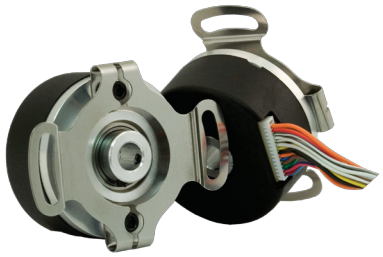
ENCODER PRODUCTS COMPANY

WHITE PAPER

WP-2002: Applying Encoders

Encoders provide velocity, acceleration, direction, and position feedback to motion systems. Two basic types of feedback are absolute and incremental. Absolute encoders report unique position information at all locations and are unaffected by power loss. Incremental encoders also deliver position information, but count from a reference, which may require that a system be reset to a known start position.

There are several variables to consider when choosing an encoder. The most common are mounting style, resolution, output type, frequency response, accuracy, and electrical connections. Environment also plays a role: specifically, encoders must withstand a range of conditions such as moisture and dust that can seep into internal optics and electronics. Sealed encoders are available to address this. Encoders are also available that address other environmental conditions, including exposure to corrosive and caustic chemicals and ambient temperatures that reach up to 120° C.



Model 15T with 15-pin connection and side mount

Q & A

Q: What are some common interfacing issues?

A: Designers must identify an encoder resolution that reflects the system's true needs. Resolution that's too high can increase costs and raise frequencies above the encoder or receiver's capabilities. And, higher resolution doesn't necessarily translate into higher system accuracy. On the other hand, resolution that's too low may limit the system's ability to control speed or position accurately. Additionally, incremental encoders with quadrature phasing not only provide directional information, but can increase resolution up to four times when combined with a compatible receiving device.

A system's receiving device (controller) generally dictates encoder output. Thus, designers should first determine the controller's input requirements, and then select a compatible encoder output driver.

Three basic types exist:

- Drivers that supply current to external devices (sourcing)
- Drivers that provide a current path to the circuit ground or common (sink)
- Drivers that do both (line drivers)

Many controllers accept differential line-driver signals, canceling common-mode noise while accommodating long encoder cable runs.

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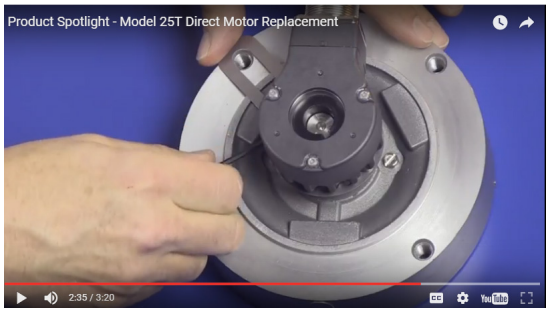
Q: How are encoders installed and mounted?

A: It depends on the style of the encoder. Hollow-bore encoders slide over and clamp onto a precision shaft, attaching directly to the motor frame through a flexible mount. A proper fit between the bore and shaft, as well as a good flex mount design, help retain accuracy and encoder bearing life. Shaft encoders, on the other hand, usually mount to a fixed surface and couple to a driven shaft. Alignment between the shafts and the coupling's design and quality also impact accuracy and encoder bearing life.



A Model 25T being installed on a motor. For more information, watch the video

Q: How can encoder signals be optimized?

A: To reduce the potential for electrical noise degrading an encoder's signal, follow these key steps:

- Connect the encoder cable shield to ground on the receiving device.
- Properly ground the motor or machine to which the encoder is mounted.
- Ensure that the encoder cable is of high quality and low capacitance with foil and braided shields. Also, avoid routing encoder cable near electrically noisy power cables or equipment.

If you have a question about which encoder is right for your application, **contact EPC**. You'll talk to real engineers and encoder experts for your toughest encoder questions, and you'll get answers that make sense for your application.

Our corporate headquarters is in the United States, and EPC has some of the fastest lead times around, including expedite options. We can provide a better encoder solution within days.

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