

Resolvers & Encoders

Knowing What to Buy

While both resolvers and encoders provide position and velocity feedback for servo motors, the way in which this is done is entirely different. Replacement of each are world's apart and testing to determine if one is bad is also quite different.

Resolvers

Resolvers that you find on ALL Fadal DC servo motors are an analog feedback device. As the shaft spins, the rotor interacts with the armature through magnetics to develop 3 separate sinusoidal wave forms which are out of phase with each other by a specific number of degrees. The number of sine waves per minute and the sequence of the sine wave outputs determine the motor rotational speed and position. The controller cards in slots 9, 10 & 11 processes this feedback and sends the speed and feedback information to the processor. You can easily test the health of a resolver and wiring to/from the resolver by removing the bullet connector in J1 of the controller card and use an AC volt meter to measure from the inside of the bullet connector to the outside ground and should measure about 1.7 VAC. If you do not see this voltage, suspect a bad resolver or wiring.



ENC-0008

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Another quick check as to the health of resolvers is by spinning the shaft. It should spin very, very smooth. If it feels like gravel, it's bad. Also check the side to side play and in/out play of the resolver shaft. While there should be a slight amount of play, the play should be limited to only a few thousandths of an inch side to side and in/out. More than that and your resolver signals become distorted and your surface finishes will suffer.

FadalCNC.com offers both new and remanufactured resolvers under the part number of ENC-0008 (New), and ENC-0008R (Remanufactured).

NOTE: ALL FADAL DC MOTORS, FROM THE BEGINNING OF TIME USE THE SAME RESOLVER.



Encoders

Encoders are quite a different animal. They are a digital device. Meaning, encoders think in ones and zeros. That's it. Nothing in between. Fadal uses AC servo motors from approximately 1995 through present on all vertical machining centers. They are more accurate than resolvers and last much longer, so why all machine tool manufacturers use them now for feedback on servo motors. Fadal uses two varieties: 5000 line count and a 4096 line count in quadrature (ie. 8192). Most machines are of the 8192 variety. Motors MTR-0142/0146 are the 8192 line count styles and the MTR-0139/0141/0143 use the 5000 line count encoder.



ENC-0110

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Here's the real kicker: You cannot replace them. Not unless you know the specific timing degrees of each leg with relation to the armature of the motor and internal Hall sensors. If you remove one, or try to adjust one, you likely have just bought yourself a new motor. Very few motor shops can replace them with any success. This is mainly due to the timing sequence needed to work in synchronicity with the amplifiers (AMP-0039/0040). It takes expensive and sophisticated electronic test gear to time them correctly, and even when you have, you **MUST** run them on a machine to be sure they work properly. Motor shops cannot do this unless they happen to have a machine. We do replace them and test each and every one on an actual machine before we shelf for resale.

All this being said, we do sell replacement encoders if you want to take a crack at replacing one or you can send your motor in to us and we can replace it here for you and test. It's up to you and the skill set you have.