



How To Test Resolvers

If you have a machine manufactured pre-1995, it is highly likely you have DC servo motors positioning your X, Y & Z axes. The weak point to all Fadal DC servo motors is the feedback device called a resolver...not an encoder. They are very different. Encoders are on AC servo motors, and resolvers for DC servo motors. Every DC servo motor Fadal installed on their vertical machining centers used the EXACT SAME RESOLVER. In the old days, Harowe supplied most if not all of them, then a couple of other manufacturers have been found in Fadal DC servo motors over time, but now we offer replacements manufactured in the US by AMCI.

The first sign of a resolver failing is surface finish problems; particularly in an X/Y angle cut. This is where it is most pronounced, but if you are able to isolate it to a specific axis, you can see it on straight cuts as well, just not as noticeable.

When it becomes very bad, you begin to get errors such as:

[1] NO MOTOR FEEDBACK

This error appears during power up, when no motor feedback (either resolver or encoder) is detected by the axis controller.

[13] MOTOR OVERLOAD - FOLLOWING ERROR > OVERLOAD FACTOR

This error appears when the following error exceeds the overload factor, which is a user-defined parameter that sets, in motor turns, the maximum allowable following error for the axis operation.

[17] BAD READING ON RESOLVER PORT

This error appears if the value of resolver "counts", read from the resolver port when the "zero-crossing" pulse is detected, is too large, indicating possible failure of the resolver cables, 1010-4 card, or the resolver itself. Also caused by severe motor vibrations.

[23] MOTOR OVERLAND DURING STAND-BY MODE

SEE ERROR CODE 13 ABOVE

[24] BAD READING ON RESOLVER PORT

SEE ERROR CODE 13 ABOVE

To validate if you have a resolver problem, you will need to do a quick check to see if it has a pulse at all, then possibly remove it to do a physical check on the health of the bearings. First, let's check its pulse. Photo #1 shows how to check a resolver while the power is on and servos are energized. Remove the bullet connector at J2 on the controller card (bottom socket on the controller board) and use a multi-meter in AC voltage mode to measure the voltage. It must read approximately 1.7VAC. If not, you either have a bad resolver, a cable unplugged from the resolver board in the motor, or a

bad wiring harness. Your machine will not run until you resolve this issue.

If you have good voltage, you will need to remove it and do a physical check. Photo #2 shows how to check a resolver shaft. Spin it and make sure it spins freely and very smoothly. If it is rough, replace it. Then check end play. Check side to side and in and out. You should have not much more than about .002" play in any direction, and new resolvers have zero noticeable play.

A noisy or rough shaft or excessive end play will scramble the sine wave signals it outputs for position and velocity information to the controller card, thus bad finishes or simply motor overload faults as the controller card and amplifier cannot keep up with the random spikes output from the resolver.

FadalCNC.com offers both new and remanufactured resolvers under the part numbers ENC-0008 (new) and ENC-0008R (remanufactured). We highly recommend you purchase a spare for your machine. They are a higher failure rate item and having one in the cabinet for emergencies is worth its weight in gold.

Figure 1

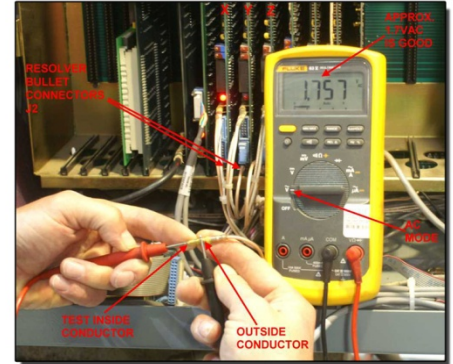


Figure 2

