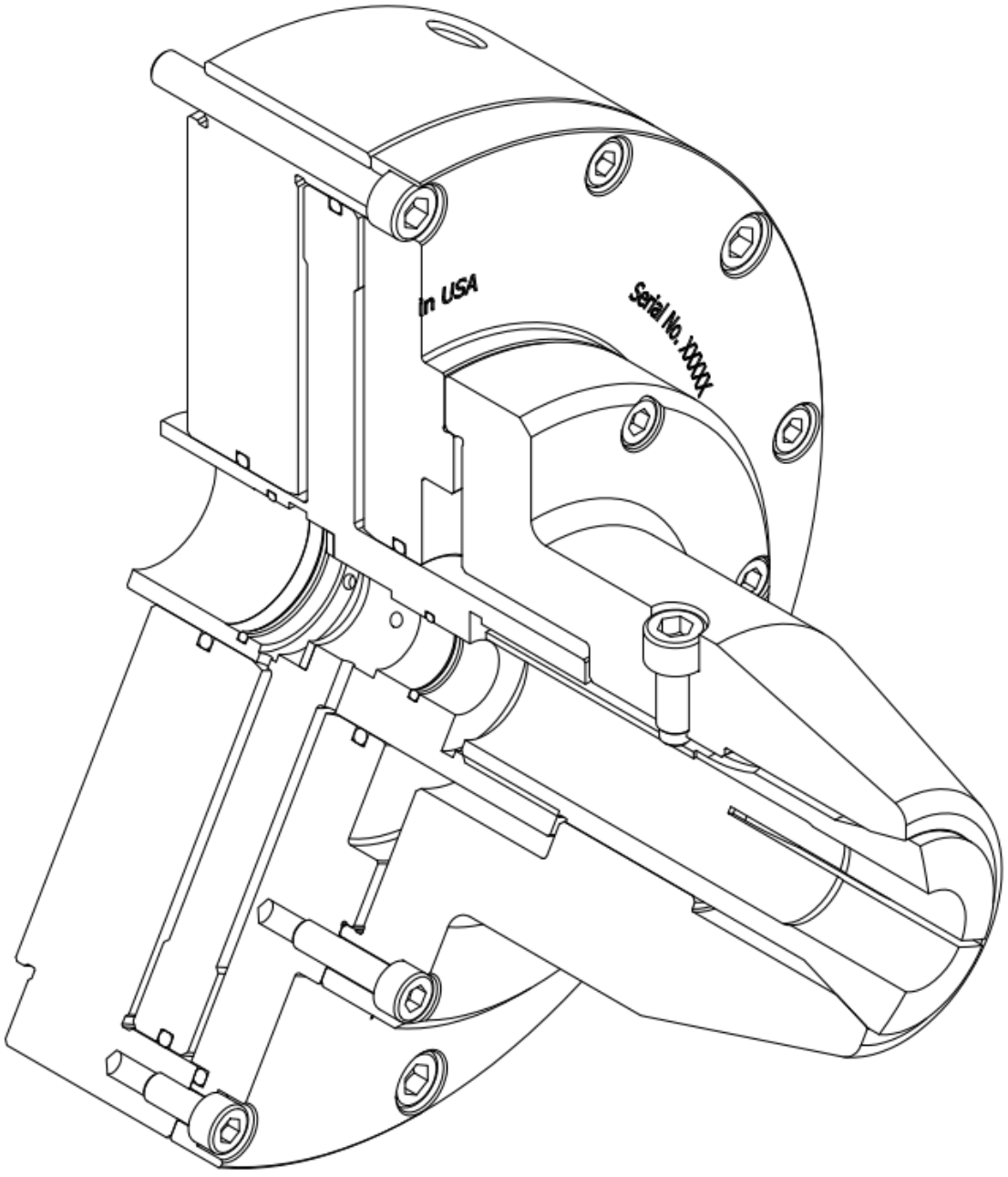
MicroCentric

Precision Workholding Technology

Technical Documentation for CBW25-B Collet Chucks



www.microcentric.com

TABLE OF CONTENTS

1.0 CONTACT AND SERVICE INFORMATION

Manufactured by:
MicroCentric Corp.
Plainview, NY USA
www.microcentric.com

Service in North America:
MicroCentric Corp.
25 South Terminal Drive
Plainview, NY 11803 USA
Toll-Free: 1-800-573-1139
Phone: 1-516-349-7220
E-mail: sales@microcentric.com

