

Bluetooth DRO Installation for Mini Mills

These instructions describe how to install the following products:

- 5514: Digital position readout for LittleMachineShop.com Model 3960 and 3990 HiTorque Solid Column Mills and SIEG SX2LF mills
- 5493: Digital position readout for LittleMachineShop.com Model 3900 HiTorque Tilting Column Mills and SIEG X2L and SX2L mills
- 5492: Digital position readout for SIEG X2 and SX2; Harbor Freight 44991; Grizzly G8689; and Micro-Mark 82573 and 84630

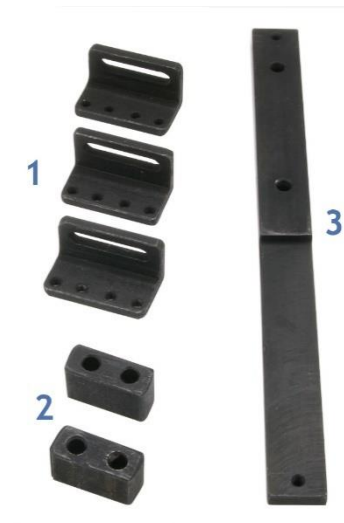
The installation procedure is the same for all mills. You'll need to partially disassemble your mill, drill and tap 12 holes, attach the hardware to your mill, connect all the pieces, and then pair the DRO to your Bluetooth display device.

Be Sure You Have Everything

The kit includes the following items:

- Bluetooth transceiver
 - Reader with chip scraper (qty 3)
 - 5V power adapter
 - Magnetic scale for X axis
 - Magnetic scale for Z axis
 - Magnetic scale for Y axis
 - 1. Reader mounting bracket (qty 3)
 - 2. Reader mounting spacer (qty 2)
 - 3. Scale extender
- Mounting screws

- M3x10 pan head screw (qty 6)
- M3x14 pan head screw (qty 6)
- M4x20 socket head cap screw (qty 4)
- M4x8 socket head cap screw (qty 2)
- M4x28 stud (qty 2)
- M4 nut (qty 4)
- M4 washer (qty 2)



Don't worry if you get a few extra items. They may be for a different version of this kit.

In addition, you'll need the following tools, which are not included with the DRO kit:

- 2.5 mm or #39 drill bit*
- 3.3 mm or #30 drill bit*

- M3x0.5 thread-cutting tap*
- M4x0.7 thread-cutting tap*
- 2.5 mm hex key wrench
- PH 1 Phillips screwdriver

*These tools are available as a kit (PN 5820) from LittleMachineShop.com

Install the X-Axis Scale and Reader

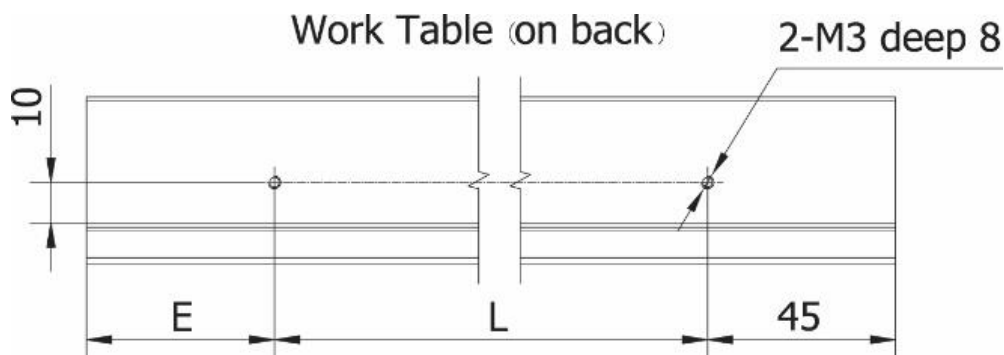
Scales come in different lengths for different models of mini mills.

