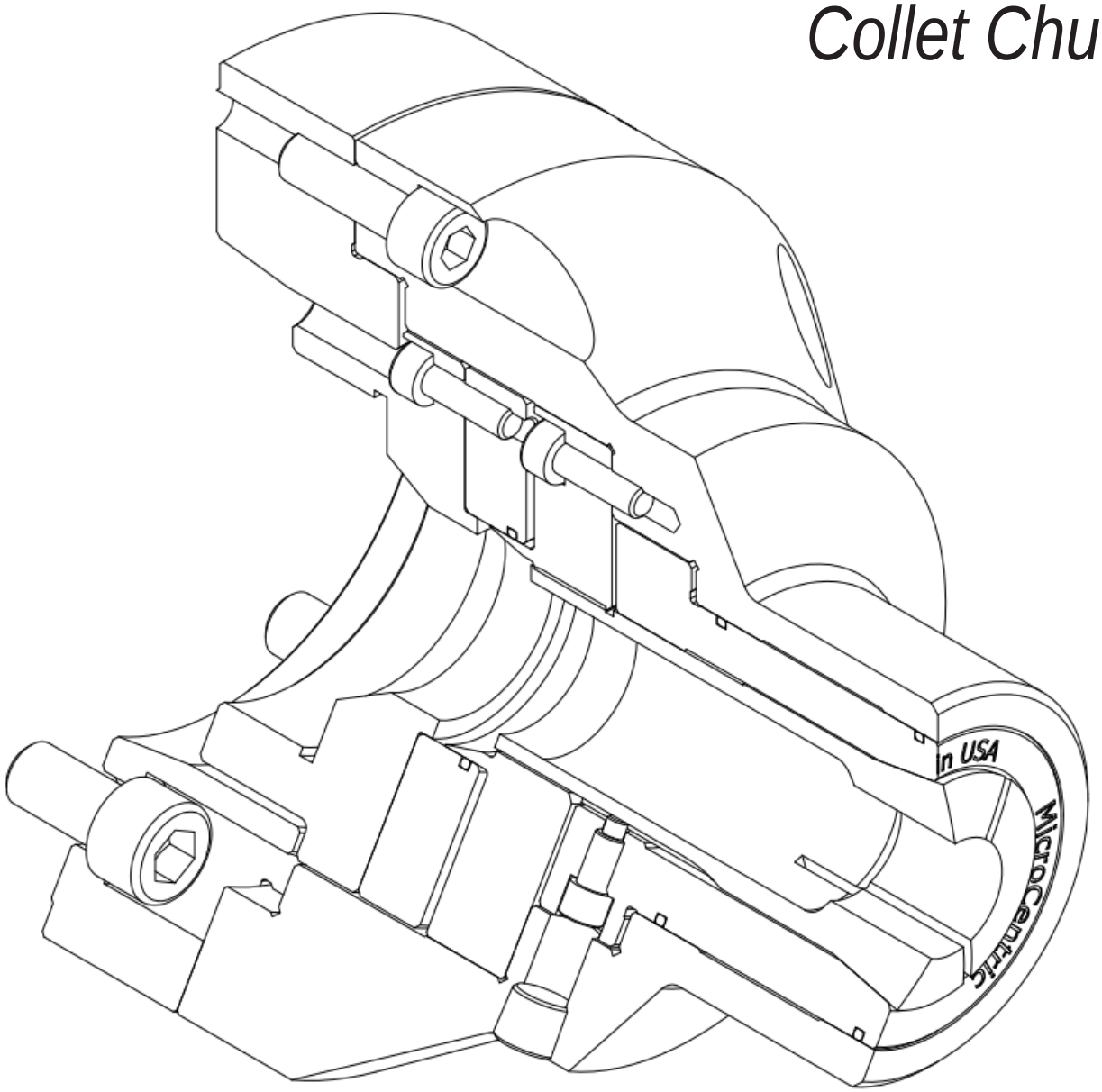
MicroCentric

Precision Workholding Technology

Technical Documentation for 5C,16C, and 3J Dead Length Collet Chucks



www.microcentric.com

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1.0 CONTACT AND SERVICE INFORMATION

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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.

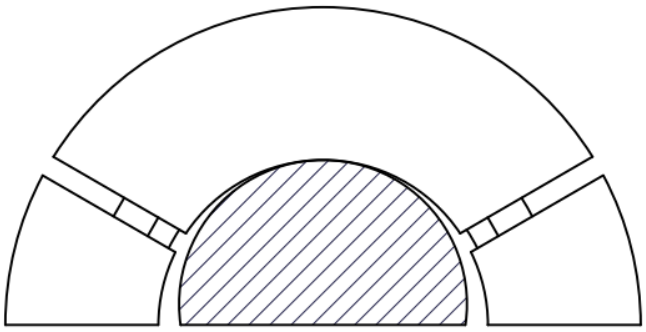


Figure 5.1

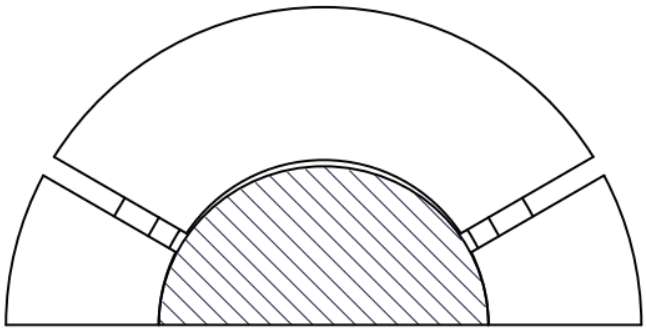


Figure 5.2

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.

