CNC Collet Chuck
Installation & Operating Manual
Installation CB-B Series Barwork Chucks

Refer to the outline/assembly drawing supplied with your MicroCentric CNC collet chuck to become familiar with the chuck's design and its components. Most CB-B series collet chucks consist of a chuck body, spindle adapter plate, and actuator (draw tube connector). On some models the collet chuck body mounts directly to the machine's spindle nose.

1. Always make certain that the mounting surfaces of each component (the spindle nose, the adapter plate, and the chuck body) are free of nicks, burrs, or foreign material that could prevent proper seating.

2. First mount the adapter plate to the machine's spindle nose. For tapered spindle noses, tighten the mounting screws alternately and equally at this point. Make certain the screws are secure, but do not over tighten. For flat pilot spindles, tighten the mounting screws lightly and proceed to the next step.

3. With a test indicator, measure the radial and lateral runout of the mounting plate as illustrated in figure 2.1. Radial and lateral runout should not exceed .0002" (0.005mm). On flat pilot spindles the runout can be adjusted to within this specification before the mounting screws are tightened. No adjustment is possible with taper nose spindles. If runout of the mounting plate exceeds .0002" (0.005mm), the adapter plate should be removed from the spindle. Check again that the mounting plate and spindle are clean and free of nicks or burrs. When remounting the adapter, verify that the mounting surfaces are seated properly.

4. Next bring the machine's draw tube to its forward position. Thread the actuator onto the draw tube. Use a spanner wrench to tighten the actuator firmly to the draw tube. Tighten the actuator securely but do not use excessive torque.

5. Actuate the hydraulic cylinder to retract the draw tube.

6. Mount the collet chuck body to the adapter plate. Only tighten the mounting screws lightly at this point.

7. Measure the runout of the tapered collet seat as illustrated in figure 2.2. Runout should be measured at two places on the taper (front and back). Radial runout should be adjusted to within .0002" (0.005mm) or less, at both places. Only use a plastic tipped hammer to true up runout of the chuck body.

8. Tighten the mounting screws alternately and equally. Do not over tighten the screws.

9. Verify that the chuck has the correct actuator stroke given on the outline/assembly drawing. Measure the forward and rear positions of the actuator relative to the face of the chuck body. Compare your measurements to those on the drawing. Maximum allowable deviation of the actuator stroke is \( \pm 0.010 \) (0.25mm).

10. Familiarize yourself with the maximum draw bar force specified for your MicroCentric CNC collet chuck. Refer to the data supplied with your machine to translate this draw bar force to hydraulic pressure. Set the hydraulic pressure into the cylinder to a value which will not exceed the maximum draw bar force for the chuck.
Installation CB-D Series Dead-Length Chucks

Refer to the outline/assembly drawing supplied with your chuck to become familiar with the chuck's design and its components. CB-D series collet chucks consist of a chuck body assembly (with collet seat and bushings), spindle adapter, and actuator (draw tube connector).

1. Always make certain that the mounting surfaces of each component (the spindle nose, the adapter plate, and the chuck body) are free of nicks, burrs, or foreign material that could prevent proper seating.

2. First mount the adapter plate to the machine's spindle nose. For tapered spindle noses, tighten the mounting screws alternately and equally at this point. Make certain the screws are secure, but do not over tighten. For flat pilot spindles, tighten the mounting screws lightly and proceed to the next step.

3. With a test indicator, measure the radial and lateral runout of the mounting plate as illustrated in figure 3.1. Radial and lateral runout should not exceed .0002" (0.005mm). For flat pilot spindles the runout can be adjusted to within this specification before the mounting screws are tightened. No adjustment is possible with taper nose spindles. If runout of the mounting plate exceeds .0002" (0.005mm), the adapter plate should be removed from the spindle. Check again that the mounting plate and spindle are clean and free of nicks or burrs. When remounting the adapter, verify that the mounting surfaces are seated properly.

4. Next bring the machine's draw tube to its forward position, and thread the entire chuck assembly onto the draw tube. Continue threading the chuck assembly as far as it will go. Back out the thread until the mounting holes on the chuck body align with the threaded holes on the adapter plate.

5. Actuate the machine's hydraulic cylinder to retract the draw tube, seating the chuck body onto the adapter plate. If the mounting holes on the chuck body and adapter do not line up, bring the draw tube back to its forward position, align the mounting holes, and repeat this step. Always make certain the mounting surfaces of the chuck and adapter are clean and free of nicks.