Service in Europe:
MicroCentric GmbH
Ringstrasse 134
70839 Gerlingen
Germany
Phone: 49-71156-17819-00
E-mail: info@microcentric.de

Service in Asia:
Dynamic Tools Corp.
7-4-6 Seikadai, Seika-cho
Sorakugun
Kyoto 6190238 Japan
Phone: 81-774-98-0518
E-mail: dynex@earth.email.ne.jp

2.0 INTRODUCTION

MicroCentric Collet Chucks offer unmatched accuracy and long term performance. The information contained in this manual, if properly followed, will enable you to take full advantage of your chuck's capabilities.

We recommend you read through this entire manual to familiarize yourself with the installation and operation of MicroCentric collet chucks before installing and using your chuck. We also suggest you keep this manual at hand for future reference. 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 spindle 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 spindle rotation.

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

DANGER

Do not exceed maximum recommended speed of the chuck for a given input pressure.

- The workpiece can be thrown from the chuck due to inadequate gripping force as a result of centrifugal force.

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 as the spindle is rotated.

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.

WARNING

Do not start the machine with the door open.

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

WARNING

Remove eyebolts after use.

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

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

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

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

Long workpieces should be supported by a live center in the tail stock or by a steady rest.

- The workpiece can be thrown from the chuck if it is too long and not properly supported.

CAUTION

Do not touch machined workpieces with bare hands.

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

CAUTION

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

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

CAUTION

Never hit the outside of the chuck, collet, or workpiece with a hammer.

- The workpiece can be thrown from the chuck if the chuck is damaged.

CAUTION

Ensure workplace is clean.

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

CAUTION

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.

4.0 RECOMMENDED 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 CHUCKING GUIDELINES

5.1 ACURACY AND RUNOUT

To obtain high accuracy workholding it is important to correctly match the collet diameter to the workpiece diameter being clamped. Each workpiece has a dimensional tolerance, and to achieve best chucking accuracy the collet should be sized to correspond to the largest diameter of the workpiece's range. Figure 5.1 illustrates the principle of single line contact by each collet segment. This condition will enable you to obtain minimum workpiece runout.

When a workpiece is clamped by a collet that has a diameter that is smaller than the workpiece diameter, the condition shown in Figure 5.2 will result. This will produce higher clamping force on the workpiece, however, accuracy will be sacrificed.

Even when close chucking accuracy is not required, it is always important to use a collet with the proper bore size for each workpiece or bar stock. Following this principle will maximize the overall performance of the collet chuck system.

In order to obtain close chucking accuracy, the collet's surfaces must be kept clean and free from chip buildup. On long running operations it is recommended that the collet be removed periodically for cleaning.

IMPORTANT

Keep the clamping surface of the collet clean and free from chip buildup.

IMPORTANT

The collet should be removed periodically from the chuck and cleaned.