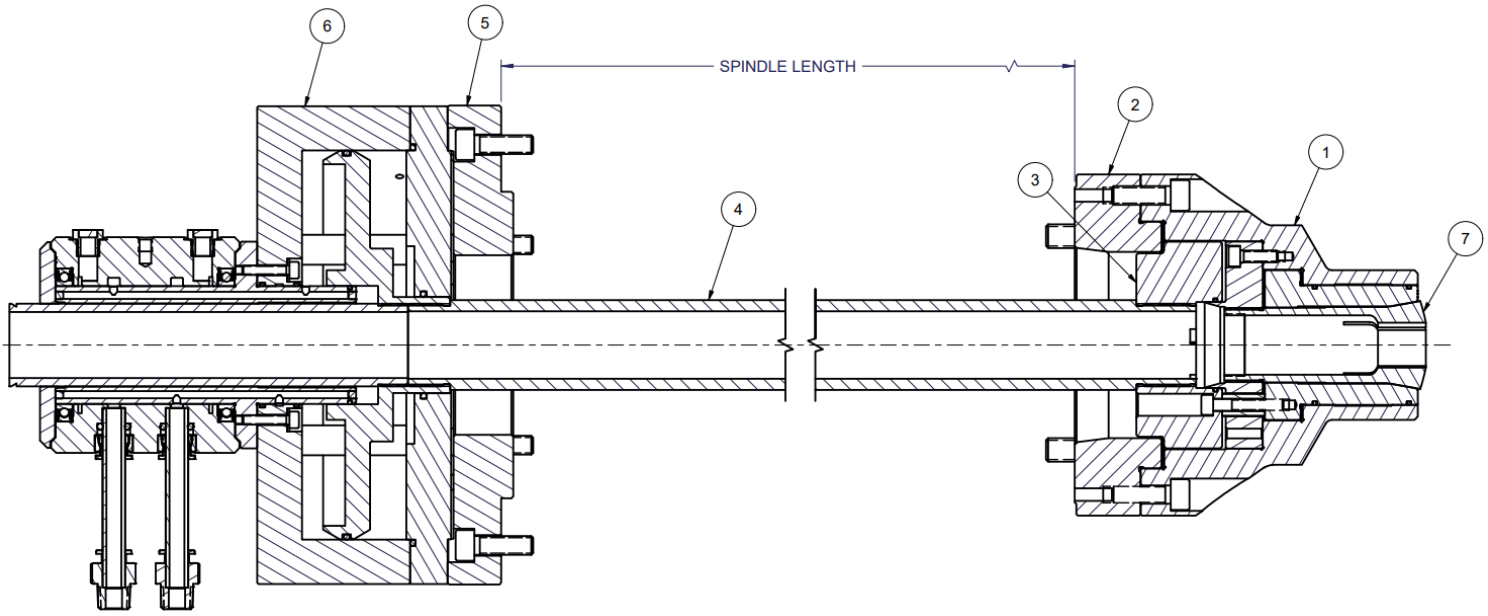
WARNING

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 COLLET CHUCK SYSTEM ASSEMBLY



ITEM	QTY	TITLE
1	1	COLLET CHUCK ASSY
2	1	ADAPTER
3	1	DRAW TUBE CONNECTOR*
4	1	DRAW TUBE
5	1	CYLINDER ADAPTER
6	1	CYLINDER ASSY (HYDRAULIC OR PNEUMATIC)
7	1	COLLET

*One-piece draw tube connector shown

7.0 COLLET CHUCK INSTALLATION

MicroCentric collet chucks are supplied with a spindle mounting plate and a threaded draw tub connector 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 9.0 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.

