Servo Systems Division

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This document summarizes the main product developments for the Servo Systems Division in 2007.

In the field of encoders, we have expanded upon the batteryless technology used in the batteryless absolute encoder "RA062" and developed a smaller version, "RA035".

In the field of servo amplifiers, we have introduced the AC servo amplifier "SANMOTION R" Series ADVANCED MODEL Type S with improved features and performance over the AC servo amplifier "SANMOTION R" Series.

Additionally, in response to increasing demand for Ethernet communication in the marketplace, we have developed an AC servo amplifier with a SynqNet interface.

In the field of stepping motors, we have developed a 50 mm square 2-phase thin-type stepping motor that contributes to the miniaturization of equipment. For stepping motor drivers, we have created a small driver by adding a micro-step controller to the small 5-phase driver with a built-in printed board that we released last year.

The following information provides an overview and features for each product.

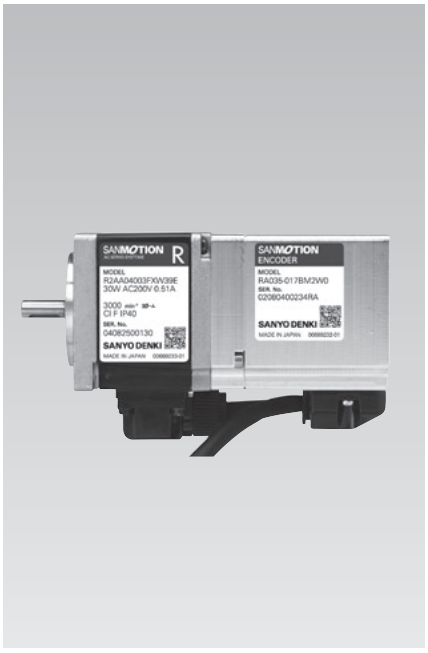
■ Small-size Batteryless Absolute Encoder "RA035"

Absolute position information, including multiple rotation has become essential for industrial applications such as industrial robots, semiconductor manufacturing equipment and electronic assembly equipment. Output of absolute position information generally requires the use of an external battery. We previously created the "RA062" encoder that outputs absolute position information without a battery that normally becomes an environmental load in the form of waste. We have now pushed the batteryless technology in the "RA062" even further and reduced the size by 30% to achieve the "RA035".

This product has been developed with the goals "smaller" and "lighter" in mind. "RA035" has two components: a resolver and a signal processing circuit. To reduce the size of the unit, we have redesigned the signal processing circuit by replacing three different IC chips with a single programmable element (FPGA). This not only reduces the size, but it also reduces the number of parts. It can also be mounted on a 40 mm square servo motor, the smallest device in the "SANMOTION R" small-capacity servo motor lineup released last year.

Finally, the signal processing circuit has resulted in 50% less consumption current than previous models.

With the smaller, lighter, and more energy-efficient design, this product has earned our ECO PRODUCTS mark.



■ AC Servo Amplifier “SANMOTION R” Series ADVANCED MODEL Type S

The AC servo amplifier “SANMOTION R” Series released in 2005 underwent an improved ease of installation and increased productivity, due in large part to higher performance auto-tuning and vibration controls.

However, the market demanded reduced environmental impact, including improvements in productivity and energy efficiency. With this in mind, we developed the AC servo amplifier “SANMOTION R” Series ADVANCED MODEL Type S with improved features and performance.

The “SANMOTION R” ADVANCED MODEL Type S includes the following features.

Frequency response of 1200 Hz, twice that of conventional products.

- New vibration control through model following control.
- Improved operability through multi-window setup and operating trace functions.
- Greater reliability through improved alarm state display, time stamp functions, and hardware gate off functions.

Thus, device productivity and servo amplifier operability and maintainability have all been greatly improved.

The newly developed product includes the following lineup:

AC 200 V input: 15 A, 30 A, 50 A

Applicable motors: 30 W to 1.5 kW

Additionally, the volume has decreased up to 15% compared to conventional products and the product is 19% more energy-efficient allowing this series to earn our ECO PRODUCTS mark.

■ AC Servo Amplifier “SANMOTION R” Series with Built-in SynqNet Interface

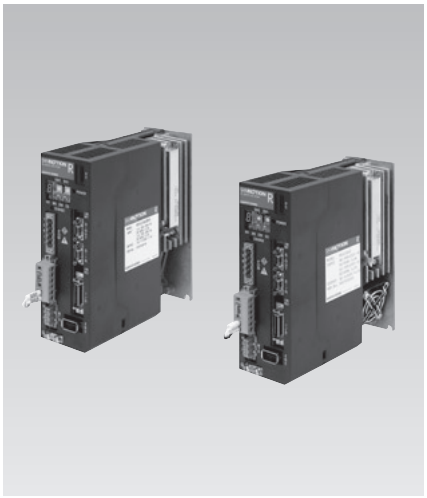
In the current FA marketplace, there is a growing demand for communication modes based on Ethernet for communication between the controller and the servo amplifier. We are dedicated to meeting market demands for all sorts of networks, and we have developed a servo amplifier with SynqNet interface that is strongly demanded in the semiconductor manufacturing equipment field.

SynqNet is a network developed by Danaher Motion that is compatible with the physical layer of Ethernet 100BASE-T and offers a communication speed of 100 Mbps.

Additionally, host masters manage position control and velocity control while the slave (servo amp) manages torque control.

We are collaborating with Danaher Motion to release 15A and 30A servo amplifiers with SynqNet interface that are under heavy demand in the market at the moment.

Once we have ascertained market demand, we may expand the line-up to include 50 A and larger servo amplifiers.



■ “SANMOTION F” Series Small-size 5-phase Micro-step Driver

The small-size 5-phase stepping motor driver released in 2006 is known for its small size and ability to be mounted on printed circuit boards. Building on this product, we have developed a small-size 5-phase micro-step driver for indoor use and other environments that require minimal noise.

The stepping motor has a simple and convenient actuator to perform positioning with open loop control, but at low speed, the vibrations caused by stepping drive become larger. Micro-step control is added as a method to reduce the vibrations when operating at low speed. This product includes a circuit that detects and controls the current command and 5-phase motor current according to the motor angle-torque characteristic and generates the ideal current in order to reduce the motor vibrations. This control reduced vibration about 90% compared to conventional products.

Additionally, the use of a new power element attains a 20% reduction of loss compared to conventional products.

■ “SANMOTION F” Series Small-size 2-phase 50 mm-square Thin-type Stepping Motor

In order to attain the demands for higher performance and smaller size in an installation site, semiconductor manufacturing equipment and component mounting devices are also demanding smaller sizes in the built-in actuators.This stepping motor, designed for optimal thinness, was developed to meet market demands.

The motor has the following features:

- Best thinness in the industry due to optimization of the stator core.
- Satisfies both high-torque and thinness due to optimization of the magnetic characteristic of the stator core.
- Compliant with EU RoHS directive.

The motor line-up includes the following two types: 11 mm and 16 mm.

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Joined Sanyo Denki in 1983.
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Worked on the design and development of servo systems.