

CHAPTER ①

Introduction

The information in this chapter will enable you to:

- Understand the product's basic functions and features

Product Description

The Dynaserv is a high-torque, low-speed, highly accurate, outer-rotor type servo actuator that can be used in various applications related to factory automation, including industrial robots, rotary indexes, etc.

The Dynaserv system's primary function is to seek and maintain a position command from an indexer or a velocity or torque command from a servo controller. Digital electronics simplify the position loop and enable precise positioning. The analog velocity loop provides high stiffness and controllability.

DM & DR Series Motors

The Dynaserv's DD motors meet the needs of the advanced motion control environment. Two motor versions are available—DR and DM Series. The DR Series includes:

- A high-speed motor option (up to 4.0 rps)
- Brushless resolver feedback
- 9 models (50 to 500 Nm) of the A type with an outer diameter of 264 mm (10")
- 5 models (70 to 220 Nm) of the E type with an outer diameter of 205 mm (8")
- 8 models (8 to 60 Nm) of the B type with an outer diameter of 150 mm (6")
- 2 models (10 to 15 Nm) of the C type with an outer diameter of 106 mm (4")

The DM Series includes:

- Incremental encoder feedback
- 6 models (50 to 200 Nm) of the A type with an outer diameter of 264 mm (10")
- 5 models (15 to 75 Nm) of the B type with an outer diameter of 150 mm (6")

SR & SD Series Driver

Although the system is defined by the motor number, the drive will have its own part number on the serial tag. When using the DR series, the corresponding drive is the **SR** series and the DM series uses the **SD** drive series. Both drives are available as 115VAC or 230VAC. Some of the high-performance drives require 200VAC. Verify the drive type prior to set-up.

Product Features

- Brushless Direct Drive Motor
- Encoder Feedback - DM Series

- Resolver Feedback - DR Series
- Compression loads up to 8900 lbs
- Overhung loads up to 296 ft-lbs
- Speeds: up to 2.0 rps (standard version), 4.0 rps (high-speed version)
- Torques to 370 ft-lbs
- Resolutions up to 1,024,000 steps/rev
- Analog Velocity Loop
- Digital Position Loop
- 10 KHz PWM Switching Frequency
- Accepts Digital Step and Direction for Position Control
- Accepts $\pm 10V$ for Torque or Velocity Control
- Monitor output representing velocity or torque
- Quadrature encoder output to interface with servo controllers or digital counter
- Built-in Test mode to simplify tuning

Interface Options

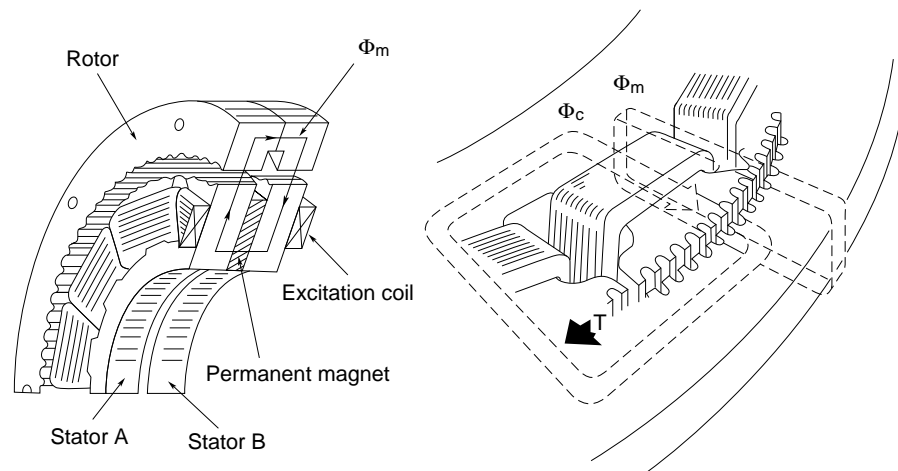
The Dynaserv can be operated in Position, Velocity, or Torque mode. In *Position mode*, the Dynaserv is compatible with all Compumotor Indexers. In Position mode, the Dynaserv moves one motor increment for each pulse received over the **STEP** input. In *Velocity mode* or *Torque mode*, the Dynaserv accepts a $\pm 10V$ analog signal representing a velocity or torque command. In torque mode $\pm 8.5V$ represents the torque command. To make the Dynaserv fully compatible with a servo controller, you can use the encoder output signal to close the position loop to your servo controller.

Theory of Operation

Direct-drive systems couple the load of the system directly to the motor without gears or pulleys. Most servo motors do not have the torque or resolution required to satisfy many application needs. Therefore, mechanical methods, such as speed reducers, are implemented to meet system requirements. Speed reducers, however, have inherent problems. Friction introduces inaccuracies and backlash in the gears limits positional accuracy. Gearing also ultimately limits the top speed of the system due to the large reduction. The Dynaserv system consists of three major components:

- ① Direct drive motor
- ② Drive
- ③ Feedback device

The direct-drive motor is the heart of the Dynaserv system. The motor provides very high torques in a modest package size. The figure on the following page shows that torque is proportional to the square of the sum of the magnetic flux, (Øm) of the permanent magnet and the magnetic flux, (Øc) of the stator windings. Two factors help the Dynaserv to generate high torque. First, since the radius of the motor is large, the tangential forces between rotor and stator work at a greater distance—producing additional torque. Second, many small rotor and stator teeth create many magnetic cycles per motor revolution. More flux contributing cycles create increased torque.



The motor contains precision ball bearings, magnetic components, and integral feedback in a compact motor package. The motor is outer—rotor, providing direct motion of the outside housing and thus the load. The cross roller bearings allow the motor to take very large compressing loads.

