



Technology 003: Closed Loop Stepper Motor

This technology is a proprietary electronic control mechanism and software for step motors that provides these stepper motors with a very high degree of precision, reliability and torque. The software is based on digital signal processing that provides precise motion control at a micro level.

1. Key distinguishing capabilities enabled by their motor controller:

- a. Proprietary digital signal processing (DSP) software in the microchip of the encoder enables motor to be 3x more precise than current step motors. Capable of positioning the rotary to support up to 32,000 ppr.
- b. Closed loop system enables driver to monitor motor continuously every 25 microseconds and correct itself upon recognizing errors.
- c. Minimizes hunting & vibration which may occur due to stopping & starting motor. Generally smoother & faster.
- d. Capable of 2x the torque of a servo motor at low speeds ranging between 1000-1500 rpm.
- e. Automatically tunes itself—no gain tuning.

These technical advances enable use of step motors in some market niches traditionally considered the purview of servo motors. For applications requiring very fast and precise motions covering short distances, this stepper motor may be superior to servo motors.

2. Performance:

- a. Speed : Maximum 3,000 RPM
- b. Strength : Holding Torque is 51 ~ 2,700 mN·m / Dielectric strength : 500V/mm (at 50Hz 1min)
- c. Processing capacity : Position Control → Incremental Mode & Absolute Mode, Data Range is -134,217,727 to + 134,217,727 pulse, Operating Speed : Max. 500 kpps
- d. Processing speed: Communication Interface → RS-485 serial communication & Data Transmission speed is 9,600 ~ 230,400 bps.
- e. Energy consumption: 1.4 ~ 3.5 Voltage (VDC) / 1.0 ~ 4.0 A (Ampere)

3. Design

- a. Position sensor: optical encoder
- b. Gain tuning: manual + automatic (no hunting)
- c. Encoder output: line driver (50cm – 20 meters)
- d. Protection of back Emf: yes
- e. Protection & alarm functions: 8
- f. High torque: available under 2000 rpm.
- g. Number of axes: 16 axes can be operated from one PC and each axis can memorize 256 positions. Motion Library (DLL) is provided for programming under Windows 2000 / XP / Vista.

Inventor. Invented by Mr. Song, Jin-II and his team. Mr. Song spent 13 years at Samsung Electronics developing robotics and automation applications before leaving to start his own company.

LG/Phillips. Subject company's stepper motors replaced servo motors previously in use at LG/Phillips in the automation of dispensing liquid crystal used in manufacturing flat screen display panels. Its precision in the placement of liquid crystal increased accuracy by an estimated 30-40%, reduced the percentage of error and defective products, and increased overall production of display panels providing a substantial cost saving for LG/Phillips.

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