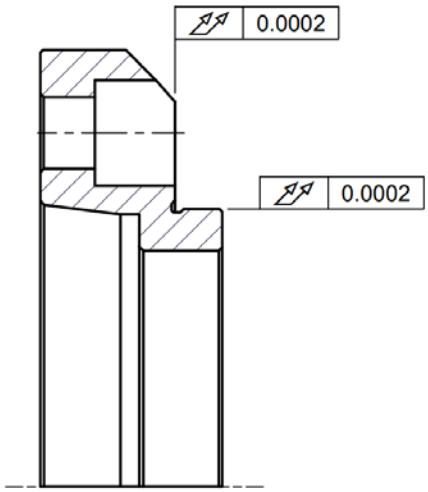


Figure 7.1

IMPORTANT

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

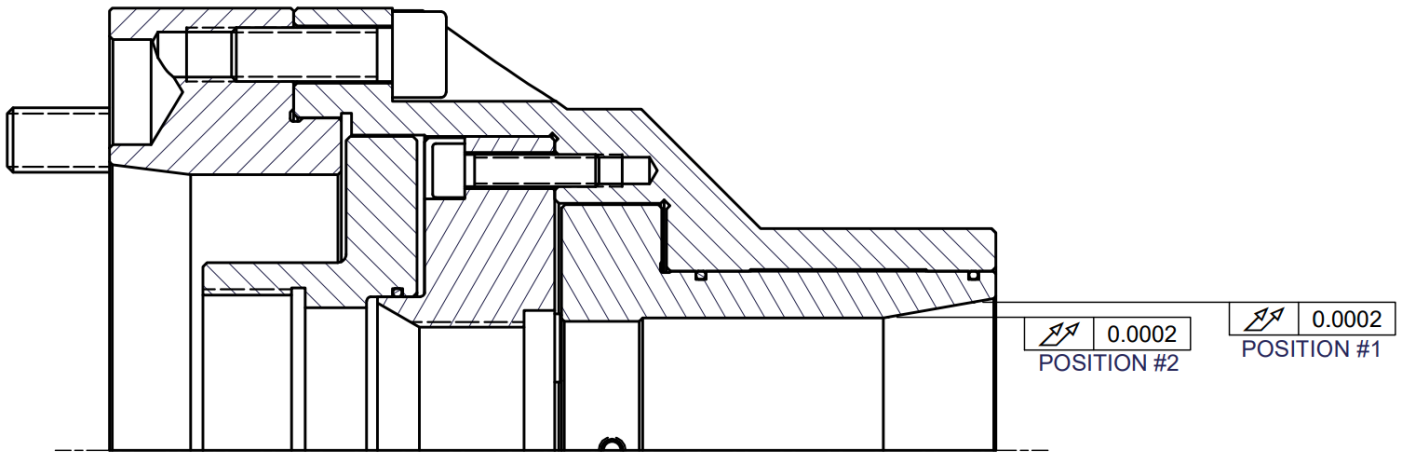


Figure 7.2

7.2 MOUNTING CHUCK ASSEMBLY

1. Set the draw tube force to the lowest pressure that is available for your machine. Actuate the draw tube to bring it to the forward position.
2. Make certain that the mounting surfaces of the chuck body and adapter plate are clean and free of nicks or burrs that could prevent the proper seating of the chuck body. Also make sure the (4) radial adjusting screws are not protruding into the locating diameter of the chuck body. Note:CB5C-D collet chuck assemblies do not contain radial adjusting screws.
3. Take the entire chuck assembly and thread the draw tube connector onto the draw tube until the thread bottoms out. Back the chuck assembly off the draw tube thread approximately 1/4 turn.
4. Actuate the draw tube to seat the chuck onto the adapter plate, and align the mounting bolts in the body with the mounting holes on the adapter plate.
5. Semi tighten all the mounting bolts, but do not fully tighten them at this point.
6. Indicate the ID runout of the collet taper as shown in position #1 in Figure 7.2. Make adjustments to the (4) radial adjusting screws so that the runout of the collet taper is within .0002" (0.005mm). Note: CB5C-D collet chuck assemblies do not contain radial adjusting screws, and must be adjusted by loosening the mounting bolts and tapping the chuck assembly with a plastic hammer.
7. Before tightening the mounting bolts, measure the runout of the collet taper on position #2 in Figure 7.2. If the chuck body is properly seated on the adapter plate, the runout measured on position #2 should be the same as position #1. If the runout measured in position #2 exceeds the runout of position #1 by more than .0001" (0.0025mm), remove the chuck body from the adapter plate and repeat this mounting procedure.
8. After the runout of the collet taper has been adjusted, tighten the mounting bolts to the torque specifications given in Section 4. Also make sure to tighten all (4) radial adjusting screws.
9. Actuate the draw tube to verify that the chuck is functioning correctly by measuring the stroke of tapered sleeve as shown in Figure 7.3.

IMPORTANT

The runout of the ID of the tapered collet seat should not exceed .0002" (0.005mm).

CHUCK MODEL	MIN. SLEEVE STOKE
CB5C-ND	.070"
	1.78mm
CB5C-D	.070"
	1.78mm
CB16C-ND	.070"
	1.78mm
CB3J-ND	.100"
	2.54mm

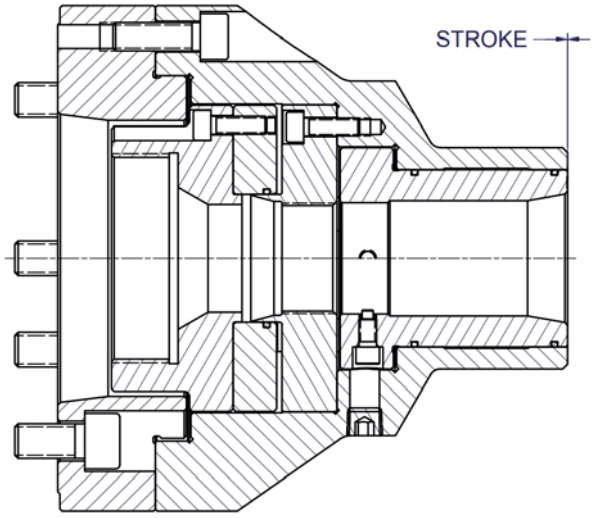


Figure 7.3

IMPORTANT

Verify that the chuck is functioning correctly by measuring the stroke of the collet sleeve.

