



Help - my magnetic scale DRO is not reading correctly!

You may go to work one day and find that your magnetic DRO scale is no longer reading correctly. This document examines what may be causing that to happen, why, and how to fix it.

In general, there are three different scale failures. They are:

Flickering. The last 2 digits on the display window are flickering. As the machine is moved, the leading digits change and appear to be correct, but no matter where the machine is moved, the last two trailing digits flicker. Cause: Improper readhead/scale orientation. Go to Step 1.

Digits Frozen / Not Moving. All digits on the display window are "frozen" and do not change value regardless of whether the machine is moved or not. Cause: Malfunctioning display or readhead. Go to Step 2.

Value Not Correct. All digits on the display appear to work fine, but the value shown in the display window does not match the actual travel. Cause: Improper readhead gap or scale not level. Go to Step 3.

1. The hash marks on the readhead, and the hash marks on the scale need to be on the same 'side' for the scale to work properly. If the last two digits are flickering, this is a classic sign of a mis-match of hash marks between the readhead and the scale. Disconnect the readhead brackets and run the readhead back and forth along the scale track by hand (much like a "Hot Wheels" car). Make sure to run the readhead with the cable pointing in both directions (ie cable to the left, and then cable to the right) to see which orientation is correct. Most likely, orienting the readhead in the opposite direction will instantly 'cure' the issue. At times, this may present a problem as the cable may now be pointing in an inconvenient direction (like towards the front of the machine). The solution is to swap the scale end for end, and mount the readhead in the same orientation as it originally was mounted.

2. There are three items that work together for a scale to 'work' properly. They are the scale, the readhead, and the display. The first step is to identify which piece is malfunctioning. Let's assume the digits on the X axis display window are "frozen". The first step is to turn off the display, and then swap the X and Y leads on the back of the display. Turn the display back on, and let it boot up. Now move your machine and see if the issue remains on the X axis window, or has 'moved' to the Y axis window. If the X axis window digits remain frozen, the issue is with the display. If the Y axis window digits are frozen, then the issue is with the scale and / or readhead. Continue to Step 4.

3. The first question to ask is this - "How do you know for **certain** the scale is misreading?" Technically, the only proper methodology to validate scale movement is with a laser. This statement bears repeating:

The only proper methodology to validate scale movement is with a laser

We do realize that most of us do not have the resources to buy a laser interferometer. As such, on the DRO PROS Library page, we've published a guide for "Validating DRO movement" which, while not an 'approved' method for validating movement, may prove extremely useful. This article highlights several very important variables to isolate **before** you conclude your DRO is mis-reading.

The next question to ask is "Has anyone ever attempted calibrating the display using either Linear Error Compensation (LEC) or Non-Linear Error Compensation (NLEC)? If so, or if you're unsure, go to the DRO PROS library page, download / print the appropriate "LEC and SLEC Error Removal" procedure for your display. Run the procedure and re-check your results.

If you're still certain something is amiss, proceed to Step 4.

4. Disconnect the readhead brackets and run the problematic readhead back and forth along the scale track by hand (much like a "Hot Wheels" car). Just to make sure, try running the readhead in both directions (ie cable to the left, and then cable to the right) to see if the display suddenly starts working. If this "fixes" the problem, then the issue was most likely an improper gap between the readhead and the scale. The proper gap is 0.5mm, or 20 thousands, and should be set using the included shim that came with your kit. An improper gap could have been caused by either the readhead, or the scale being bumped or jarred out of alignment. It may be a sudden causation, such as a workpiece or tool striking the bracketry, or something much less insidious, such as moving full travel down a scale that was improperly installed and always mis-aligned, but was never "found out" because the operator never went full travel on the scale. In any case, if the scale is not reading correctly, make sure to perform the following steps in order:

I. First check to make sure the scale is level. Run a dial indicator along the top and the side of the scale, **full travel, both directions**.

II. Check the readhead for physical damage. A readhead can be crushed with very little apparent external visible damage.

III. Make sure the wipers (and wiper holders) are installed correctly. The bevel on the black plastic wiper holder block should be pointed **away** from the scale, not towards it.

IV. Check the gap between the readhead and the scale. The proper gap is 0.5mm, or 20 thousands, and should be set using the included shim that came with your kit.

Make sure to check the gap all along the scale, especially at full travel, on both ends of the scale. Do not simply check the gap at one location and call it good. Make sure the gap between the readhead and the scale is consistent along the **entire full travel of the scale**.

If the scale still seems to be mis-reading, try resetting the display to it's original factory settings (see the DRO PROS Library page for the appropriate document).

If all the above fails, or you simply get confused as to what is happening, give us a call. We're here to help, and have dealt with the above scenarios many times.