X-Axis Dimension Table

Machine	X Scale Length	Dimension E	Dimension L	SIEG Model
Most Mini Mills with tilting column	290 mm	42.5 mm	300 mm	X2/SX2
LMS 3900 Mini Mill	360 mm	45 mm	370 mm	X2L/SX2L
LMS Solid Column Mini Mills	360 mm	45 mm	370 mm	X2D/SX2LF

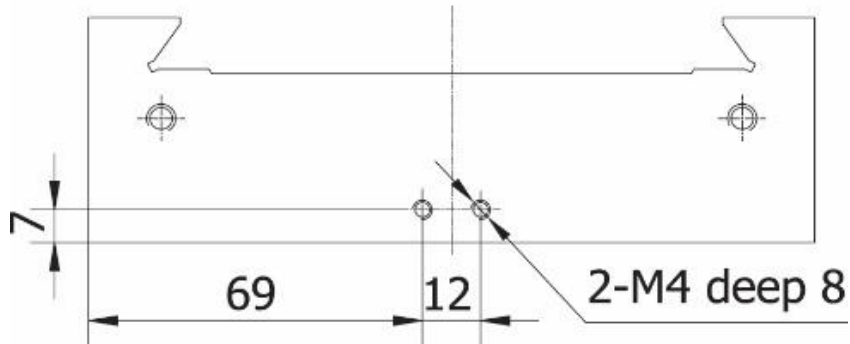
Follow these steps to install the scale and reader for the X-axis.

1. Remove the retainer that attaches the chip guard bellows to the back of the mill table. Two screws hold the retainer in place; remove the screws and the retainer and set them aside.
2. Remove the column assembly. Three or four bolts hold the column in place; remove the bolts and then carefully lay the column head down. (*Caution! The column assembly on a mini mill weighs about 60 pounds, so you might want to have a friend help you with this step.*)
3. Clean the back side of the mill table and the saddle to remove all chips and oil.
4. On the back side of the mill table, mark two hole locations as shown below.

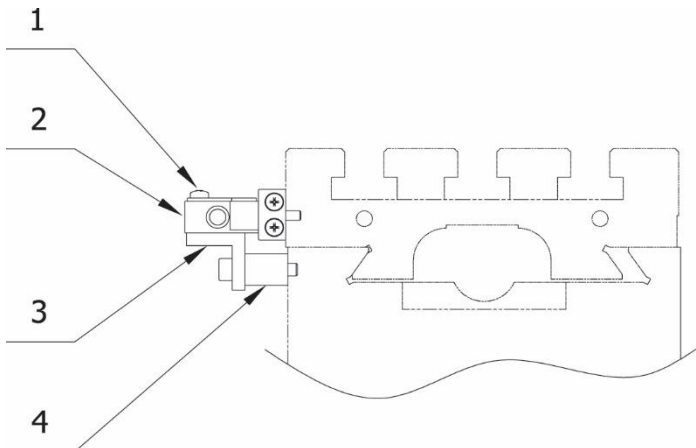


5. Drill and tap the two holes M3 to a depth of 8 mm (0.3 in). Use a 2.5 mm or #39 tap drill and an M3x0.5 metric tap.
6. On the back of the saddle, mark two hole locations as shown below.

Saddle (on back)



7. Drill and tap the two holes M4 to a depth of 8 mm (0.3 in). Use a 3.3 mm or #30 tap drill and an M4x0.7 metric tap.
8. Use two M3x10 pan head screws to attach the magnetic scale to the back of the mill table.
9. Install the X-Axis scale using two M3x10 socket head cap screws.
10. Install the X-axis read head with a spacer and bracket as shown in the drawing below using 2 M4x20 socket head cap screws.



1 M3x14 pan head screw (2)	3 Reader mounting bracket
2 Reader	4 Reader mounting spacer

Install the Y-Axis Scale and Reader

Scales come in different lengths for different mini mills.

