MINISCALE INSTALLATION MANUAL

I. INTRODUCTION

Apparently most installers read the installation manual only when they run into trouble. Therefore, the most important points (the ones most likely to result in damage) in the section titled, "**READ THIS BEFORE STARTING**". However, the installer is still responsible for all information contained in this manual. Also, mishandling of the miniscale in any way, whether described in this manual or not, is the responsibility of the installer or user.

Installers are strongly advised to read the section titled, "**READ THIS BEFORE STARTING**", before attempting to install miniscales.

> **CAUTION:** It is important to properly install the miniscales, as described in this manual.Failure to do so could result in miniscale damage.
>
> **WARRANTY DOES NOT COVER FAULTY INSTALLATION!**

II. READ THIS BEFORE STARTING

- Miniscales contain precision electronic and glass components. Do not drop, bend or hammer on the miniscales.
- Before beginning installation, verify that your miniscales are the correct travel. The overall scale length is not the travel. The travel is specified by the part number. Example: An XT350-12 miniscale has a 12 inch travel.
- Do not mount the miniscale housing (spar) directly to an uneven surface. Use a backplate if the surface is not a machined surface.

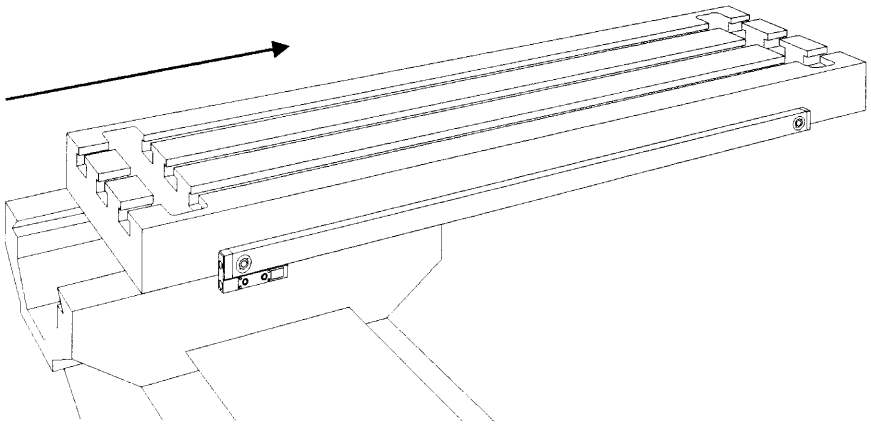
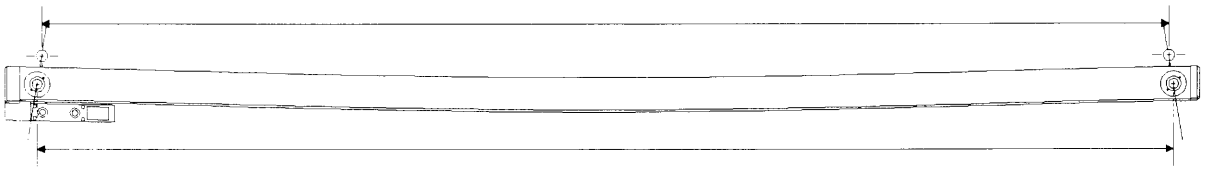


Figure 1. Do not loosen or remove the alignment bracket until installation is complete. The alignment bracket is designed for ease of encoder box mounting. For installation, position the table to its maximum travel in one direction. If a special application requires removing the alignment bracket to slide the encoder over, call the factory for an optional encoder slide bracket.

- The machine must have mechanical stops that prevent overtravel. Mount stops if necessary. Do not remove stops after miniscale installation.
- Do not offset the miniscale (extra travel on one end, insufficient travel on the other end).

Figure 2. Do not drill holes at an angle. Do not improperly space holes. These errors will cause bowing or sagging of the miniscale.

CAUTION: Mounting holes are normally transfer punched to locate the proper hole location. Since these holes are hand drilled, it is advisable to begin by drilling a smaller guide hole to prevent the larger drill bit from "walking".



