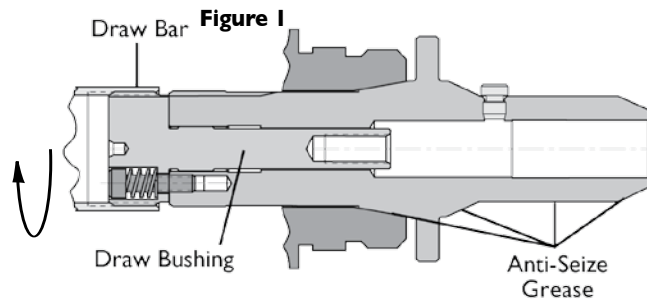


Installing 5C, I6C and 3J Sure-Grip Collet-Style Expanding Collet Systems

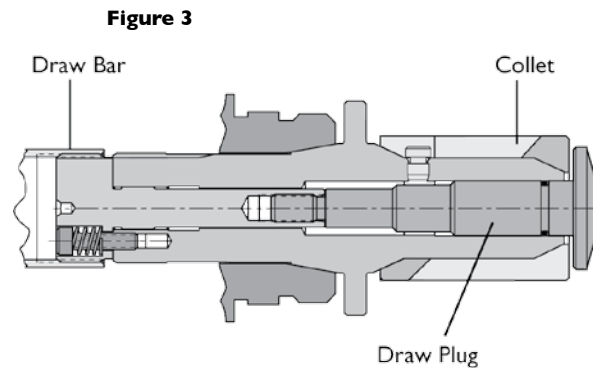
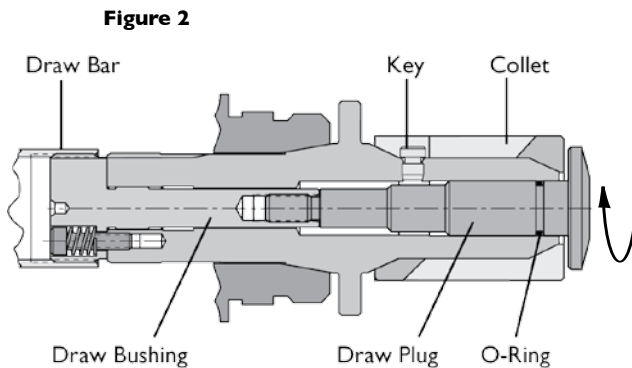
Installing the expanding collet arbor assembly

- Remove any spindle-mounted devices (jaw chuck, fixtures, etc.).
- Actuate the machine's draw bar to its open position – draw bar full forward.
- Thoroughly clean inside spindle and the expanding collet body.
- Coat all sliding surfaces with anti-seize grease.
- Fully insert the expanding collet arbor assembly into the spindle, aligning the collet keyway with the spindle key.
- Thread the draw bar onto the arbor assembly a couple turns. This is to temporarily secure the collet arbor while mounting the Collet and Draw Plug.
- Lightly coat angles and sliding surface with anti-seize grease.



Installing the collet

- To mount the #200, #250, #300, #400, #500 and #600 collets (#600 is not used on 5C Style) and adjust them properly, continue with the instructions. For the #100 style collets follow the instructions in the next section.



- Slide the expanding collet on the arbor, making certain the keyway is aligned to the key.
- Insert the draw plug with the O-ring into the spindle arbor and tighten until it bottoms out on the face of the draw bushing. The back face of the draw plug head should not touch the front face of the collet unless the machine's draw bar has been tightened too many turns. If this condition exists, back off the draw bar adjustment (see figure 2).
- Adjust the machine's draw bar until the back face of the draw plug is against the face of the collet (see figure 3). The collet should just begin to expand.
- If the collet is going to be used towards the high side of its range, adjust the machine's draw bar until there is about .005" (.127mm) clearance between the internal diameter of the workpiece and the expanding collet's outside diameter.
- Lock the machine's draw bar — Mount workpiece on expanding collet.
- Turn machine's draw bar pressure way down — Actuate machine's draw bar to close collet.
- Adjust pressure according to the following chart.