Y-Axis Dimension Table

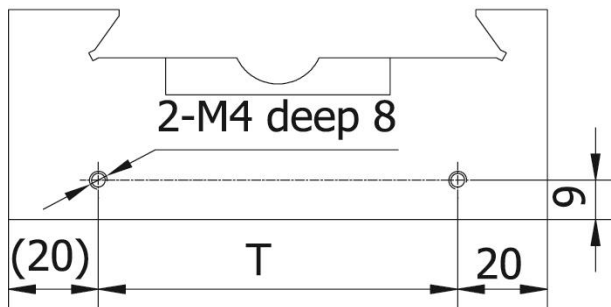
Machine	Y Scale Length	Dimension B	Dimension T	SIEG Model

Most Mini Mills with tilting column	160 mm	129.5 mm	53 mm	X2/SX2
LMS 3900 Mini Mill	200 mm	158 mm	80 mm	X2L/SX2L
LMS Solid Column Mini Mills	200 mm	158 mm	80 mm	X2D/SX2LF

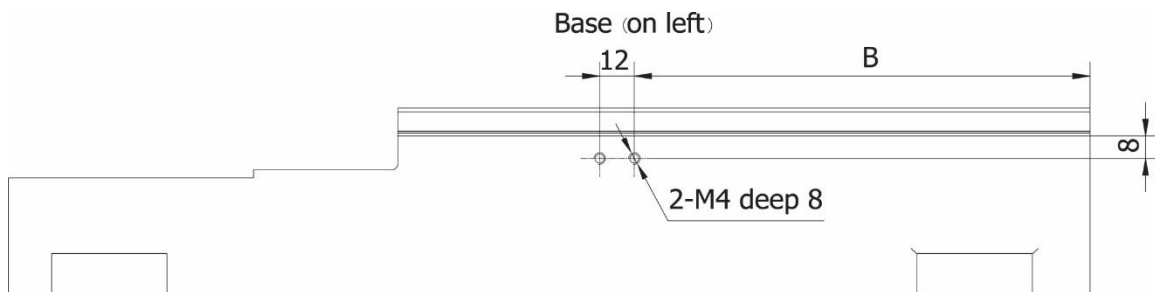
Follow these steps to install the scale and reader for the Y-axis.

1. On the left side of the saddle, mark two hole locations as shown below.

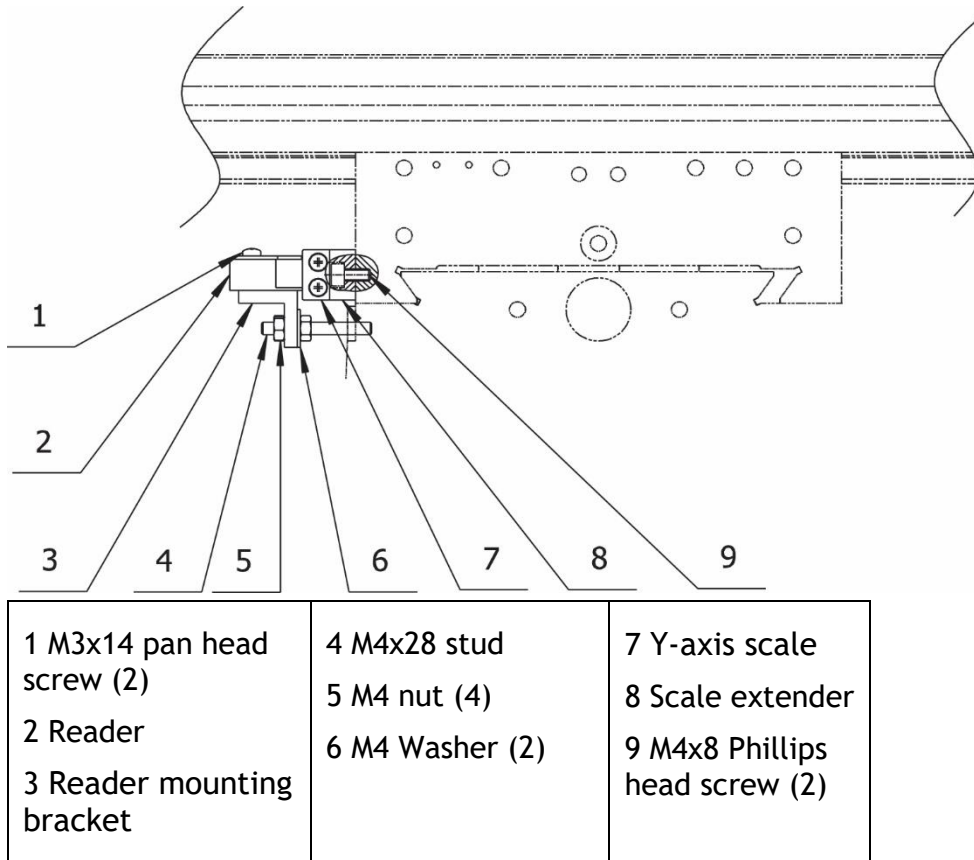
Saddle (on left)



2. Drill and tap the two holes M4 to a depth of 8 mm (0.3 in). Use a 3.3 mm or #30 tap drill and an M4x0.7 metric tap.
3. On the left side of the machine base, mark two hole locations as shown below.