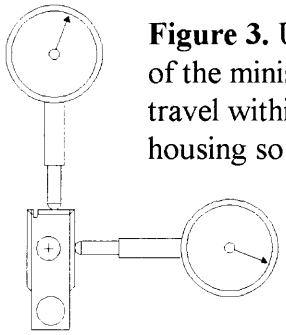
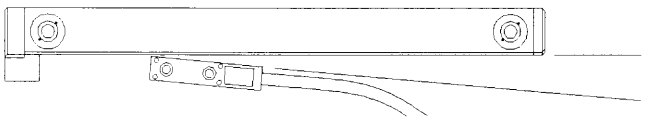


Figure 3. Use a micrometer or dial indicator to indicate the front of the miniscale housing surface. It must be parallel to the table travel within ±0.005". Likewise, align the top of the miniscale housing so that it is parallel to the table travel within ±0.005".



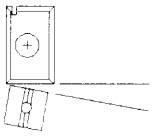


Figure 4. Do not cock the encoder (parallelism must be maintained).

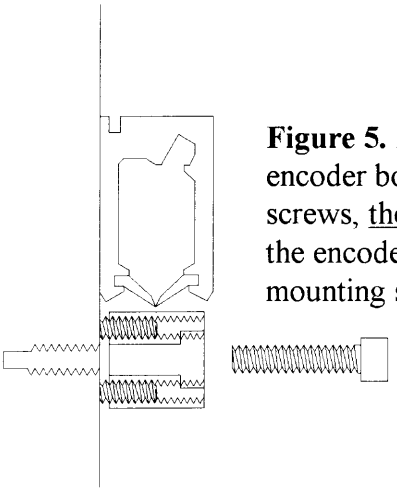
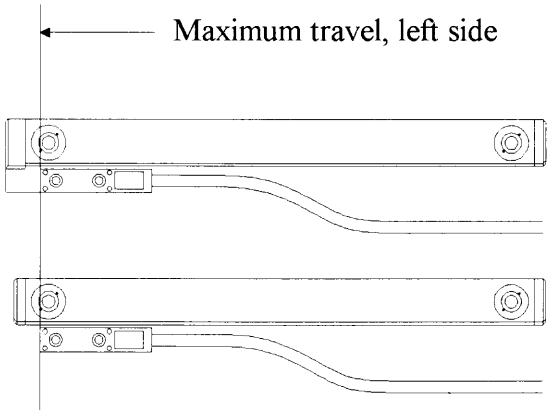


Figure 5. Adjust encoder box set screws, then tighten the encoder box mounting screws.



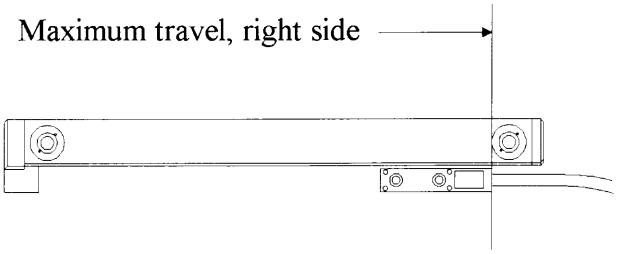


Figure 6. After installation, verify that the scales cannot be overtraveled. The maximum left travel is the same with or without the alignment bracket.

► Do not leave miniscale cables hanging loose. They may be caught and pulled out. Dress and secure with tie-wraps and cable anchors.

III. GENERAL

This section describes installation procedures for Bridgeport/Lagun type kneemills. The same guidelines are applicable for lathes (where miniscales are used), grinders, EDMs, comparators, etc.

Hardware

For systems that include hardware kits, the part number is located on the hardware kit box and on the corresponding hardware drawing. Verify that you have the correct hardware kit for your application.

Machines vary from type to type. Also, machine manufactures may change specifications without notice. For these reasons, installation hardware may require some modification. Due to the dynamic nature of the machine tool industry, hardware kits and drawings are subject to change without notice.