8.0 COLLET INSTALLATION

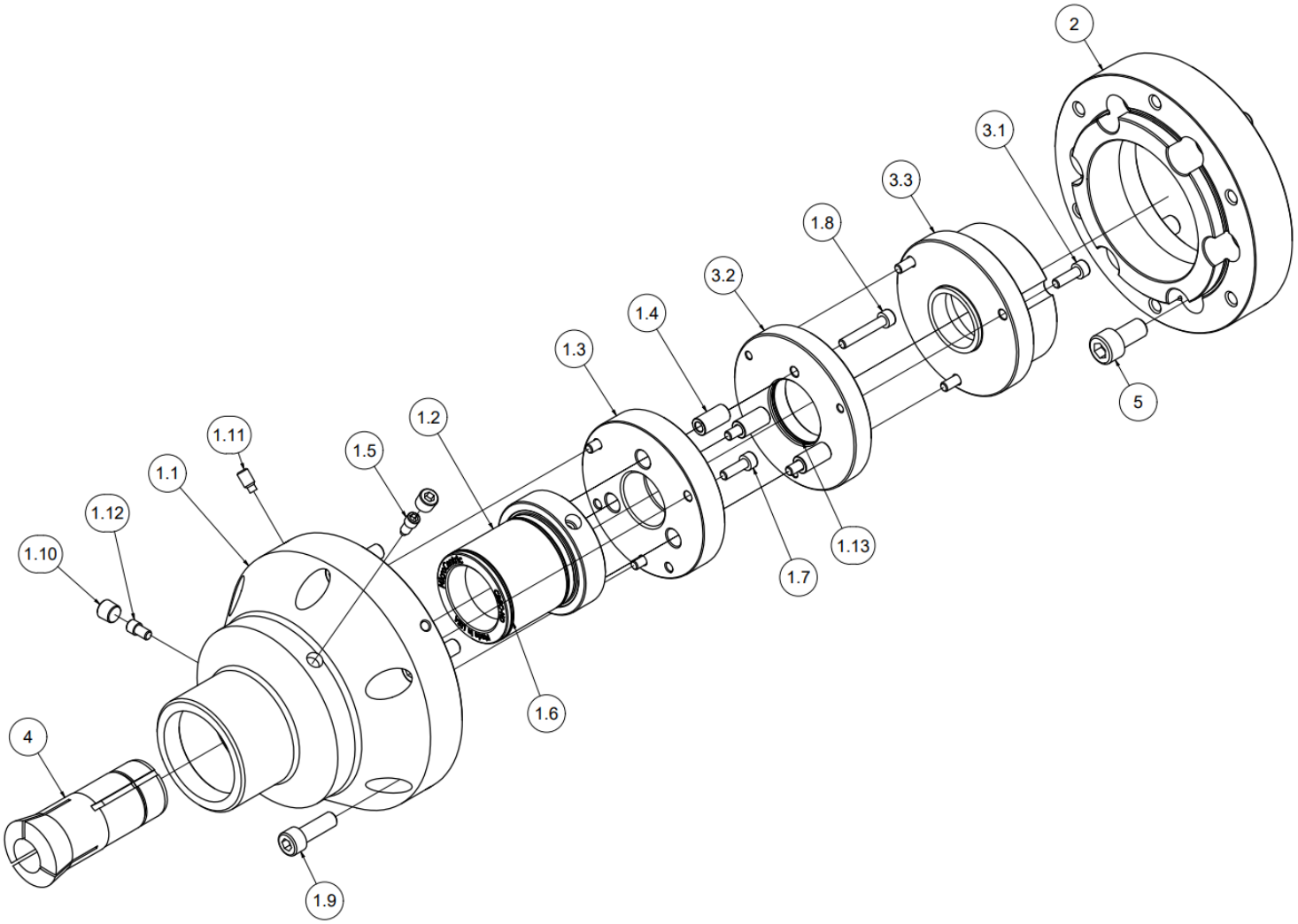
1. Set the draw tube force to the lowest pressure that is available for your machine. Actuate the draw tube to bring it to the forward position.
2. Thread the collet into the piston until the collet contacts the taper on the chuck body.
3. Insert collet key into keyway of the collet. Utilize any of the three holes within the side of the chuck body. Slightly unthread collet if necessary. Tighten collet key securely. Note: CB5C-D collet chucks are sealed by the collet key, and do not have an additional pressure plug.
4. Place pressure in the same hole as the collet key to seal the passage. In addition, place pressure plugs in two remaining holes to plug passages. See Section 10 for assembly drawings. Note: CB5C-D collet chucks utilize two additional socket head cap screws rather than pressure plugs to seal the remaining two passages.
5. Actuate the chuck to verify that the collet was installed correctly, before attempting to clamp a workpiece.