4. Drill and tap the two holes M4 to a depth of 8 mm (0.3 in). Use a 3.3 mm or #30 tap drill and an M4x0.7 metric tap.
5. Install the scale extender using two M4x10 socket head cap screws.
6. Install the Y-axis scale onto the scale extender using two M3x10 Phillips head screws.
7. Install the Y-axis read head using the studs, nuts, and reader mounting bracket as shown in the drawing below.



Install the Z-Axis Scale and Reader

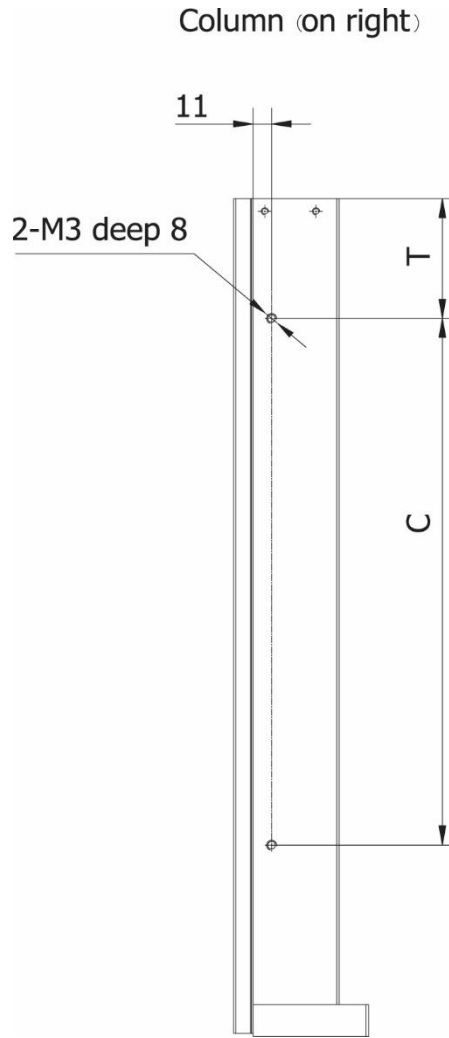
Scales come in different lengths for different model mini mills.

Z-Axis Dimension Table

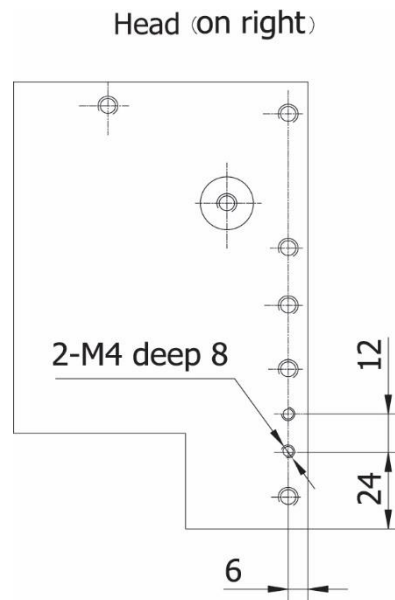
Machine	Z Scale Length	Dimension C	Dimension T	SIEG Model
Most Mini Mills with tilting column	240 mm	250 mm	110 mm	X2/SX2
LMS 3900 Mini Mill	240 mm	250 mm	110 mm	X2L/SX2L
LMS Solid Column Mini Mills including 3960 and 3990	320 mm	330 mm	75 mm	X2D/SX2LF

Follow these steps to install the scale and reader for the X-axis.