Maximum Recommended Draw Bar Pull for Collet Styles: 5C, I6C and 3J

	#100	#200	#250	#300	5C #400	5C #500	#400	#500	#600
Max. Lbs.	2,000	2,000	2,000	4,000	4,000	4,000	7,000	7,000	7,000
Max. Newtons	8,896	8,896	8,894	17,793	17,793	17,793	31,138	31,138	31,138

To obtain maximum efficiency and adequate gripping of your workpiece requires the proper amount of drawbar force. If inadequate force is used, the part will slip on the collet. Excessive force could break the threaded draw plug and possibly damage the spindle arbor. NOTE: Never exceed the Maximum Force in the chart. Use the above chart only as a general guideline. The end user is responsible for determining the drawbar force required to adequately hold the workpiece. Contact Hardinge if you have application questions.

Machining and Mounting the Work Stop

The internal diameter of the work stop must be machined before mounting to the assembly

Figure 4
Small Diameter Work Stops

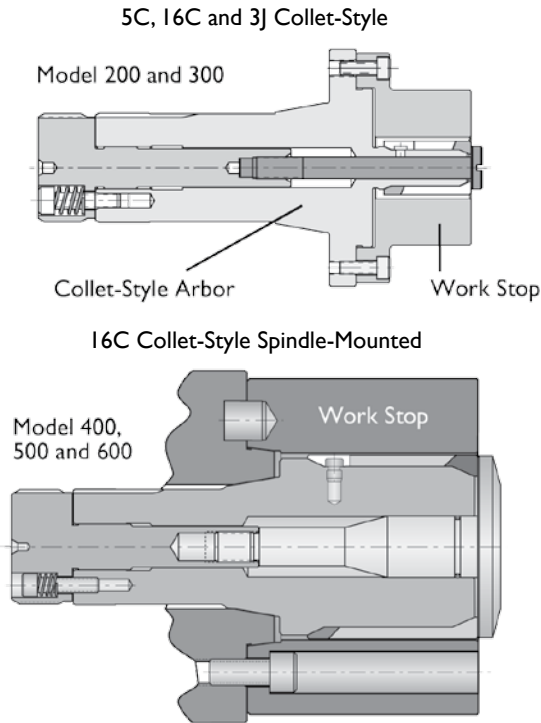
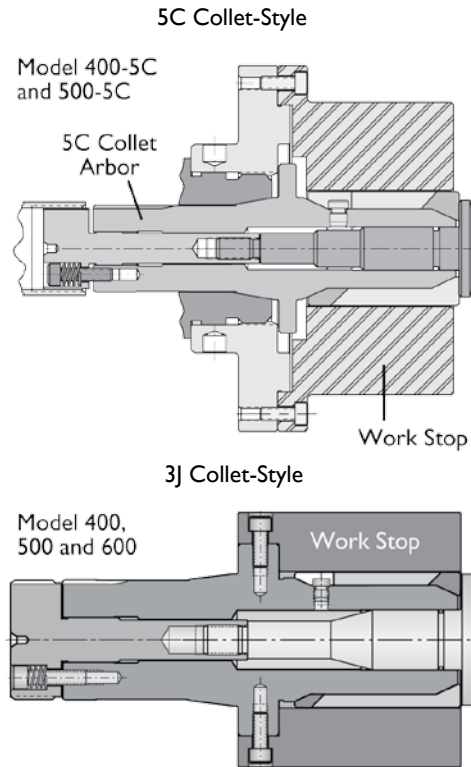


