

Servo System Division

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This paper presents the technical results of the Servo Systems Division in 2000.

For servo motor products, we introduced a 28mm sq., 40W model of the "P5" series into the market and NEMA-compatible products. In addition, we made a statement that the DC servo motor, the "L" series conformed to CE specifications, thus accomplishing expansion.

For a servo sensor, we developed a small-size, high-precision 18mm sq. model and mounted it on a small-diameter servo motor of the "P5" series, thus accomplishing its entry into the market. We also mounted a resolver-type linear sensor on a cylinder-type core-equipped linear servo motor and completed it.

For servo amplifiers, we developed large-capacity models of 200V and 400V for the multi-axis servo amplifier the "PQ" type M and entered it into the market. For the "PB" series, we completed new command type products and interface-expanded products. For "PM" drivers, we equipped them with a newly developed HIC and completed a micro-step driver, which is small in size and low in vibration.

The completion of these servo amplifier "PQ" type M, "PB," and "PM" drivers will enable the expansion of system configurations with servo motors and stepping motors and are expected to find a larger market.

For stepping motors, we completed the "Step Syn F" series capable of meeting a wide range of variations in the market of general industrial equipment.

These products are developed products that fulfill the concepts of energy-saving, safety, and environmental resistance. By taking advantage of their respective characteristics, they will hopefully help incite potential needs of customers.

This paper gives an overview of and explains the features of these products.

28mm sq. AC servo motors

We developed 28mm sq., 40W motors with small diameters and high outputs of the AC servo motor "P5" series.

The conventional line-up involved 20mm sq. 10W and 20W, and 35mm sq. and 30W. We set dimensions of 28mm sq. to meet customer needs for motor outputs of 40W with an installation pitch of no more than 30mm.



Conventional models were belt-driven to achieve a ball screw pitch of 30mm. The new model is 28mm sq., so that the ball screws can be connected directly, resulting in high rigidity and compactness.

The incorporated encoder is an E18, which is common to 20mm sq. motors.

Demand is expected mainly for mounter-purpose Z-axis and ϕ -axis applications. We are also scheduled to develop some versions suited for motor outputs of 20W and 30W.

CE conformity of L series DC motors

We made a statement that our DC servo motor, the "L" series standard model conformed to CE specifications.

Applicable models are the "L4" (42mm sq.), "L5" (54mm sq.), "L7" (76mm sq.), and "L8" (88mm sq.).

The "L" series is compatible with the "V" series, on which we made a CE-conformity statement beforehand.

Small-size DC servo motors enjoy prolonged popularity in the world market, centering on the Western market. They are expected to satisfy an even wider range of demand.



Conformity of AC servo motors, "P5" series, to NEMA standards

To increase sales in the United States, we completed products with their motor installation dimensions adapted to the relevant NEMA standards for AC servo motors of the "P5" series with outputs 50W to 1kW.

Here are the new models added as NEMA-compatible products:



①NEMA 23 size

Models 50W to 200W of "P5" motors. Flange angle dimensions: 57.15mm sq.(2.25 inches).

②NEMA 34 size

Models 300W to 1kW of "P5" motors. Flange angle dimensions: 86mm sq.(3.386 inches).

Small-size, high-precision incremental sensors

To meet the small-size, lightweight, and high-precision requirements for AC servo motors, we developed small-size, high-precision incremental sensors that can be mounted on "P" series 20mm sq. and 28mm sq. motors.

Here are the main features.

Dimensions: 18mm x 18mm x 25mm

Resolution: 2,048 pulses/revolution

Custom LEDs, custom ICs, and a high-precision assembly method have achieved a high resolution in a model of this size.

Saved wiring: 4-pair shielded cable



Development of cylinder-type core-equipped Linear Servo Motors

We developed linear motors designed for high accelerations and high hit rate drives.

A newly developed linear resolver is adopted in the sensor, making it cheaper than models equipped with optical sensors.