Other machine types may require special hardware fabrication; however, actual miniscale installation follows the same guidelines. The installer must maintain the specified miniscale housing (spar) alignment tolerances to achieve optimal performance and accuracy. Custom installations may be completed by the end user without assistance; however, factory assistance is available if necessary.

Standard machine shop practices should be used always; for example, safety, set up, cleaning of fluids, swarf, etc.

Mounting Area

The miniscale may be mounted directly to a flat, accurately machined surface such as the back of the table on a mill. If the surface is not flat, such as the Y axis mounting surface on a mill or the bed of a lathe, then the use of a backplate (included with most mill hardware kits for Y axis travel) is required. Also, the use of shim stock between the miniscale and the table surface can correct minor deviations. Adjustment must also be made for any obstructions such as oil lines, power feeds, etc.

The miniscale may be mounted with the cable exiting in either direction. Mounting considerations and miniscale cable routing must be taken into account by the installer to determine which orientation is best.

IV. MILL - X AXIS SCALE INSTALLATION

1. It is recommended that the miniscale be mounted on the back of the table with the encoder mounted to the saddle. A miniscale guard (supplied with mill hardware kits) is then mounted over the miniscale for protection.
2. Move the table fully to one end of its travel and lock it into position (Figure 1). Determine whether the miniscale will be mounted with the cable exiting to the left or to the right. Position the miniscale assembly against the back of the table so that the bottom longitudinal edge of the miniscale is flush with the lower edge of the table. This is easily accomplished by using two mag-bases under the table and then resting the miniscale on them. Position the miniscale so that it does not cover any drain holes, which are located at the end of some tables. Route cabling so that the miniscale guard will not snag it.
3. Transfer punch the two mounting holes (located on each end of the miniscale) to the table. Refer to Section II for drilling precautions. Drill/tap for 1/4-20 x 3/4 low head socket cap bolts and mount the miniscale.

4. Indicate the miniscale housing surface (top) using a depth micrometer or indicator. Adjust the two miniscale ends so that the housing surface is parallel to the table travel within ±0.005" (Figure 3).

5. Compensate for any bowing or sagging of the miniscale that may have been caused by inaccurate drilling.

DO NOT PROCEED BEFORE MAKING ANY NECESSARY CORRECTIONS.

6. Encoder Assembly Mounting

   a. Verify that the gap between the encoder box and the hardware mounting surface is less than 0.200" (Figure 5).

   b. Transfer punch the two encoder box mounting holes to the saddle surface. Drill/tap for 8-32 x 3/4 socket cap screws.

   c. Insert and adjust the 4 encoder box set screws until they just touch the mounting surface (Figure 5). Improper adjustment can force the encoder out of its calibrated position and cause erratic miniscale performance and damage.

   d. Mount the encoder with the two 8-32 x 3/4 socket cap screws. Do not overtighten the encoder mounting screws.

   e. Release the encoder from the shipping bracket by removing the 10-32 x 3/8 pan head screw. The alignment bracket may be left on the miniscale or replaced with the end cap provided in the hardware kit.

      Note: Save the alignment bracket for future use.

   f. Release the table lock and move the X axis table to its two extreme positions while monitoring the encoder travel.

      VERIFY THAT THE MINISCALE CANNOT BE OVERTRAVELED (FIGURE 6).

7. Position the miniscale guard over the miniscale housing. Drill/tap for 8-32 x 3/8 pan head screws.

8. Install a cable clamp (provided) on the table where the cable just exits under the miniscale guard. After installing the miniscale guard, it may be necessary to bend it out to provide additional clearance for the cable. It is not advisable to exit the cable out the end of the guard since during travel it may catch and pull the cable from the encoder box.

9. Install the "O" ring in the groove of the guard and mount the miniscale guard using the 8-32 x 3/8 pan head screws.

10. Route and secure the cables to the display. Ensure that the cables are not hanging loose to be caught on any part of the machine during operation.