IMPORTANT

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

9.0 ASSEMBLY DRAWING AND PARTS LIST

9.1 CB5C-ND COLLET CHUCK ASSEMBLY AND PARTS LIST

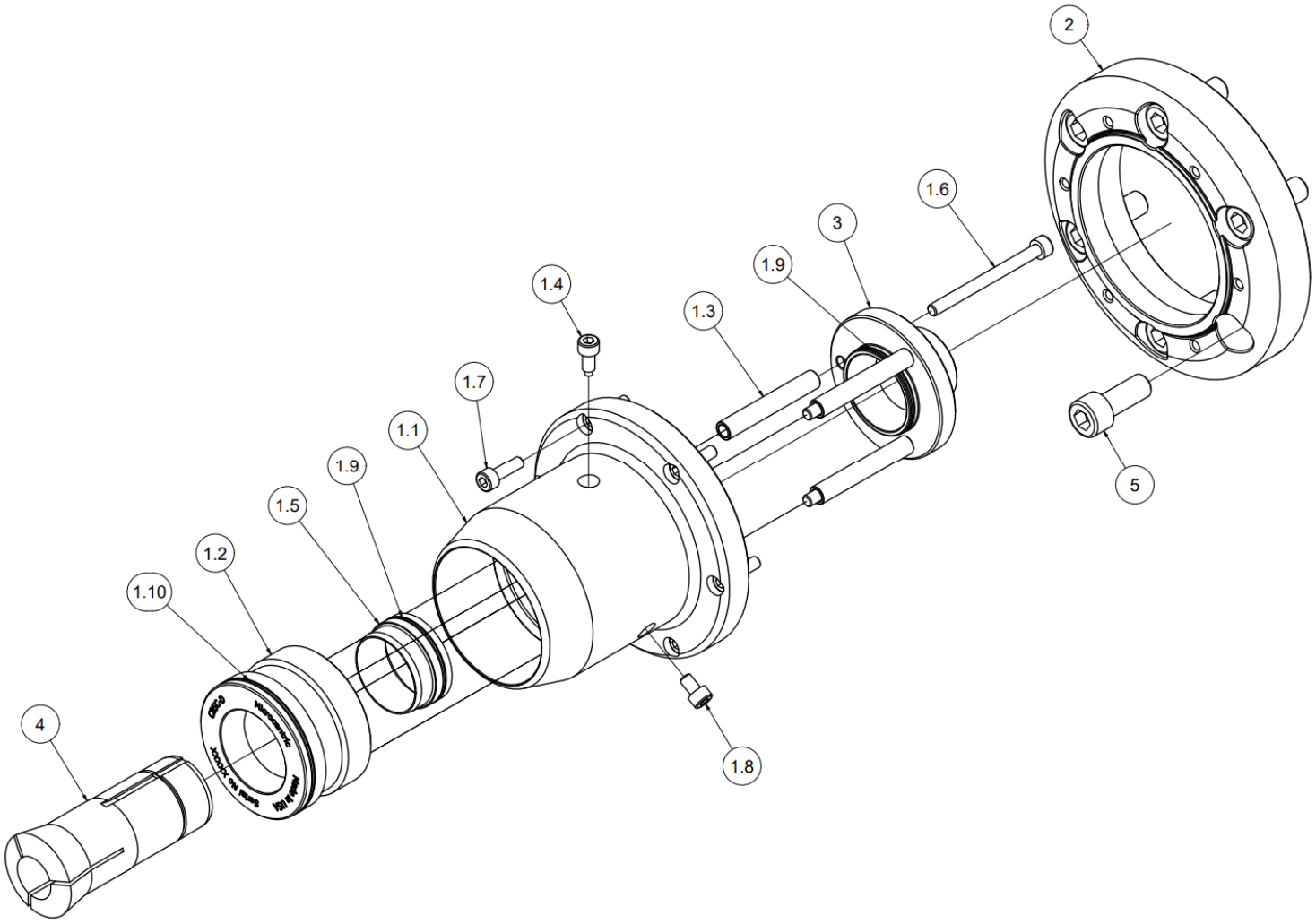


ITEM	QTY	TITLE
1	1	FITTED BODY & SLEEVE
1.1	1	COLLET CHUCK BODY
1.2	1	COLLET SLEEVE
1.3	1	NUT RING
1.4	3	BUSHING
1.5	1	COLLET KEY
1.6	2	O-RING
1.7	3	SOCKET HEAD CAP SCREW
1.8	3	SOCKET HEAD CAP SCREW
1.9	6	SOCKET HEAD CAP SCREW
1.10	3	PRESSURE PLUG

ITEM	QTY	TITLE
1.11	4	DOG POINT SET SCREW
1.12	2	COLLET SLEEVE PLUG
1.13	1	O-RING
2	1	ADAPTER
3	1	DRAW TUBE CONNECTOR ASSY*
3.1	3	SOCKET HEAD CAP SCREW
3.2	1	DRAW TUBE CONNECTOR FLANGE
3.3	1	DRAW TUBE CAP
4	1	5C COLLET
5	6	SOCKET HEAD CAP SCREW