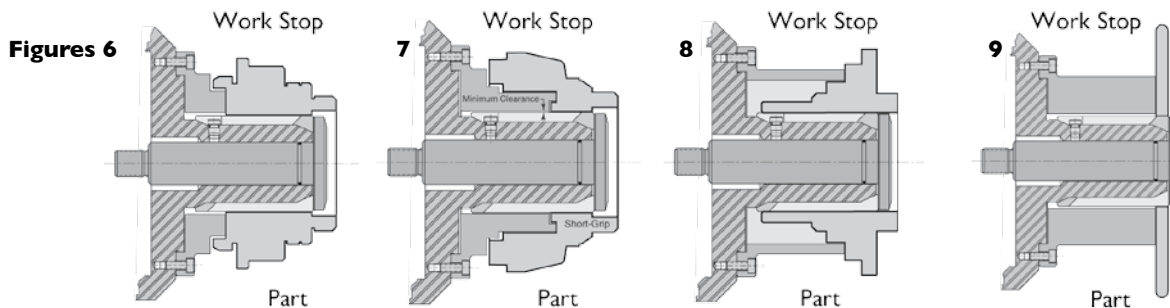
Figure 5
Large Diameter Work Stops



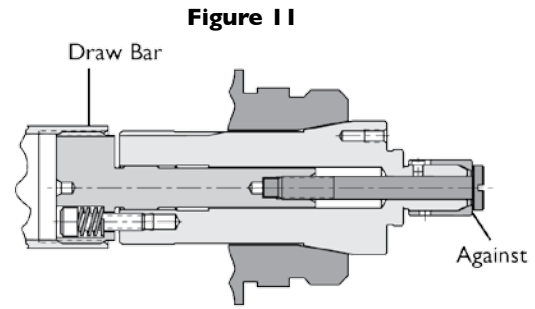
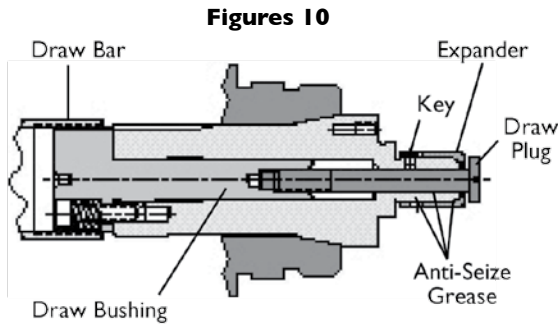
- When the full length of the collet grips the bore of the part, the ID of the work stop is bored to 1/64" (.396mm) above the maximum part ID. When short gripping, the work stop should be bored to .002" to .003" (.0508mm to .0762mm) larger than the maximum bore of the workpiece. This reduces gripping problems when holding on a bore that is less than the length of the collet.
- The work stop must be machined to conform to the locating surface required by the workpiece's engineering drawing. See figures 4 through 9 and "Frequently Asked Questions" Page 5.
- Clean all locating surfaces
- Using the four mounting screws, assemble the work stop onto the face of the spindle arbor, the threaded/taper nose spindle collar (5C), or the spindle (16C). The Model #200 #250 and #300 work stops bolt directly to the face of the collet arbors. See figure 20. The Model #400, #500 and #600 expanding collet assemblies require the work stops be bolted either to a spindle collar (5C), or the spindle (16C), or directly to the OD of the Arbor (3J) (see figures 4 & 5).

NOTE: If the perpendicularity tolerances are extremely close, the locating face of the work stop may need a very light cut taken with a facing tool.

- Put the workpiece on the collet, against the work stop and close the collet.
- Check the workpiece.



Installing Style #100 Expander & Draw Plug



- Install the 5C #100 Expanding Collet Assembly using the instructions "Mounting the 5C Arbor Assembly" on page 1.
- Coat the angle/sliding surfaces of the 5C arbor with anti-seize grease (see figure 10).
- Slide the expander full forward on the 5C arbor, aligning the keyway with the key.
- Insert the draw plug into the 5C arbor. Tighten the draw plug until it bottoms out in the draw bushing.
- Adjust the machine's draw bar until the back face of the draw plug is against the face of the expander. The expander should not be expanded (see Figure 23).
- Lock the machine's draw bar.

NOTE: Do not actuate the expanding collet system until the expanding collet #100S or #100L is mounted and a set ring or part is on the collet.

Mounting and Machining Style 100S and 100L Expanding Collets

Figure 12

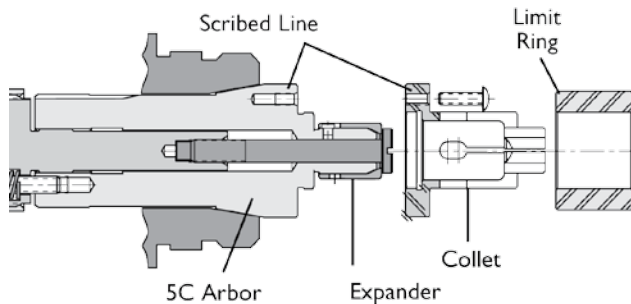
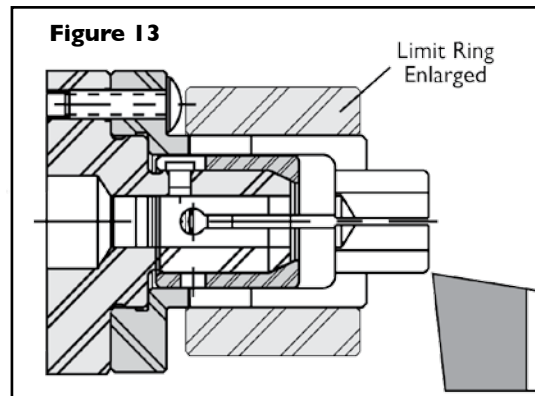