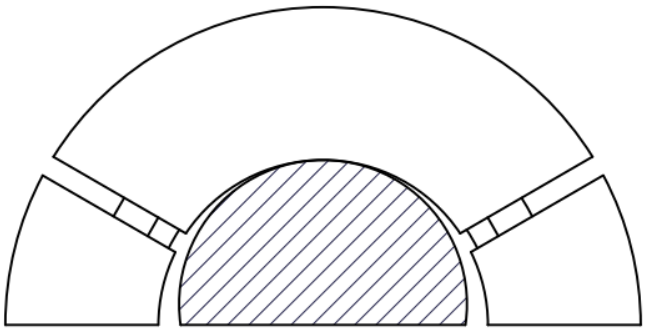


Figure 5.1

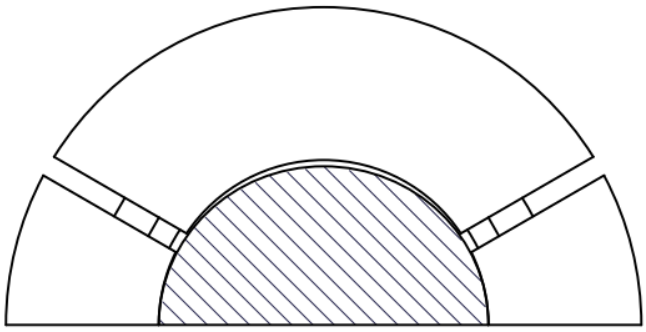


Figure 5.2

5.2 CLAMPING FORCE

Higher clamping force is generally required for roughing applications as compared to finishing operations. The clamping characteristics of a collet are enhanced by serrations, which will permitted higher rates of metal removal at the same draw tube force as compared to a smooth bore collet. The frictional force between the collet and workpiece or bar stock can also be increased by applying a carbide grit or diamond particle plating to the clamping surface of the collet. Sharp serrations that penetrate the surface of the workpiece provide the greatest clamping force to prevent workpiece slippage. Collets with widely spaced serrations also have enhanced clamping capability. The appropriate collet configuration for a given application is determined by a number of factors including cutting forces, spindle speed, and the material of the workpiece or bar stock. Recommendations for a specific applications can be obtained by calling MicroCentric's technical sales staff.

5.3 CENTRIFUGAL FORCE

The clamping force of a collet is affected by centrifugal force as spindle speed increases. Never exceed the maximum spindle speed recommended for a specific collet chuck model.

The loss of clamping force at high spindle speeds can be minimized by reducing the weight of a collet. Excess weight can be removed from a collet by drilling holes into the front face. For some high speed applications it may be necessary to dynamically balance the collet chuck. Consult MicroCentric's technical sales staff for further information.