6. Insert the mounting screws and tighten lightly at this point.

7. Measure the runout of the tapered collet seat as illustrated in figure 3.2. Runout should be measured at two places on the taper (front and back). Radial runout should be adjusted to within .0002" (0.005mm) or less, at both places. Only use a plastic tipped hammer to true up the runout of the chuck body.

8. Tighten the mounting screws alternately and equally. Once again do not over tighten the screws.

9. Verify that the chuck has the correct actuator stroke given on the outline/assembly drawing. Measure the forward and rear positions of the actuator relative to the face of the chuck body. Compare your measurements to those on the drawing. Maximum allowable deviation of the actuator stroke is +-.010 (0.25mm).

10. Familiarize yourself with the maximum draw bar force specified for your MicroCentric CNC collet chuck. Refer to the data supplied with your machine to translate this draw bar force to hydraulic pressure. Set the hydraulic pressure into the cylinder to a value which will not exceed the maximum draw bar force for the chuck.
Installation CB-DC Series Combination Chucks

Refer to the installation procedure for CB-D series chucks. The CB-DC series chucks are essentially the same chuck as the CB-D series, with the addition of threaded mounting to install stop plates behind the collet. To convert the CB-DC chuck from bar to chucking work, first remove the quick change collet and mount the stop plate as described below.

Stop Plate

CB-DC Series chucks are supplied with a stop plate which has a threaded hole onto which part stops, centers, or ejectors, can be mounted.

The stop plate is installed and removed by a wrench which is also supplied with the chuck.

Always make sure the threaded mounting and stop plate are clean and free of nicks which would prevent proper seating of the stop plate. Tighten the stop plate securely onto the chuck but do not use excessive force.

It is recommended that a grease be applied to the threads on the stop plate prior to installation to facilitate easy removal at a later date. Refer to figure 4.1.

Stop Housings

To end stop long workpieces, stop housings into which workpieces can be swallowed are available in various lengths. Stop housings are installed with the wrench used to install the stop plate previously described.

Figure 4.2 shows a typical stop housing which incorporates a thread in the center for mounting stop pads or other locators.

Figure 4.1

Note: The stop plate is installed while the collet is removed from the chuck.

Figure 4.2

Workpiece Locators

Part stops, ejectors, and centers are custom made and quoted upon request. Since workpiece locators are designed on application, installation procedure will vary.
Chucking Guidelines

Clamping Force
Higher clamping force is generally required for roughing applications than for finishing operations. The clamping characteristics of a collet are enhanced by serrations, which permitted higher rates of metal removal at a given draw tube force. The frictional force between the collet and the workpiece can also be increased by applying a carbide coating or diamond particle plating to the collet's holding surface. Generally serrations which are sharp and penetrate into the workpiece provide the greatest clamping force to prevent workpiece slippage. It has also been observed that collets with widely spaced serrations have enhanced gripping ability. 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. Recommendations for a specific application can be obtained by calling MicroCentric's technical support staff.

Accuracy
To obtain high accuracy workholding it is important to correctly match the collet diameter to the workpiece's O.D. 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 yield the best results in terms of chucking accuracy.

When a workpiece is clamped by a collet whose diameter is smaller than the workpiece's O.D., the condition shown in figure 5.2 will result. This will provide better clamping force on the workpiece, however, accuracy is usually 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. 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.

End Location of the Workpiece
Part stops can be used on CB-DC series chucks to provide end location of a workpiece. Figure 5.3 illustrates two basic stop configurations. Part stops and locators are generally designed for specific applications. Consult MicroCentric's technical support staff for further information.

Figure 5.2

Figure 5.1

Figure 5.3
A banking face can also be provided on the face of a special configuration collet. Figures 5.4 and 5.5 illustrate two examples of such collets. Dead-length style chucks are recommended for these applications because they provide consistent positioning as opposed to pull-back style chucks.

**Chucking Short Workpieces**

When chucking short workpieces it is important to stop the part on a surface which is perpendicular to the holding diameter. Without a true locating face to stop against, the workpiece will usually not be adequately centered for accurate workholding.

On applications where the workpiece's chucking length is less than .312" (8 mm) it is recommended that a reduced nose collet be used to properly hold the workpiece. Figure 5.6 illustrates a reduced nose collet chucking a short workpiece. Reduced nose collets are manufactured upon request. Contact MicroCentric's technical support staff for further information.

**Workpiece Ejectors**

Spring loaded parts ejectors can also be used on CB-DC chucks to aid automated operations by ejecting the workpiece from the chuck after unclamping.

Workpiece ejectors are designed on application. Contact MicroCentric's technical support staff for further information.

**Chucking Long Workpieces**

Long workpieces should be chucking at the largest a holding surface as is possible. Ideally a holding area should be a length equal to twice the workpiece's chucking diameter.

