

Encoders are the digital version of potentiometers and panel controls. Rather than providing a resistive variable output with rotation of the shaft, encoders simulate an on/off switching digital output. Applied as human-to-machine interface (HMI) devices, encoders are typically used to sense human adjustment of the device in a clockwise or counter-clockwise direction triggering some action by the digital circuit. Applied as machine-to-machine interface (MMI) devices, encoders are typically coupled to a motor or other mechanical device.

***General design considerations are provided below:***

- Encoders should be operated within the recommended operating conditions.
- Care should be taken to provide adequate current at the proper voltage to the encoder.
- Line drivers should be used when connecting to long wire leads, low-impedance loads, or capacitive loads. Long wire leads on the output have an associated capacitance which can degrade high frequency signals.
- Care should be exercised when attaching the encoder to a heat-generating device, such as a motor, to prevent damage to the encoder. The maximum temperature of the heat-generating surface or the free ambient airspace, whichever is greater, should be considered for selection of a suitable encoder with adequate operating temperature range.
- Exceeding the maximum mechanical speed of the encoder may cause permanent damage to the encoder.
- Exceeding the maximum rotational speed may result in incorrect data or signal error.
- Noise in the input power supply or the outputs of an encoder may cause output signal error. Some common means of minimizing such noise are proper grounding, utilizing twisted pair leads, shielded or isolated leads, and signal conditioning.
- Sensitivity of triggering is directly related to the resolution of the encoder. The resolution should be selected based on the required sensitivity to movement of the shaft (i.e., coarse or fine adjustment).

***General design considerations specific to non-contacting encoders:***

- Electrostatic discharge (ESD) precautions should be observed at all times when handling the device due to possible damage to the internal electronics.
- This type of encoder is recommended for both HMI and MMI applications.

***General design considerations specific to contacting encoders:***

- Contact bounce is typical in contacting encoders, which may cause false signals to the digital circuitry. Use of debounce circuitry or software signal conditioning is highly recommended.
- This type of encoder is recommended for HMI applications only.

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