WARNING

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

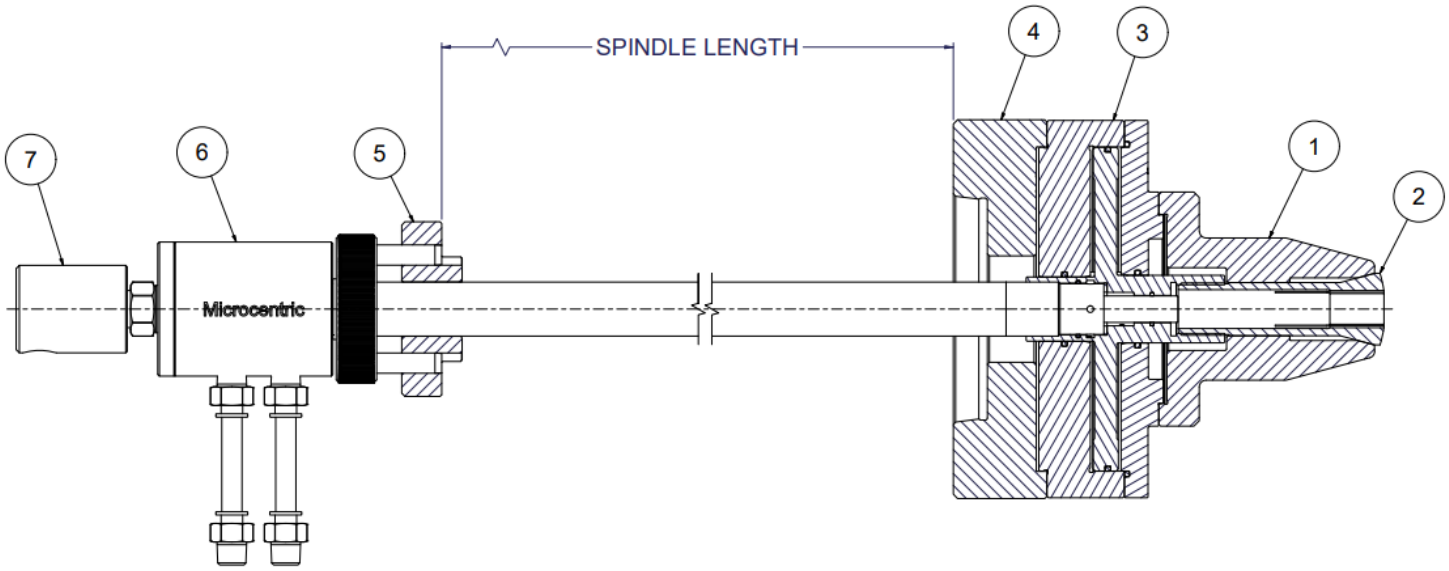
WARNING

Do not exceed the maximum recommended spindle speed for a specific collet chuck model.

CAUTION

Collet chucks running at speeds above 4,000 rpm may need to be dynamically balanced.

6.0 CBW25-B COLLET CHUCK SYSTEM ASSEMBLY



ITEM	QTY	DESCRIPTION
1	1	BODY ASSEMBLY
2	1	COLLET
3	1	AIR CYLINDER ASSEMBLY
4	1	ADAPTER
5	1	SUPPORT BUSHING
6	1	AIR TUBE
7	1	ROTARY UNION*

* OPTIONAL. FOR COOLANT, LUBRICANTION, AIR SENSING, OR AIR BLAST.

7.0 COLLET CHUCK INSTALLATION

MicroCentric CBW25-B collet chucks are supplied with a spindle mounting plate and a rear support bushing to suit the machine configuration specified when the chuck was ordered. Refer to the system assembly in Section 6.0 and the chuck assembly drawing in Section 10.0 to familiarize yourself with the chuck's components before installation.

7.1 MOUNTING ADAPTER PLATE

1. Make certain that the spindle and the mounting plate are clean and free of nick or burrs that could prevent the proper seating of the adapter plate.
2. Mount the adapter plate to the machine spindle. Tighten the mounting bolts to the recommended torque value given in Section 4.0.
3. Use a dial indicator to measure the radial and face runout of the mounting surfaces of the adapter plate. Radial runout should not exceed .0002" (0.005mm), as seen in Figure 7.1. Runout of the face should not exceed .0002" (0.005mm). On flat spindle noses, the radial runout can be adjusted by loosening the mounting bolts and tapping the mounting plate with a plastic hammer. On tapered spindle noses no adjustment is possible. If the runout exceeds these values, remove the adapter from the spindle nose and ensure it is seated properly, and is clean and free from nicks and burrs. A skim cut can be taken on the pilot diameter and mounting face of the adapter once mounted to ensure both surfaces are running true.

7.2 MOUNTING AIR CYLINDER

1. Make certain that the adapter plate is clean and free of nick or burrs that could prevent the proper seating of the air cylinder assembly.
2. Mount the air cylinder assembly to the adapter plate. Semi tighten all the mounting bolts, but do not fully tighten them at this point.
3. Use a dial indicator to measure the radial and face runout of the mounting surfaces of the air cylinder assembly, as seen in Figure 7.2. Radial runout should not exceed .0002" (0.005mm). Runout of the face should not exceed .0002" (0.005mm).
4. After the runout of the air cylinder assembly has been verified, tighten the mounting bolts to the torque specifications given in Section 4.

