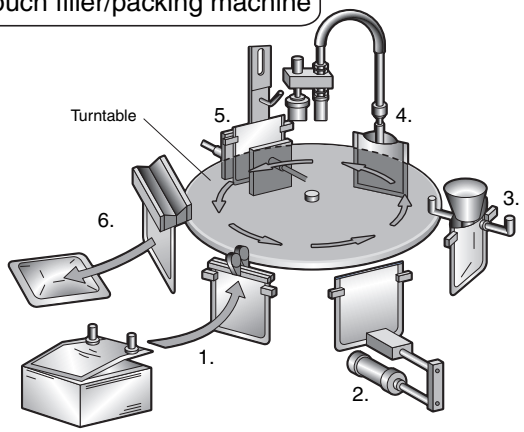
Overview of Cam Positioners

■ What is a Cam Positioner?

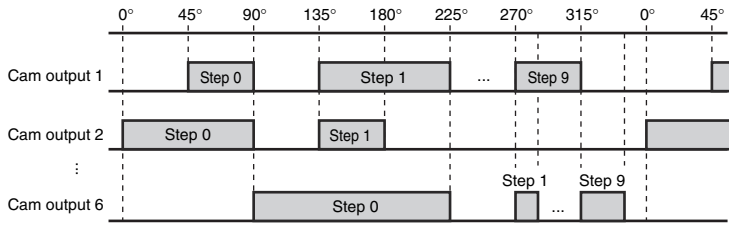
A Cam Positioner obtains angle data from an input device (e.g., an Encoder or Resolver) and uses preset ON/OFF angle settings to turn outputs ON and OFF. In food packing machines, for example, the Cam Positioner uses angle position data to control the timing of various mechanisms. The purpose of Cam Positioners is generally this type of timing control.

Pouch filler/packing machine



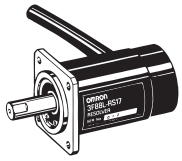
1. Control of the arm that supplies bags from the magazine
2. Control of the pump-driven cylinder
3. Control of filling a solid object with a specific amount of liquid
4. Control of the plunger and pump used to fill a body with a specific amount of liquid
5. Control of pouch sealing and air removal
6. Control of the metal seal pressing time and discharge arm

Cam outputs	Step 0		Step 1		...	Step 9	
	ON angle	OFF angle	ON angle	OFF angle		ON angle	OFF angle
1.	45°	90°	135°	225°		270°	315°
2.	0°	90°	135°	180°		---	---
...							
6.	90°	225°	270°	285°		315°	345°



■ Resolver

Unlike Encoders, Resolvers are simply structured and have no electronic components so their performance is virtually unaffected by dust or vibration. This makes them highly reliable and environmentally resistant. Because they are brushless as well, they are maintenance free and their service life depends solely on the ball bearings.



Features

Excellent Environmental Resistance

Resolvers boast excellent environmental resistance, particularly against oil, dust, temperature, and shock. They also have an ambient operating temperature range of −10 to 80°C.

Absolute Angle Detection

Resolvers can detect absolute angles and only one Resolver is needed for high-precision at 360 and 720 resolutions.

Shaft-load Tolerance: 196 N, Shaft Diameter: 10 mm (3F88L-RS17/RS17T).

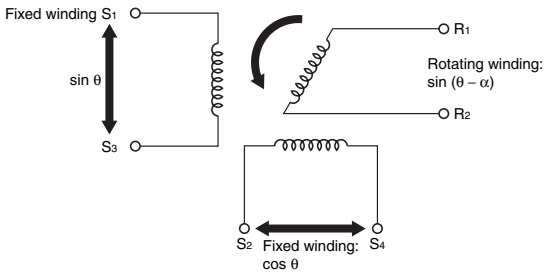
With a radial and thrust shaft-load tolerance of 196 N, Resolvers outclass all other detectors, such as Encoders.

Maximum Cable Length Up to 100 m

Resolver cables can be extended up to 100 m to enable remote operation and control from a location well away from the Resolver.

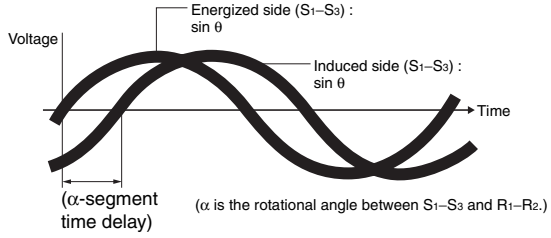
Operating Principle

As shown in the following diagram, sin θ and cos θ voltage is applied to the two sets of fixed windings, S_1–S_3 and S_2–S_4, respectively, that are mechanically 90° out of phase. Observing the sin (θ − α) voltage induced in the rotating winding R_1–R_2 makes the Resolver a kind of rotating transformer that detects angles.



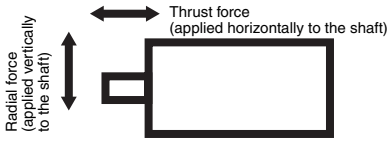
If the fixed winding is locked in position completely in phase with fixed winding S_1–S_3 (energized by sin θ voltage) for example, then sin θ voltage will be induced in R_1–R_2. When the rotating winding starts rotating, sin (θ − α) voltage will be induced in R_1–R_2 because of the cos θ voltage of the S_2–S_4 winding that is 90° out of phase with the S_1–S_3 winding. (See the figure below.)

A delay or advance of α is detected and measured to determine absolute angles.



Allowable Thrust and Radial Forces

Thrust and radial forces represent the maximum vertical and horizontal forces applied to a shaft. The magnitude of these forces is proportionally related to the service life of the product (i.e., the mechanical service life of the bearings).



Origin Compensation

When a Resolver is linked to a mechanical system, the Resolver origin can be easily adjusted to match the machine origin if they are not the same. The process of aligning the two origins is called origin compensation.