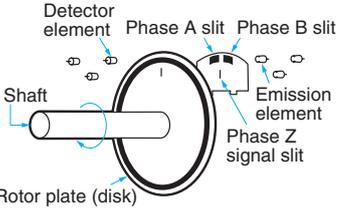
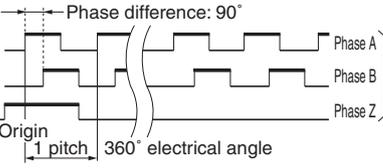
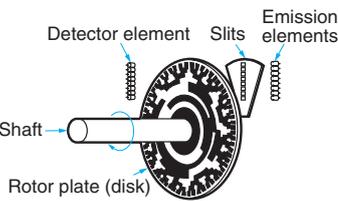
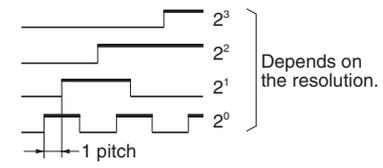


Rotary Encoders Technical Guide

Operating Principles

Item Classification	Features	Structure	Output waveform
<p>Incremental Encoders</p> <p>E6J-C E6A2-C E6B2-C E6C2-C E6C3-C E6D-C E6F-C E6H-C</p>	<ul style="list-style-type: none"> This type of encoder outputs a pulse string in response to the amount of rotational displacement of the shaft. A separate counter counts the number of output pulses to determine the amount of rotation based on the count. To detect the amount of rotation from a certain input shaft position, the count in the counter is reset at the reference position and the number of pulses from that position is added cumulatively by the counter. For this reason, the reference position can be selected as desired, and the count for the amount of rotation can be unlimited. <p>Another important feature is that a circuit can be added to generate twice or four times the number of pulses for one signal period, for heightened electrical resolution.*</p> <p>Also, the phase-Z signal, which is generated once a revolution, can be used as the origin within a revolution.</p> <p>*When high resolution is necessary, a 4-multiplier circuit is generally used. (4x output is obtained by differentiating the rise and fall waveforms of phase A and phase B, resulting in four times the resolution.)</p>	 <p>When a disk with an optical pattern revolves along with the shaft, light passing through two slits is transmitted or blocked accordingly. The light is converted to electrical currents in the detector elements, which correspond to each slit, and is output as two square waves. The two slits are positioned so that the phase difference between the square wave outputs is 1/4 pitch.</p>	 <p>Phase difference: 90°</p> <p>Origin, 1 pitch, 360° electrical angle</p> <p>* Even if resolution changes, the number of phases does not change.</p>
<p>Absolute Encoders</p> <p>E6J-A E6CP-A E6C3-A E6F-A</p>	<ul style="list-style-type: none"> This type of encoder outputs in parallel the rotation angle as an absolute value in 2^n code. It therefore has one output for each output code bit, and as the resolution increases, the value of outputs increases. Rotation position detection is accomplished by directly reading the output code. When the Encoder is incorporated into a machine, the zero position of the input revolution shaft is fixed, and the rotation angle is always output as a digital value with the zero position as the coordinate origin. <p>Data is never corrupted by noise, and returning to the zero position at startup is not necessary.</p> <p>Furthermore, even when code reading becomes impossible due to high-speed rotation, correct data can be read when the rotation speed slows, and correct rotation data can even be read when the power is restored after a power failure or other interruption in the power supply.</p>	 <p>When a disk with a pattern rotates, light passing through the slits is transmitted or blocked according to the pattern. The received light is converted to electrical currents in the detector elements, takes the form of waves, and becomes digital signals.</p>	 <p>2³, 2², 2¹, 2⁰</p> <p>1 pitch</p> <p>Depends on the resolution.</p>