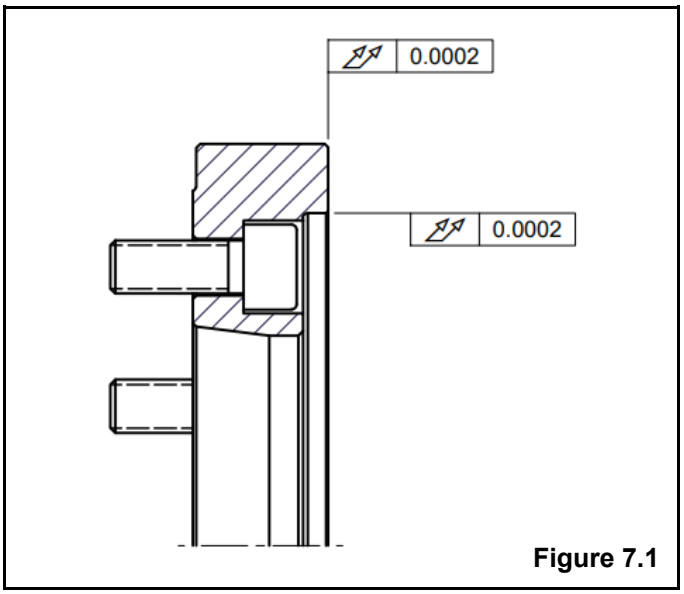


Figure 7.1

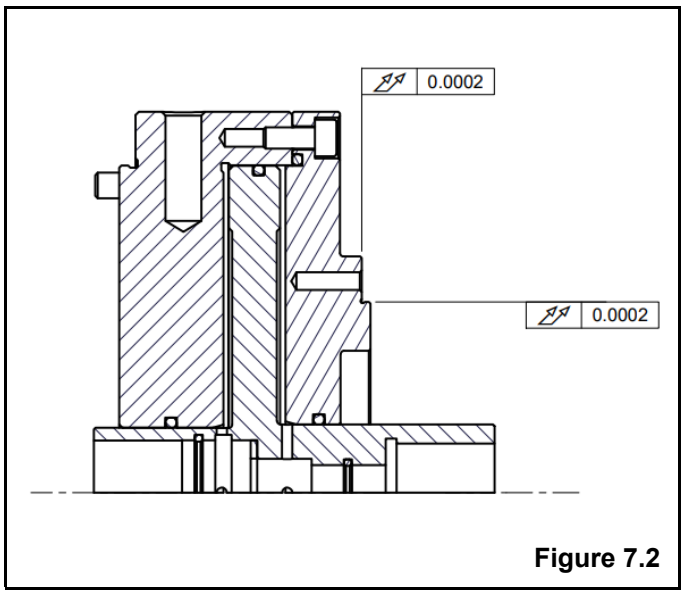


Figure 7.2

IMPORTANT

The runout of the mounting plate and air cylinder should not exceed .0002” (.005mm) radially, and .0002” (.005mm) laterally.

7.3 MOUNTING CHUCK ASSEMBLY

1. Make certain that the mounting surfaces of the chuck body and air cylinder assembly are clean and free of nicks or burrs that could prevent the proper seating of the chuck body.
2. Seat the chuck onto the air cylinder assembly, and align the mounting bolts in the body with the mounting holes on the air cylinder assembly.
3. Semi tighten all the mounting bolts, but do not fully tighten them at this point.
4. Indicate the ID runout of the collet taper as shown in position Figure 7.3. Ensure the runout of the collet taper is within .0002" (0.005mm).
5. If the runout exceeds .0002" (0.005mm), remove the chuck body from the air cylinder assembly, and repeat the mounting procedure.
6. After the runout of the collet taper has been adjusted, tighten the mounting bolts to the torque specifications given in Section 4.

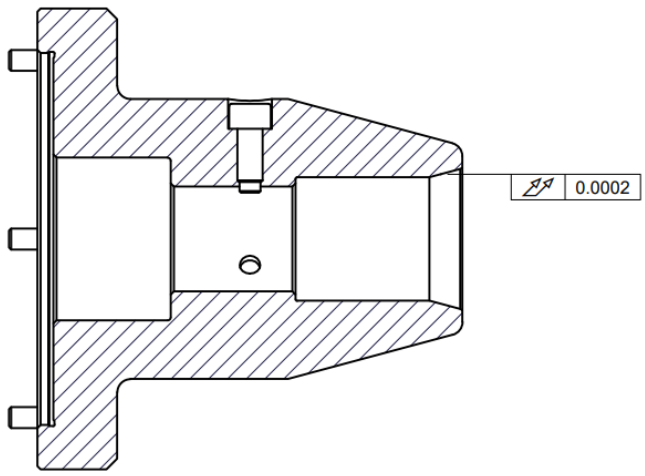


Figure 7.3

IMPORTANT

The runout of the collet taper should not exceed .0002" (0.005mm).