Locating a long workpiece on a face which is perpendicular to the holding diameter greatly enhances chucking accuracy and rigidity. Extremely long workpieces, where overall length is greater than four times the chucking length, require an end support to adequately hold the workpiece.

**Centrifugal Force**

A collet chuck is not subject to the magnitude of holding force loss, due to centrifugal forces, as is a jaw chuck. However, collet chucks sometimes lose a portion of their holding force at high spindle speeds. The holding force loss at high rpm's can be minimized by reducing the mass of a collet. Consult MicroCentric's technical support staff for further information.
Collet Chuck Operation

To insure proper and trouble-free operation of the collet chuck, it is very important that the chuck has been correctly installed, and has the proper collet stroke as indicated in the outline/assembly drawing supplied with the chuck.

MicroCentric quick change collet chucks are operated by the machine's hydraulic cylinder. Always set the appropriate chucking pressure for each application. If a collet is not adequately holding a workpiece, refer to the chucking guidelines section on page 5.

Caution: Do not exceed the maximum recommended draw tube forces specified in the table below.

<table>
<thead>
<tr>
<th>DRAW TUBE FORCE</th>
<th>CB-42</th>
<th>CB-65</th>
<th>CB-90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min (LB)</td>
<td>250</td>
<td>500</td>
<td>750</td>
</tr>
<tr>
<td>Max (LB)</td>
<td>8,000</td>
<td>10,000</td>
<td>14,000</td>
</tr>
</tbody>
</table>

An important rule to follow is to set hydraulic pressure to a value which is adequate for each particular application. Do not use draw tube forces which are considerably higher than required. Few devices will perform optimally for the long term when continually run at their maximum capacity.

Collet Changeover

MicroCentric quick change collets are collapsed by a changing fixture for installation and removal from the collet chuck. Changing fixtures are available either manual, pneumatic, or hydraulically operated.

| Always set the collet chuck into its unclamped position when installing and removing collets. On CB-B series chucks, the unclamped position is when the actuator (draw tube) is forward. On CB-D and CB-DC chucks, the unclamped position is when the actuator (draw tube) is in the rear position. |
| Collet Installation |
| 1. With the changing fixture in the open position, insert the pins on the changing fixture’s jaws into the holes on the face of the MicroCentric collet. The head on the pins should seat on the face of the collet. |
| 2. Actuate the changing fixture to collapse the MicroCentric collet. The collet is fully collapsed when the rear of all segments are touching. |
| 3. With the collet fully collapsed, insert the collet into the chuck. Make certain to align the slot on O.D. of the collet with the key in the tapered seat. |
| 4. While pressing the collet firmly against the face seal in the collet chuck, release the collet to engage it into the actuator or collet chuck body. |
| 5. Remove the changing fixture from the collet. |
| 6. Insert a workpiece or nominal size test bar to check that the collet is properly clamping. |
CLAMPING RANGE

<table>
<thead>
<tr>
<th>Collet Model</th>
<th>Clamping Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>42 BZI</td>
<td>+/- 0.020&quot; (0.5mm)</td>
</tr>
<tr>
<td>65 BZI</td>
<td>+/- 0.020&quot; (0.5mm)</td>
</tr>
<tr>
<td>90 BZI</td>
<td>+/- 0.040&quot; (1mm)</td>
</tr>
</tbody>
</table>

Changing Fixture Operation

Collet Removal
1. With the changing fixture in its open position, insert the pins into the holes on the face of the collet. The head of the pins should seat on the face of the collet.

2. Actuate the changing fixture to collapse the MicroCentric collet.

3. Remove the MicroCentric collet from the chuck. If the collet does not disengage from the chuck, the collet is not fully collapsing. First make sure the changing fixture is operating properly (check pressure setting on hydraulic units) and is correctly inserted into the collet. Also check that chips which may have accumulated in the chuck are not preventing the collet from collapsing fully. Never force the collet out of the chuck since damage to the collet chuck and/or changing fixture may result.

4. After the collet has been removed from the chuck, open the changing fixture to release the collet. Remove the collet from the fixture.

Hydraulic Pressure Recommendations

<table>
<thead>
<tr>
<th>Fixture Model</th>
<th>Pressure Range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min</td>
</tr>
<tr>
<td>CH42</td>
<td>350</td>
</tr>
<tr>
<td>CH65</td>
<td>450</td>
</tr>
<tr>
<td>CH90</td>
<td>650</td>
</tr>
</tbody>
</table>

Caution: Do not exceed the hydraulic pressure recommended for your changing fixture.