*Two-piece draw tube connector assembly shown

9.2 CB5C-D COLLET CHUCK ASSEMBLY AND PARTS LIST

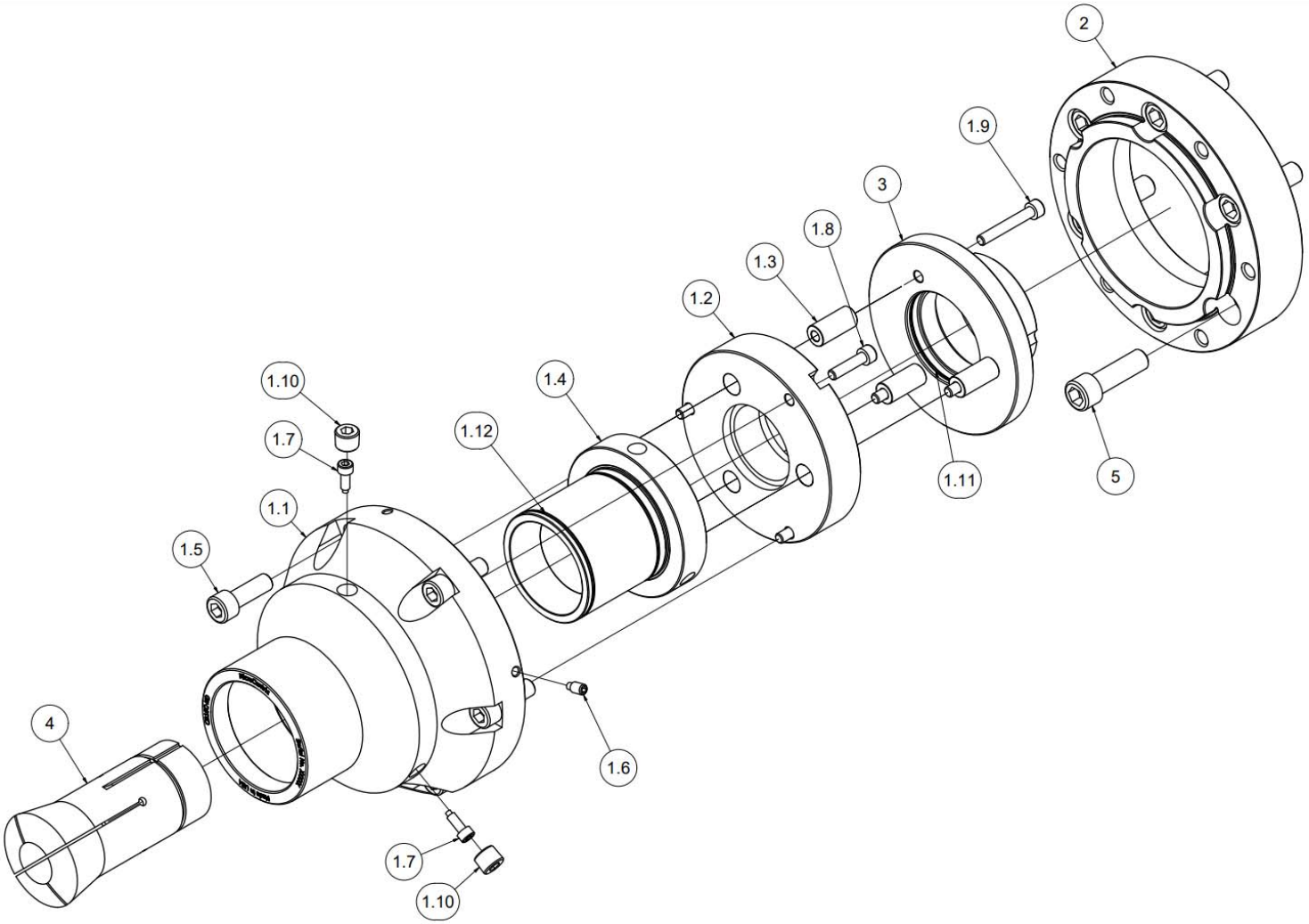


ITEM	QTY	TITLE
1	1	FITTED BODY & SLEEVE
1.1	1	COLLET CHUCK BODY
1.2	1	COLLET SLEEVE
1.3	3	BUSHING
1.4	1	COLLET KEY
1.5	1	SEAL
1.6	3	SOCKET HEAD CAP SCREW
1.7	9	SOCKET HEAD CAP SCREW

ITEM	QTY	TITLE
1.8	2	SOCKET HEAD CAP SCREW
1.9	2	O-RING
1.10	1	O-RING
2	1	ADAPTER
3	1	DRAW TUBE CONNECTOR*
4	1	5C COLLET
5	6	SOCKET HEAD CAP SCREW