Figure 13



- Clean the faces of the 5C arbor, the bearing diameters and the expander.
- There are lines scribed on the large diameter of the expanding collet and on the face of the 5C arbor. Slide the expanding collet onto the expander sleeve and align the two scribe marks (see figure 12).
- Insert the three (3) button head screws and tighten.
- Slip the Limit Ring on the expanding collet until it touches the screws - pull away about .015" (.381 mm). This ensures that the expander is not misaligned by the screws (see figure 13).
- Turn the draw Bar pressure way down.
- Actuate the machine's closer to expand the collet
- Adjust the machine's closer pressure to make certain it is adequate and not too high (see "maximum recommended draw bar pull" chart on page 1).

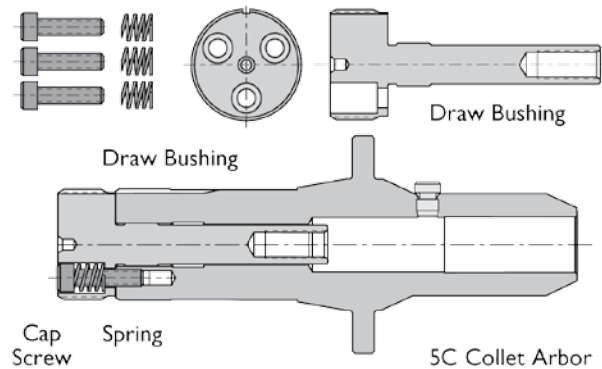
Sure-Grip® Expanding Collets (collet-style) Instructions B-97B

NOTE: The maximum length of the gripping portion of the collet should not exceed the diameter dimension of the workpiece's bore. For example, a part with .125" (3.17mm) bore should have a maximum turned length of .125"(3.17mm). A part with a .375"(9.53mm) bore should have a maximum turned length of .375"(9.53mm). If the length recommendations are exceeded, the collet will collapse in the front resulting in a line contact at the back of the collet. Concentricity requirements will be very difficult to hold. In this condition, the part may slip, causing damage to the part, collet, and/or cutting tools.

- Machine the collet to the desired dimension. The last cut on the OD and the face should be very light. The finished diameter should be the same size as the bore of the workpiece (-.001 [.025mm] or less).
- Remove the Limit Ring.
- Deburr the collet — Begin your production run.

Spring Replacement – All Collet Arbor Assemblies

- Remove the three cap screws and the three springs.
Note: The cap screws have been factory set using loctite.
- Check the shoulders of the cap screws as well as the springs for damage. Replace all damaged parts
Cap Screw - Hardinge Part # 0100312
Spring - Hardinge Part # CS 0006045
- Remove the threaded draw bushing - clean and coat with anti-seize grease.
- Replace threaded draw bushing, aligning keyway with keyway on the collet arbor.
- Place springs on each screw.
- Place cap screw with spring in counterbored holes in the end
- * Tighten to compress the spring, then back of 2 full turns



Troubleshooting:

The workpiece will not fit on the collet:

- The draw bar adjustment has expanded the collet too much. Loosen the draw bar and then adjust it until the workpiece easily slides on the collet. Re-lock the draw bar.
- Check the size of the collet. The range is -.001" to +.015" (.025 to .381mm) from the size of the collet. The range of the Model #100 is -.001" to +.005" (.0254- to .127mm) from the size of the original turned diameter.

The spindle arbor runs out or the collet on the arbor runs out:

- Remove the spindle arbor and clean the spindle and arbor thoroughly. Look for small nicks and stone them down with a hard Arkansas stone (white stone). Use a lint-free cloth when cleaning the parts.
- Check the Total Indicator Reading (TIR) of the machine's spindle.

Frequently Asked Questions

Can I machine a workpiece without using a work stop?