    Note: Do not run miniscale cables parallel with power wires. Induced noise may cause the display to miscount Maintain a minimum of 6 inches between cables and cross at right angles.

V. MILL - Y AXIS SCALE INSTALLATION

1. Refer to Figure 7. It is recommended that the miniscale be mounted on the right side of the mill knee (as viewed from the front). Due to mill variations and specific applications it may be necessary to mount the miniscale on the left side. In most cases, the miniscale is best mounted with the encoder box (as it is locked to the alignment bracket) closest to the front of the mill.

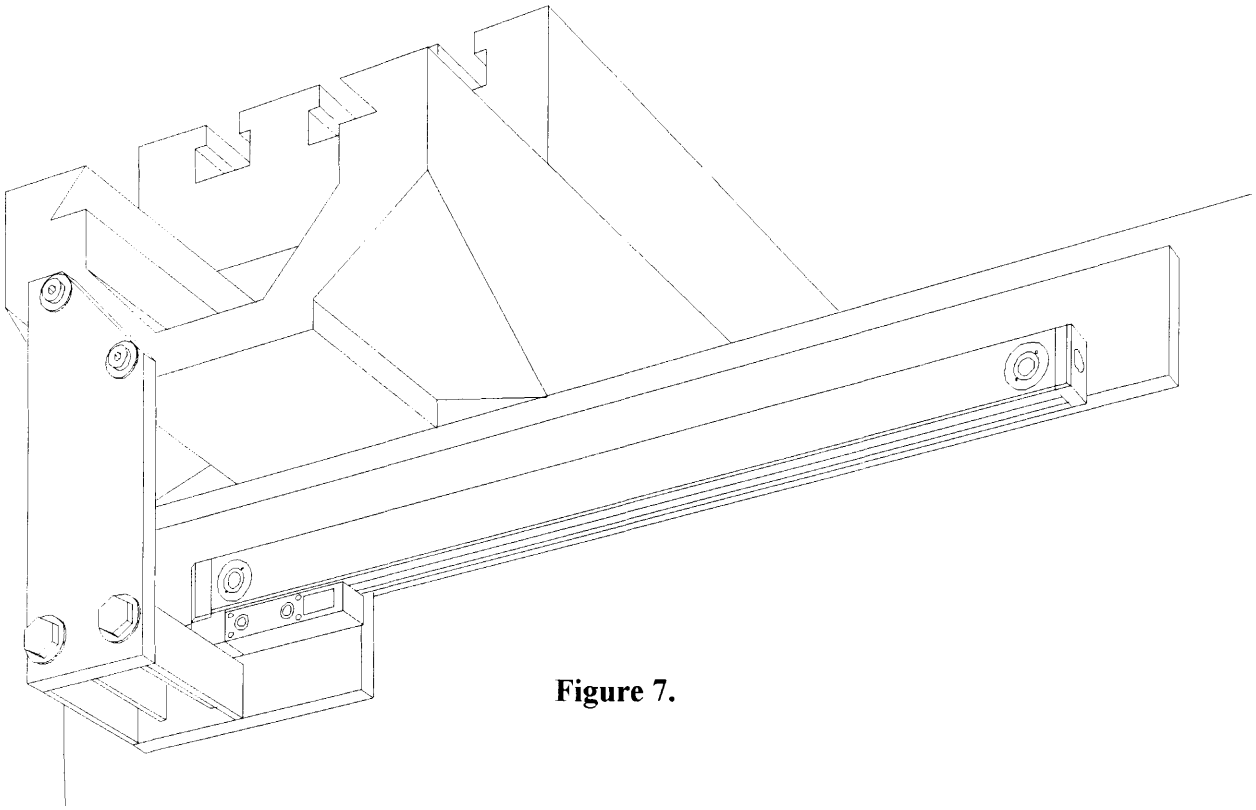


Figure 7.