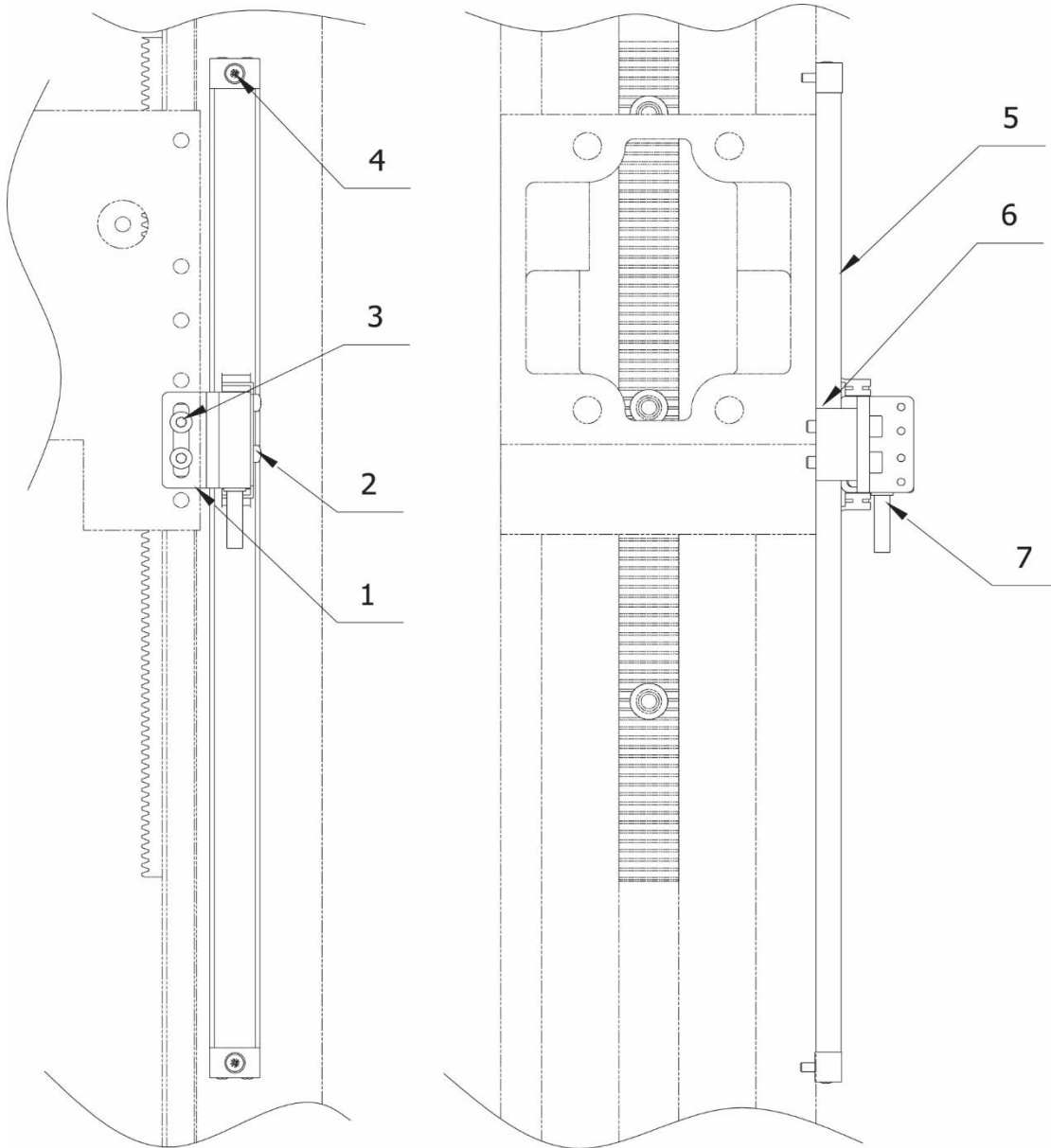
1. On the right side of the column, mark two hole locations as shown at the right.
2. Drill and tap the two holes M3 to a depth of 8 mm (0.3 in). Use a 2.5 mm or #39 tap drill and an M3x0.5 metric tap.



