



Installing the Air Spring Kit

The air spring kit replaces the torsion-spring head support on the HiTorque Mini Mill and provides greater travel on the Z-axis.



The air spring kit includes the following parts:

- One air spring
- One head support shaft
- One air spring lower mount
- One air spring upper mount
- One Z-axis limit
- One long Z-axis rack
- One lower rod end
- Four M6x12 flat socket head machine screws
- Two M4x10 socket head cap screws
- Two M6x20 socket head cap screws
- Two M6x55 socket head cap screws
- One M8x20 socket head cap screw
- One M8x30 socket head cap screw
- Two M8 hex nuts
- Two M10 hex nuts

- One M8 flat washer

You will need the following tools:

- Hex (Allen) wrenches (2.5, 4, 5, and 6 mm)
- The end wrenches that came with your mill (14 and 17 mm)
- An M4x0.70 metric tap and tap drill (3.5 mm or #28)
- An M6x1 metric tap and tap drill (5.0 mm or #9)
- A 9 mm, letter T, or 23/64" drill bit
- A 6.5 mm, or 1/4" drill bit
- An 11/64" transfer punch
- An 13/64" transfer punch
- A #2 Phillips screwdriver
- An electric hand drill

Expect to spend about one hour on this project.

Installation

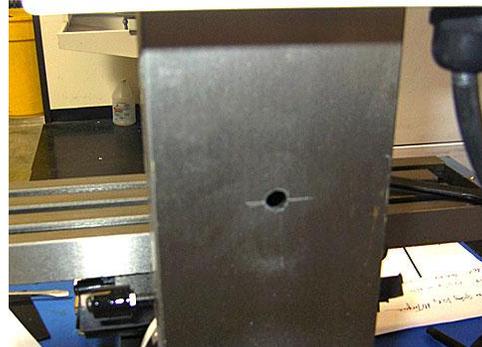
Follow these steps to install the kit.

Preparation

1. Remove the cover from the column. It's glued on and pops right off.



2. Drill a hole 13.38" below the top of the column casting, centered in the back of the column. Use a 9 mm, letter T, or 23/64" drill bit.
3. The new Z-axis limit mounts at the top of the column on the right side. Set it on the column, centered (by eye) from front to back. Put a business card under the Z-axis limit to give yourself a little margin.



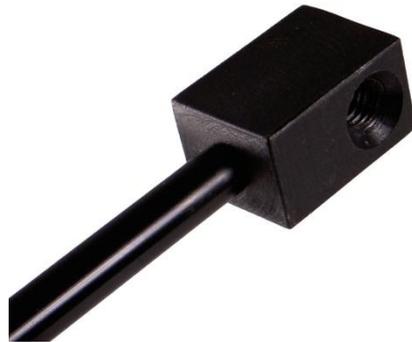
4. Drill and tap two M4 holes into the side of the column casting for the Z-axis limit. Use the Z-axis limit and an 11/64" transfer punch to mark the hole locations. Use a 3.25 mm or #30 (0.129") drill bit. Use an M4x0.70 tap to thread the holes.

Drill and tap one hole, and then install the socket head cap screw to hold the Z-axis limit in place while you mark the second hole.



Do not install the Z-axis limit at this time. Later you need to move the head above the top of the column.

5. Remove the rod end from the rod of the air spring. Assemble the rectangular rod end on the rod.



6. Put an M10 nut on each end of the head support shaft.
7. Put the air spring lower mount on one end of the head support shaft, and the air spring upper mount on the other end. Don't tighten these connections yet.



8. Attach the air spring to the upper mount with the M8x20 socket head cap screw. Don't tighten this connection yet.
9. Remove the cap screw and plastic bushing that limits the upward travel of the Z-axis.

Install the Rack

10. Move the head to its highest position and lock it in position using the locking lever on the right side.
11. Remove the two flat head screws securing the lower part of the rack.