The developed product has the following features:

- ① Capability of absolute position detection within the stroke (with a resolution of 5 μ m).
Incremental signals are output in a line driver form at the same time as absolute position output by serial transmission. This allows users to select a desired position signal type.
- ② Continuous thrust 300N, maximum thrust 600N.
The motor and sensor are integrated in a body as same as rotary servo motors. This facilitates assembly on host equipment. The flange dimensions are 100mm sq. and its stroke is 35mm.

Development of large-capacity, multi-axis servo amplifier, the "PQ" type M

We developed a new large-capacity model and added it to the multi-axis servo amplifier of the "PQ" type M series.

The line-up comes in 200V inputs of 300A, 600A, and 900A, and 400V inputs of 600A and 800A. This allows users to select servo systems from a wide range of capacity specifications in the fields of injection molding machines, semiconductor-manufacturing equipment, and other machinery. This is, therefore, expected to increase demand.



Development of position-command type amplifier "PB" series, which give commands whenever necessary

For the "PB" and "RB" series, which involved conventional target position command types, we newly developed position command type "PB" amplifiers that give variable data commands whenever necessary, and produced a line-up of two models with an interface of highly versatile pulse-string input (right-hand photo) and an interface of RS-485 serial communications (4Mbps) (left-hand photo).



To make them more user-friendly, we turned the power supply input into a wide range of 24V to 48V DC and increased their output currents, thus increasing torque.

For new control functions, we incorporated a micro-step control function with six steps to meet the requirement of 200 to 12800P/R. Combination motors come in standard models consisting of a long line-up of 28mm, 42mm, 50mm, 56mm, and 60mm sq. Additional options were also provided for solenoid brakes, spur gears, high-precision gears, and harmonic gears.

Small-size, low-vibration DC input "PM drivers"

We developed small-size, low-vibration micro-step drivers of the 5-phase, DC input type. The developed items are available in two models: a multi-functional type (top photo) and a small-size high-performance type (bottom photo).



On the drivers, a newly developed HIC was equipped with an ASIC and provided with many controls (such as micro-step control, current control, vibration suppression, and torque increase control), thus cutting size and vibration.

- ① The multi-functional type is a micro-step driver of the open frame type and for small- to mid-size stepping motors. It is equipped with a newly developed HIC to reduce the volume by about 50% from this company's conventional products, thus making major size cuts.

Dimensions: 82mm x 64mm x 33mm

Number of micro-step divisions: 10 steps (1, 2, 2.5, 4, 5, 8, 10, 20, 40, 80) Applicable motors: 42mm sq. to 60mm sq. and ϕ 60mm diameter to ϕ 86mm diameter.

- ② The small-size high-performance type is a micro-step driver of the card type and for small stepping motors. It is equipped with the developed ASIC to turn it into the smallest of all conventional drivers, "smaller than a business card".

Dimensions: 72 x 56 x 12mm

Number of micro-step divisions: 10 steps (1, 2, 2.5, 4, 5, 8, 10, 20, 40, 80)

Applicable motors: 28mm sq., 42mm sq.

These variations will meet a wider range of demand in the field of general industrial machinery.

Stepping motors for general industrial machinery

The "Step Syn F" series was introduced into the line-up of stepping motors for general industrial machinery to establish a line-up of products capable of meeting demand for a wide range of variations from office-automation equipment to general industrial machinery.



The main features of the product are:

- ① A rich variety of models
We have provided a line-up of 32 models of power systems with five sizes ranging from 28mm sq. to 60mm sq. and ϕ 86mm diameter to ϕ 106mm diameter. Diverse options have also been provided as standard types with brakes, high-precision gears, and harmonic gears.
- ② Low-vibration, low-noise structure
Higher structural rigidity and Sanyo Denki's original optimal design of magnetic circuitry have achieved cuts in vibration and noise levels.
- ③ High torque characteristic
Achieving high torque in a compact body with keeping the concept of highly acclaimed "Step Syn H" series.
- ④ Conformity to international standards
We have added the "Step Syn M" series, which achieves low vibration, low noise, and high torque and conforms to relevant UL and CE specifications, and expanded

our line-up.

Shigeto Murata
Joined company in 1965
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Worked on development and design of servo systems