1. On the right side of the head assembly, mark two hole locations as shown at the right.
2. Drill and tap the two holes M4 to a depth of 8 mm (0.3 in). Use a 3.3 mm or #30 tap drill and an M4x0.7 metric tap.



3. Install the Z-axis scale using two M3x10 socket head cap screws.
4. Install the Z-axis read head using a reader mounting spacer, reader mounting bracket and two M4x20 socket head cap screws as shown in the drawing below.



1 Reader mounting bracket	3 M4x20 socket head cap screw (2)	5 Z-axis scale
2 M3x14 Phillips head screw (2)	4 M3x10 Phillips head screw (2)	6 Reader mounting spacer
		7 Reader

Adjusting the Read Heads

Adjust the DRO read heads so that the chip plows touch the stainless strip, but the reader head is clear of it.



Connecting the Bluetooth transceiver

1. Use a small straight screwdriver to open the Bluetooth transceiver. Use both corner slots to open it.



2. Identify the connector for each axis. Remove the green plug from each one.



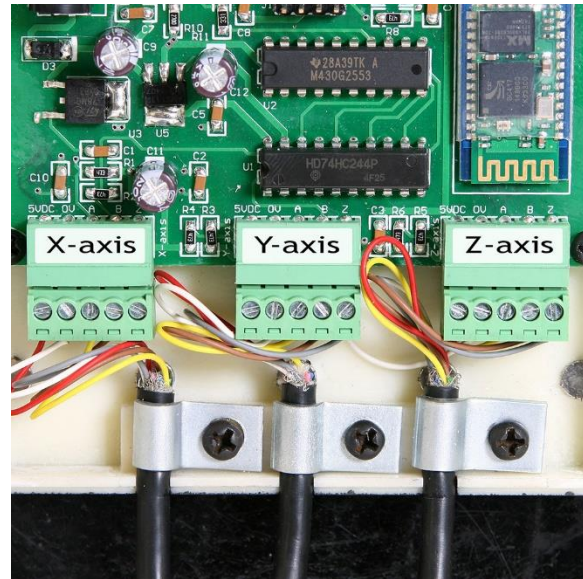
3. Install a green plug on the wire from each read head. With the screw heads up, the colors, from left to right are:
Red White Yellow Brown Gray

Double check each wire to ensure that the wires are in the correct order and that the screw terminals are secure.

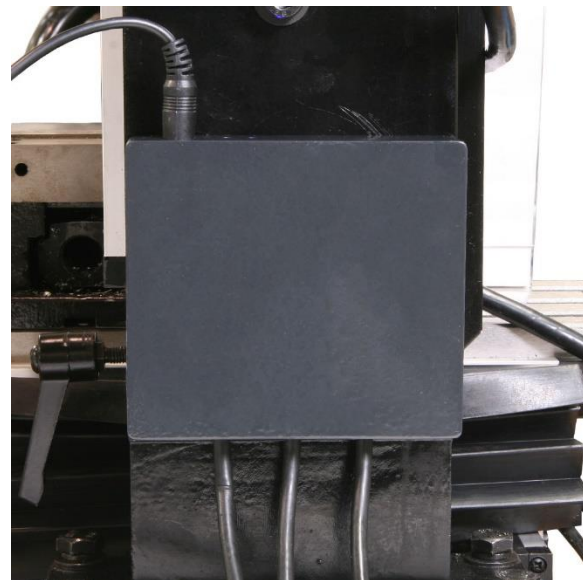
Chris' Tip: You can shorten the wires if that makes sense for your installation. It's good practice to tin (apply a bit of solder to) the bare wire ends. Be sure to leave enough length for full travel of your machine.



4. Insert each axis plug into the appropriate socket. Clamp the black-jacketed wire in the corresponding strain relief.
5. Snap the cover onto the Bluetooth transceiver.



6. The Bluetooth transceiver mounts magnetically. Place it at a convenient location on your machine.
7. Plug in the power supply and you are ready to go to work.



Done!

That's it, the DRO is ready to go. Fire up the Android tablet and go to work.

If you have our Android Tablet, the software is already installed. If you have another Android tablet go to the Apps store at Google Play to find and install Yuriy's Toys TouchDRO.