8.0 MOUNTING OF AIR TUBE

8.1 AIR TUBE PRECAUTIONS

1. An air filter-regulator-lubricator unit must be installed to assure proper operation.
2. The air tube must be of proper length with a minimum of 15mm to a maximum of 25mm clearance at the rear of the machine spindle.
3. The air journal bearing requires continuous lubrication. Lubricated air is supplied by the air filter-regulator-lubricator unit.
4. Recommended lubricant is light spindle oil: (Mobil Velocite no. 6 or equivalent).

8.2 AIR TUBE INSTALLATION

1. The air tube must be supported by the split bushing provided. Machine a short step on the bushing for a slip fit into the spindle as shown above. Tighten the set screw on the bushing to secure it in place. The air tube must be free to rotate. Because the air tube moves with the piston, the air tube must be free to slide back and forth within the bushing.
2. Install the tube by threading it into the piston in the air cylinder. All threads and steps on the air tube must be free of chips and dirt. Tighten the tube by hand using the black knurled ring. Tighten securely, but do not use excessive force. Make certain your air tube is of sufficient length to allow a minimum of 15mm to a maximum of 25mm clearance at the rear of the machine spindle.
3. The air tube assembly supplied with a high speed chuck includes a drive pin to prevent the air tube from unthreading during operation. Make certain the drive pin is engaged into the machined slot in the knurled ring.
4. Connect control valve, air hoses, and air filter regulator lubricator unit as illustrated. The use of an air filter-regulator is essential, as line pressure will damage the chuck. Moisture and impurities will contaminate the air rotary journal 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

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

5. If the chuck does not operate, or if it does not generate appropriate holding force, verify that the air tube is threaded firmly into the chuck.
6. Actuate the chuck to verify that it is functioning properly by measuring the stroke of the piston, as shown in Figure 10.1. The minimum total piston stroke for CBW25-B chuck is .100". If not, check that the air flow is unrestricted, the spindle data that was specified when the chuck was ordered is correct, or that the air tube was correctly manufactured.

8.3 ROTARY UNION INSTALLATION

1. To apply coolant or lubrication through the center of the air tube, install a rotary union in place of the red retaining knob at rear of air tube.
2. To install, clean the end of the air tube thoroughly.
3. Chuck rotary union only at its housing, and attach flexible hose with sealant or PTFE tape. Be sure not to damage housing.
4. Attach rotary union onto the air tube with sealant or PTFE tape.
5. Check union for leaks, and ensure there are no strains, torsional stresses, or sharp bends in the hose.

IMPORTANT

Verify that the chuck is functioning correctly by measuring the stroke of the piston, as shown in Figure 10.1 on Page 15.

IMPORTANT

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

IMPORTANT

Do not move the knurled ring. Aside from convenient grip during tightening, the ring functions as a clamp, securing the outer tube to the journal.

9.0 COLLET INSTALLATION

1. Set the air pressure to approximately 30 psi (0.21 MPa). Actuate the piston to bring it to the forward/ open position.
2. Thread the collet into the piston until the collet contacts the taper on the chuck body.
3. Insert collet key into keyway of the collet. Utilize any of the three holes within the side of the chuck body. Slightly unthread collet if necessary. Tighten collet key securely.
4. Place cap screws in two remaining holes to plug passages. See Section 10 for assembly drawing.
5. Actuate piston to verify that the collet was installed correctly, before attempting to clamp a workpiece.