2. Bridgeport mills have holes pre-drilled for backplate mounting. The Bridgeport hardware kit comes with a backplate that mounts directly to these mills. Other mills may also have these pre-drilled holes. Most imported Bridgeport style mills do not have these holes and they will have to be drilled into the mill for mounting. Hardware kits for these Bridgeport copy mills have a backplate with set leveling screws. Bridgeport backplates use shim washers between the backplate and the mill for leveling if necessary.

3. Lagun and some imported mills require a slotted "D" bracket for encoder mounting to the saddle instead of the Bridgeport style hardware. This hardware may be mounted on either the rear or the front of the saddle depending on which is best for a particular application. The hardware drawing for these mills shows the slotted "D" bracket mounted to the rear of the saddle. Backplates in these hardware kits come with set leveling screws.

4. Attach the miniscale to the backplate. Do not tighten as adjustment will be needed when indicating. Be sure that the miniscale's alignment bracket will clear the backplate mounting holes. If it does not, remove the miniscale, and flip the backplate over and remount the miniscale. Mounting holes are offset to allow room for the alignment bracket.

5. With the hardware bracketry pre-assembled, hold it up to the mill to determine the mounting locations. Bridgeport backplates may be mounted to the pre-drilled holes. After locating the

mounting area, mark both ends using the ways as a reference with a precision instrument, such as calipers. Drill/tap for 5/16-18 x 1-7/8 socket cap bolts. Mount the backplate (with the miniscale attached) to the mill. Verify that the encoder bracket and the rest of the bracketry will mount to the encoder. Adjust the backplate using the leveling screws (or washer/shim for Bridgeport hardware) as necessary.

DO NOT WARP OR TWIST BACKPLATE BY SETSCREW MISALIGNMENT.

6. Indicate the miniscale housing surface (top) using a depth micrometer or indicator. Adjust the two miniscale ends so that the housing surface is parallel to the table travel within ±0.005" (Figure 3). Use the ways as a reference. Indicate the miniscale face housing surface from end to end to within ±0.005" (Figure 3). Adjust the backplate and/or miniscale using the leveling screws (or washer/shim for Bridgeport hardware) as necessary.

7. Move the table fully to one end of its travel closest to the operator (standing in front of the machine) and lock it into position. Align the pre-assembled encoder bracket to the miniscale's encoder box and to the area on the saddle where the bracket is to be mounted. Mark the saddle location and drill/tap for 1/4-20 x 3/4 socket cap bolts. Mount the bracket assembly

8. Encoder Assembly Mounting

   a. Verify that the gap between the encoder box and the encoder bracket is less than 0.200" (Figure 5). If it is not, adjust the backplate or modify the hardware as necessary specifications.

   b. Transfer punch the two encoder box mounting holes to the encoder bracket. Drill/tap for 8-32 x 3/4 socket cap screws.

   c. Insert and adjust the 4 encoder box set screws until they just touch the mounting surface (Figure 5). Improper adjustment can force the encoder out of its calibrated position and cause erratic miniscale performance and damage.

   d. Mount the encoder with the two 8-32 x 3/4 socket cap screws. Do not overtighten the encoder mounting screws.

   e. Release the encoder from the shipping bracket by removing the 10-32 x 3/8 pan head screw. The shipping bracket may be left on the miniscale or replaced with the end cap provided in the hardware kit.

      Note: Save the alignment bracket for future use.

   f. Release the table lock and move the Y axis table to its two extreme positions while monitoring the encoder travel.

      VERIFY THAT THE MINISCALE CANNOT BE OVERTRAVELED (FIGURE 6).

9. No miniscale guard is provided for the Y axis travel on mills since the miniscale is mounted underneath the saddle. However, an optional miniscale guard may be provided by contacting the factory.

10. Route and secure the cables to the display. Ensure that the cables are not hanging loose to be caught on any part of the machine during operation.

    NOTE: Do not run miniscale cables parallel with power wires. Induced noise may cause the display to miscount Maintain a minimum of 6 inches between cables and cross at right angles.