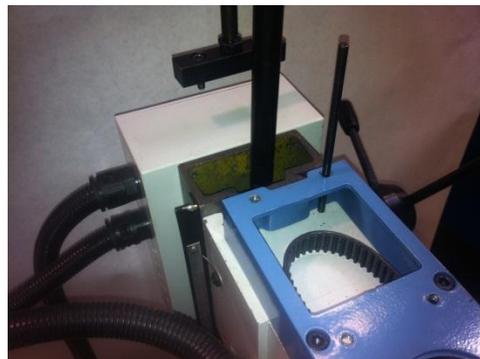
12. Move the head to its lowest position and lock it in position using the locking lever on the right side.
13. Remove the top flat head screw securing the rack and remove the rack. Use the Z-axis feed handles to crank it out the top.
14. Feed the new long rack into the slot in the column from the top. Use the Z-axis feed to run the rack down into position.
15. Install the two top M6x12 flat socket head machine screws to secure the rack.
16. Move the head to its highest position and install the two lower M6x12 flat socket head machine screws to finish securing the rack.

Remove the Torsion Spring

17. Using the locking lever on the right side, lock the head in place. Remove the torsion spring assembly. Remove the anchor pin that slides in the arm first. You can control the spring by pressing down on the end of the arm. Then disassemble the spring pivot shaft and remove it.

Drill & Tap Mounting Holes

18. Remove the four socket head cap screws that retain the motor adjusting plate and motor. Set the motor down on the bench next to the mill.
19. Loosen all four Z-axis gib adjusting screws about 4 turns.
20. There is nothing supporting the head now, so be careful. Using a screwdriver to keep the top of the gib even with the top of the column, move the head up about 1½". Lock the head in this position with the locking lever on the right side.
21. Using a 13/64" transfer punch through the rear motor mounting bolt holes in the belt cover, mark the hole locations on the top of the casting. You may have to tap the transfer punch through the threaded holes. Don't worry about bugging the threads as you are going to drill them out shortly.



22. Remove one (and only one) of the two M8 socket head cap screws that were exposed when you raised the head above the top of the column.



23. On the side where you removed the M8 socket head cap screw, use a 5 mm or #9 drill to drill down through the threaded hole in the belt cover and into the top of the head casting where you center punched it. You will drill into the hole for the M8 cap screw.



24. Clear the chips from the vertical and horizontal holes.

25. Replace the M8 socket head cap screw and remove the other M8 socket head cap screw.

26. On the side where you removed the M8 socket head cap screw, use a 5 mm or #9 drill to drill down through the threaded hole in the belt cover and into the top of the head casting where you center punched it. You will drill into the hole for the M8 cap screw.

27. Remove the belt cover by removing four M6 socket head cap screws.

28. Using an M6x1 tap, thread the hole over the empty M8 cap screw hole.

29. Clear the chips from the vertical and horizontal holes.

30. Replace the M8 socket head cap screw and remove the other M8 socket head cap screw.

31. Using an M6x1 tap, thread the hole over the empty M8 cap screw hole.



32. Clear the chips from the vertical and horizontal holes.

33. Replace the M8 socket head cap screw.

34. Using a 6.5 mm or ¼" drill bit, enlarge the two (threaded) rear motor mounting holes on the belt cover.

35. Replace the belt cover by installing four M6 socket head cap screws.

36. Replace the motor by installing the two front M6 socket head cap screws.

Install the Air Spring

37. Put the air spring assembly into the column. Insert the M8x30 socket head cap screw through the hole in the back of the casting and thread it into the rectangular rod end..
38. Attach the air spring mounting block to the top of the spindle-housing mount with two M6x55 socket head cap screws.
39. Tighten all the connections to the gas strut and the rod. Start at the bottom of the rod.
40. Install the Z-axis limit using two M4x10 socket head cap screws.
41. Readjust the Z-axis gib. See your *User's Manual* for the correct procedure.