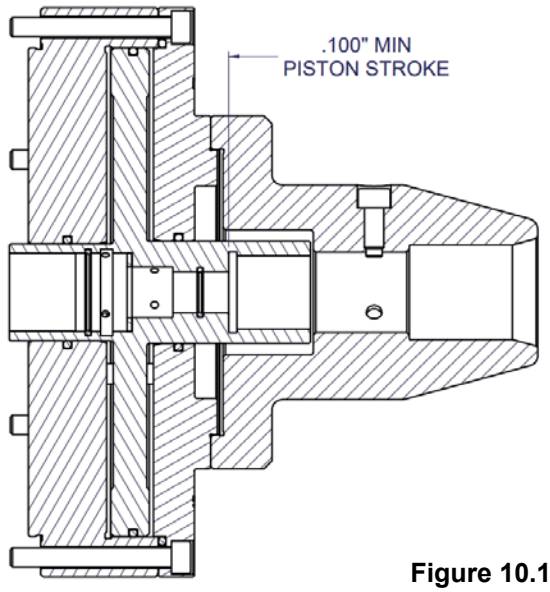
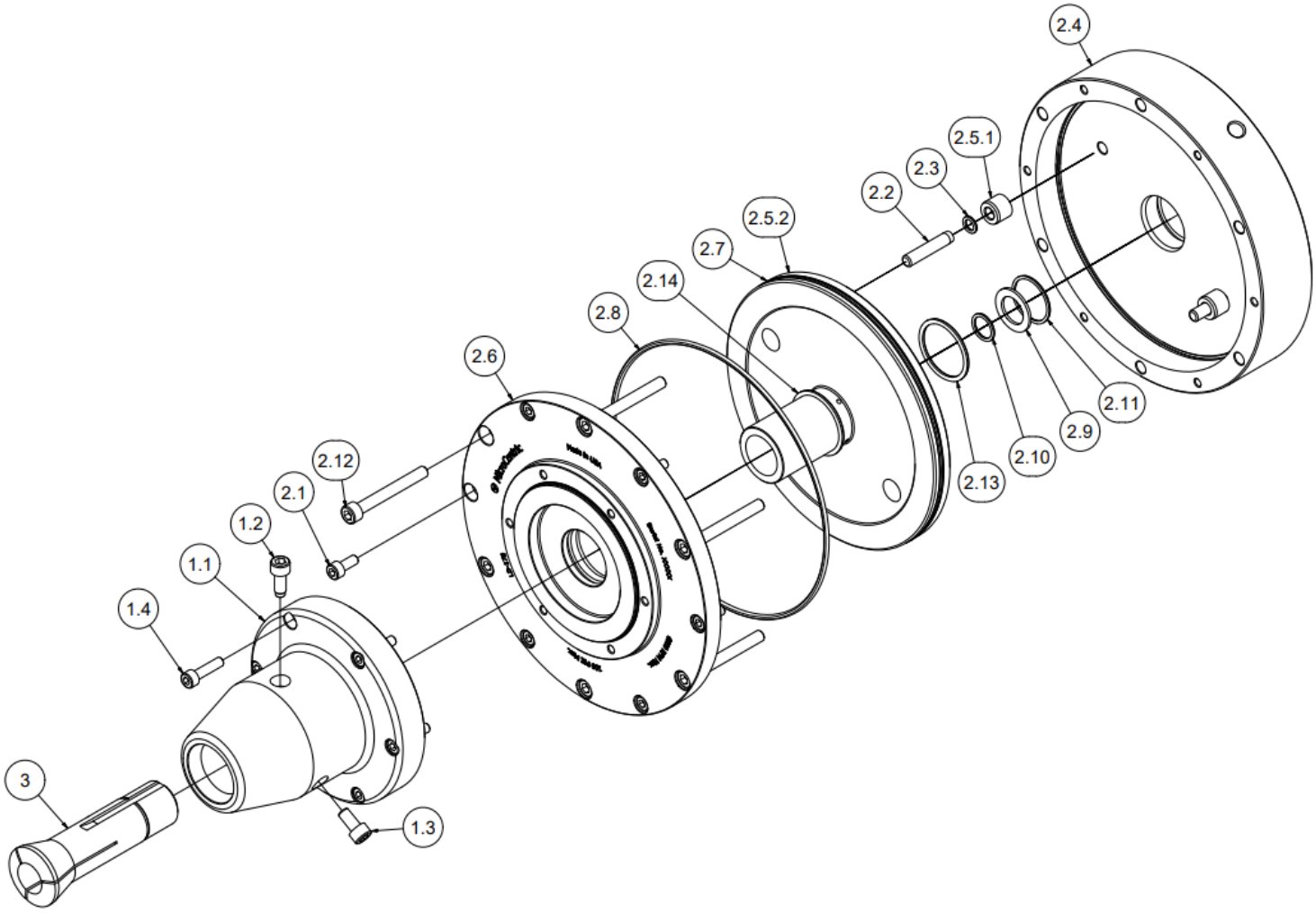