Yes & No. The collet draws back as it grips the bore of the workpiece. Any variation in the gripping diameter will cause the part to pull back farther or less than the setup piece. If you are only machining the OD of the part, then a work stop is not necessary. Unfortunately 99% of the time this is not the case. Usually you will be machining a face or shoulder which has a length dimension that has to be held to a locating surface. This requires a work stop.

Do I have to buy a different collet for each different bore size?

No. The collets will handle a variation in size of $-.001"$ to $+.015"$ (.025mm to .381mm). If you have a 1-3/4" (44.45mm) collet, it can grip workpieces that have bores from 1.749" to 1.765" (44.42mm to 44.83mm) in diameter.

Will I destroy the expansion collet if I close the collet without a part on it?

No. The Hardinge® Sure-Grip System is designed to eliminate this problem. The draw plug will contact the face of the arbor before the collet can be overexpanded.

Can I buy Emergency Expanding Collets?

No. Because the collets come in 1/64" (.3968mm) sizes and each collet can handle a variation of $-.001"$ to $+.015"$ (.025mm to .381mm), there is no need for emergency collets.

Can I grip on a Hex hole?

Yes. Hex and Square collets are available.

Can I damage my Hardinge Sure-Grip System if I use too much draw bar force?

Yes: The maximum draw bar forces are listed on page 1. If you exceed these forces, you may damage the arbor assembly.

I plan on taking 1/8" off a part while holding on a small bore. Can I use the Model #100?

No: The #100 collet is for light machining operations such as taking a few thousandths off the face or OD of a workpiece. We recommend that you use the Model "S" Precision-style expanding collet for heavier stock removal on parts with small bores less than 1/2" (12.7mm).

How do I machine the Work Stop?

This is usually done by gripping the work stop in a step chuck or 3-jaw chuck. When the full length of the collet grips the bore of the part, the ID of the work stop should be bored to 1/64" (.3968mm) above the maximum part ID. When short gripping, the bore of the work stop should be $.002"$ to $.003"$ (.0508 mm to .0762 mm) larger than the maximum bore of workpiece. This practice will ensure the best gripping of workpieces whose bore is less than the length of the collet (this is called short-gripping). The remainder of the machining on the work stop relates to the workpiece and its locating surface. After mounting the work stop onto the arbor, take a very light facing cut on the locating surface to make it perpendicular to the centerline of the spindle. For models #400, 500 and 600, the 5C work stop mounts to a spindle adapter and the 16C work stop bolts directly to the spindle. For models #200, 250 and 300, the work stops bolt directly to the arbor. When machining the work stop, do not mount the collet arbor; mount the spindle adapter and work stop to the 5C spindle adapter or bolt the 16C work stop to the A2-5 spindle and machine the bore and work stop according to the workpiece specifications. Caution: Do not bore the work stop any deeper than 1/8" beyond the length of the collet otherwise you may run into the face of the spindle. After machining, remove the work stop, clean the spindle, mount the spindle arbor; replace the work stop and adjust the collet closer. You must take a very light facing cut on the locating surface of the work stop to make it run perpendicular to the centerline of the spindle.

After mounting my Expanding Collet Assembly, the TIR is a couple thousandths.

How can I correct this condition?

Did you take a very light facing cut on the locating surface of the work stop? Many people forget to do this operation and it must be done each time the assembly is mounted on/into the spindle. Not doing this operation can cause your workpiece to run out many thousandths. If you have taken a facing cut on the locating surface: Remove the Hardinge Sure-Grip Assembly, clean the spindle and the assembly. Look for small nicks and stone them down with a hard Arkansas stone (white stone). Use a lint-free cloth when cleaning the part. Before remounting the Hardinge Sure-Grip assembly, check the spindle TIR of your machine tool with an electronic indicator. For the collet-style assembly, check the collet seat. For the spindle-mounted style, check the spindle nose and the locating face. If these areas run out, the only solution is to have your machine spindle rebuilt. Remount the Hardinge Sure-Grip assembly without the collet and check the TIR of the arbor angles. If these run within the arbor specifications, mount the collet, take a very light facing cut on the work stop locating surface and then check the TIR with a gauge piece. A gauge piece is made by boring a hole in a blank to the exact size of the part bore, facing the end and turning the OD all in one chucking. This piece is then mounted on the Hardinge Sure-Grip expanding collet with the machined face located against the work stop. Don't forget, the work stop must be lightly faced to make certain that it is perpendicular to the centerline of the spindle.