*One-piece draw tube connector shown

9.3 CB16C-ND COLLET CHUCK ASSEMBLY AND PARTS LIST

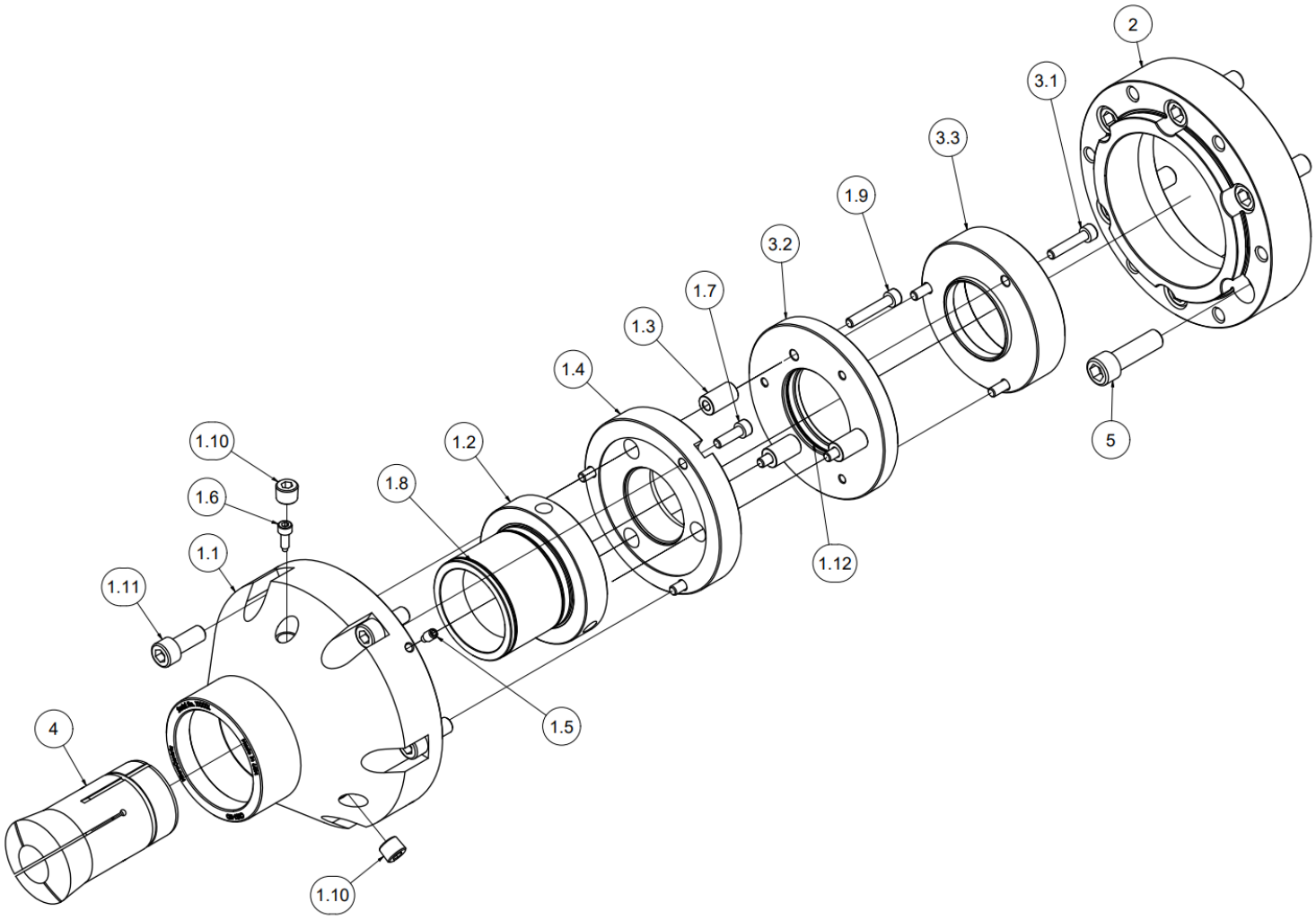


ITEM	QTY	TITLE
1	1	FITTED BODY & SLEEVE
1.1	1	COLLET CHUCK BODY
1.2	1	NUT RING
1.3	3	BUSHING
1.4	1	SLEEVE
1.5	6	SOCKET HEAD CAP SCREW
1.6	4	DOG POINT SET SCREW
1.7	2	COLLET KEY
1.8	3	SOCKET HEAD CAP SCREW

ITEM	QTY	TITLE
1.9	3	SOCKET HEAD CAP SCREW
1.10	3	PRESSURE PLUG
1.11	1	O-RING
1.12	2	O-RING
2	1	ADAPTER
3	1	DRAW TUBE CONNECTOR*
4	1	16C COLLET
5	6	SOCKET HEAD CAP SCREW

*One-piece draw tube connector shown

9.4 CB3J-ND COLLET CHUCK ASSEMBLY AND PARTS LIST



ITEM	QTY	TITLE
1	1	FITTED BODY AND SLEEVE
1.1	1	COLLET CHUCK BODY
1.2	1	SLEEVE
1.3	3	BUSHING
1.4	1	NUT RING
1.5	4	DOG POINT SET SCREW
1.6	1	COLLET KEY
1.7	3	SOCKET HEAD CAP SCREW
1.8	2	O-RING
1.9	3	SOCKET HEAD CAP SCREW