Figure 10.1

IMPORTANT

Verify the collet is properly assembled into the chuck body, by actuating the chuck, before attempting to clamp a workpiece.

10.0 CBW25-B ASSEMBLY DRAWING AND PARTS LIST



ITEM	QTY	DESCRIPTION
1	1	BODY ASSEMBLY
1.1	1	BODY
1.2	1	COLLET KEY
1.3	2	SOCKET HEAD CAP SCREW
1.4	6	SOCKET HEAD CAP SCREW
2	1	AIR CYLINDER ASSEMBLY
2.1	6	SOCKET HEAD CAP SCREW
2.2	2	DOWEL
2.3	2	O-RING
2.4	1	CYLINDER
2.5	1	PISTON ASSEMBLY
2.5.1	2	BUSHING

ITEM	QTY	DESCRIPTION
2.5.2	1	PISTON
2.6	1	COVER
2.7	1	O-RING
2.8	1	O-RING
2.9	1	MANIFOLD WASHER
2.10	1	O-RING
2.11	1	O-RING
2.12	6	SOCKET HEAD CAP SCREW
2.13	1	O-RING
2.14	1	O-RING
3	1	W25 COLLET

11.0 TROUBLE SHOOTING GUIDE

This trouble shooting guide is intended to help you identify some common causes of problems experienced operating MicroCentric CBW25-B collet chucks, or correctly clamping a bar or workpiece. For further assistance contact one of our technical sales associates.

PROBLEM	POSSIBLE CAUSE	SUGGESTED REMEDY
The piston does 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.
	Air tube is too short.	Check for interference at rear of spindle.
Workpiece runs out excessively.	Collet taper is running out, (mounting screws not tight).	Indicate the collet taper and re-true chuck to within specifications given in Section 7.3. Ensure all mounting screws are tight.
	Chips, dirt, or other foreign material has accumulated between the collet and tapered collet seat.	Remove the collet and clean out all accumulated chips and sludge from inside the chuck, both from tapered seat and coupling area.
	The taper in chuck body is worn.	Replace the chuck body assembly.
	The clamping diameter and/or the OD taper of the collet have worn.	Replace the collet.
Workpiece slips or pushes back during machining.	Collet is oversized for the bar or workpiece clamping diameter.	Use a collet with a clamping diameter that matches the OD of the bar or workpiece.
	Insufficient clamping force.	Increase the air pressure to the cylinder to increase the force to the chuck.
	Cutting force is too high.	Reduce cutting force.
	Spindle speed is too high.	Reduce spindle speed.
	Restricted air flow.	Check air lines. Make sure valve and pressure regulator are correctly installed. Old piping and hoses sometimes have restricted air flow.
Air leaks from the chuck.	Broken O-ring.	Replace O-Rings as needed.
	Broken tubing or fittings.	Replace tubing or fittings as needed.
	Air tube not screwed in completely, or not properly seated against Teflon washer.	Hand tighten air tube from knurled ring, replace washer if damaged.
Excessive Vibration	Unequal weight distribution.	Counterbalance as required.
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 7.0. This includes the adapter plate, air cylinder assembly, and chuck body. 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 have not been adequately tightened.	Tighten mounting screws to torque specifications given in Section 4.0.
	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.

MicroCentric Corp • 25 So. Terminal Drive, Plainview, NY 11803 USA
Tel: 516-349-7220 • Fax: 516-349-9354 • e-mail: sales@microcentric.com

1-800-573-1139

www.microcentric.com