
IMPORTANT A quadrature encoder provides rotor speed and direction. Therefore, the encoder must be wired such that the forward direction matches the motor forward direction. If the drive is reading encoder speed but the position regulator or other encoder function is not working properly, remove power to the drive, then do one of the following:

- Swap the A and A (NOT) encoder channels.
- Swap the B and B (NOT) encoder channels.
- Swap any two motor leads.

Drives will fault when an encoder is incorrectly wired and [A535](#) [Motor Fdbk Type] is set to 5 “Quad Check”.

Determine Encoder Pulse Per Revolution (PPR) Specification Based on Speed Resolution

Use the following formula to determine the encoder pulse per revolution (PPR) specification based on the speed resolution.

$$\text{Speed resolution (Hz)} = \frac{\left(\frac{1}{\text{encoder pulse number} \times 4} \right) \times \text{pole pairs}}{10^{-3} \text{ sec}}$$

TIP The operating speed range will depend on the motor control mode selected (SVC or VVC). For more information, see [Performance with Encoder on page 170](#).

Example 1

To determine the PPR for quadrature encoder, to achieve 0.06 Hz of speed resolution on a 4-pole motor (2-pole pair) with a base speed of 60 Hz:

$$\begin{aligned} 0.06 \text{ Hz} &= \frac{\left(\frac{1}{\text{encoder pulse number} \times 4} \right) \times 2}{10^{-3} \text{ sec}} \\ &= \sim 8333 \text{ pulse} \end{aligned}$$

Therefore, select 8333 PPR or higher for the quadrature encoder to achieve the desired speed resolution of 0.06 Hz.

Example 2

To determine the speed resolution, using a 1024 PPR quadrature incremental encoder on a 4-pole (2-pole pair) motor:

$$\begin{aligned} \text{Speed resolution (Hz)} &= \frac{\left(\frac{1}{1024 \times 4} \right) \times 2}{10^{-3} \text{ sec}} \\ &= 0.49 \text{ Hz} \end{aligned}$$

Therefore, using a 1024 PPR quadrature encoder will give a speed resolution of 0.49 Hz.