ITEM	QTY	TITLE
1.10	3	PRESSURE PLUG
1.11	6	SOCKET HEAD CAP SCREW
1.12	1	O-RING
2	1	ADAPTER
3	1	DRAW TUBE CONNECTOR ASSY*
3.1	3	SOCKET HEAD CAP SCREW
3.2	1	DRAW TUBE CONNECTOR
3.3	1	DRAW TUBE CAP
4	1	3J COLLET
5	6	SOCKET HEAD CAP SCREW

*Two-piece draw tube connector assembly shown

10.0 TROUBLE SHOOTING GUIDE

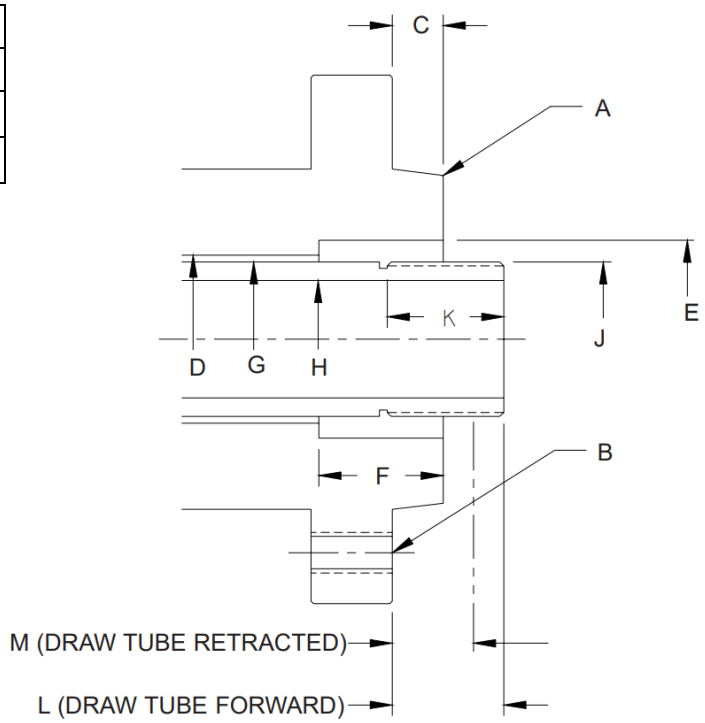
This trouble shooting guide is intended to help you identify some common causes of problems experienced operating MicroCentric dead length collet chucks, or correctly clamping a bar or workpiece. For further assistance contact one of our technical sales associates.

PROBLEM	POSSIBLE CAUSE	SUGGESTED REMEDY
The tapered collet sleeve does not stroke fully.	The forward and retracted position of the draw tube was not specified correctly.	Refer to the spindle data sheet in Section 11. Remove the collet chuck from the machine spindle and measure the draw tube position.
	The threaded draw tube connector was not made correctly.	Compare the design of the draw tube connector with the spindle data sheet for the machine model the chuck is being mounted to.
	Chips and sludge mat have accumulated inside the chuck body preventing the collet sleeve and/or the draw tube connector from stroking fully.	Disassemble the chuck and clean all chips and sludge that has built up inside the chuck body.
Workpiece (bar) runs out excessively.	Tapered collet seat is running out, (mounting screws not tight).	Indicate ID of the collet seat and re-true chuck to within specifications given in Section 7.2. Make sure 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.
	The tapered collet seat in the chuck body is worn.	Replace the chuck body assembly.
	The clamping diameter of the collet has worn.	Replace collet.
Workpiece (bar) 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 hydraulic pressure to the cylinder to increase the draw tube force to the chuck.
	Cutting force is too high.	Reduce cutting force.
	Coefficient of friction between collet and workpiece (bar) is insufficient.	Use a serrated collet. Use more aggressive serrations. Or apply a diamond particle plating or carbide grit to the clamping surface of the collet.
	Spindle speed is too high.	Reduce spindle speed.
Workpiece comes out of the collet	Too short a length of the workpiece is being clamped.	Increase the length being clamped to ensure the part is within the tapered collet sleeve.

11.0 SPINDLE DATA SHEET

Company	
Chuck Model	
Date	
Ref. No.	

Contact us at ***1-516-349-7220*** *if you have any questions about completing this data sheet.*



Machine Make		
Machine Model		
Machine Serial No.		
A* taper size		
B mounting thread		
C length of pilot		
D through hole diameter		
E ID counterbore or taper (if any)		
F depth of counterbore (if any)		
G OD of draw tube		
H ID of draw tube		
J thread data	thread diameter	
	thread pitch	
	right hand / left hand	
	OD thread / ID thread	
K length of thread		
L** forward position		
M retracted position		

* For machines with a straight spindle pilot a detail drawing of the spindle must be submitted

** Positive (+) indicates draw tube is in front of the spindle face (as shown)
Negative (-) indicates draw tube is behind the spindle face

Please email completed form to ***sales@microcentric.com***

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