

Servo Systems Division

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Sanyo Denki aims to develop servo system products which our customers can use with peace-of-mind, and at the same time significantly contribute to the creation of problem solutions and new values.

In 2015, we developed a servo amplifier and stepping driver that offers benefits such as space-saving, safety and user-friendliness. In regards to servo motors, we developed a linear servo motor which pursues high acceleration and user-friendliness.

This section will provide an overview of the new products developed in 2015 and their respective technologies.

First, in regards to servo amplifier products, we developed the "48 V DC EtherCAT Interface-Equipped 4-Axis Integrated Type" and

added it to our "SANMOTION R ADVANCED MODEL" lineup. We also developed the "DC Power Input 4-Axis Integrated Type" and added it to our "SANMOTION Model No.PB". By making these products the "4-Axis Integrated Type", we have achieved significant downsizing and weight reduction, thus greatly contributing to the space-saving of machinery and equipment. The input voltage specifications of these products is the highly safe low voltage.

We have also added 75 A current capacity models to the AC servo amplifier "SANMOTION R 3E Model" lineup. This servo amplifier is optimal for combined use with a motor which has a rated output of 1.8 kW to 3.5 kW and can be alternated with a 100 A capacity amplifier, depending on the

necessary maximum instantaneous torque.

Next, in regards to servo motors, we have developed the "Compact, Large Thrust, Low Magnetic Attractive Force Linear Servo Motor". This linear servo motor is compact, lightweight and large thrust, thereby enabling acceleration/deceleration drive with an acceleration rate of 3G. Moreover, this linear servo motor is user-friendly as it has zero magnetic attractive force on equipment, therefore equipment mechanisms can be simplified and support mechanisms such as linear guides can be downsized.

The following is an overview of the new model and their respective features.

■ “SANMOTION R ADVANCED MODEL” 48 V DC EtherCAT Interface-Equipped 4-Axis Integrated Type Servo Amplifier

In 2009, Sanyo Denki launched a servo amplifier supporting EtherCAT communication and it is now being used by customers around the world. In 2015, we developed an “EtherCAT Interface-Equipped 4-Axis Integrated Type Servo Amplifier” with a safe torque off (STO) function and low voltage input. This servo amplifier was used to enhance the servo system “SANMOTION R ADVANCED MODEL” lineup. This servo amplifier is a 48 V DC input 4-axis integrated type servo system and the lineup consists of two types of product, one with a 4-axis combined output of 120 W and one with 300 W.

The new model includes the following features.

1. Equipped with a high-speed field bus EtherCAT interface

High-speed communication with a speed of 100 Mbps and a minimal communication cycle of 125 μ sec has helped make equipment movements smoother by enabling commands for position, speed and so on to be subdivided.

2. Compact and Lightweight

The 4-axis integrated structure means the new model is compact and lightweight, with 60% the volume and 40% the mass of four drivers using one motor each.

3. Safety

A safe torque off (STO) function is standardly equipped. Moreover, the new model complies with “SIL3/IEC61508, PL=e/ISO13849-1”, therefore can be used for applications which require high safety performance such as medical equipment.

4. User-friendly

A cooling fan is built into the amplifier, and it is structured as an enclosure type, therefore there are no issues related to heat dissipation. Moreover, serial communication of motor setup software is connected to each CPU in a daisy chain connection, therefore communication can be performed with all four motors using a common communication cable, meaning the new model uses less wires.

5. Energy Saving

The new model contributes to the energy-saving of other equipment as the generated regenerative electric power can be used as the power of other motors.



■ “SANMOTION Model No.PB” DC Power Input 4-Axis Integrated Type Driver

Stepping systems are often used in open-loop control due to the simplicity of their system configuration and control, however closed-loop control is used in applications where high-speed drive and high reliability are required. Sanyo Denki had already been offering the closed-loop stepping system “SANMOTION Model No.PB”, however we have newly developed a DC power input (24 V and 48 V) 4-axis integrated driver to enhance our lineup.

The new model includes the following features.

1. Space-saving, less wiring

Four stepping motors can be driven using one driver unit therefore installation space is less than half of that occupied by four drivers with one motor each.

Moreover, less wiring is used as the power cable, I/O signal cable and other cables independent of the number of motors are common.

2. Reduced tact time

The new product adopts “low-deviation closed-loop control” which has higher follow-up performance of position commands than conventional closed-loop control. As such, there is no delay after a position command is made, which in turn has reduced equipment tact time.

3. Flexible resolution settings

The resolution of the position command can be set between 200P/R and 51200P/R therefore drive can be adjusted to suit the resolution necessary for the equipment. The speed of the calculation processing performed by the driver has been increased, therefore there is also less speed fluctuation during low-speed drive.

4. Easy settings and operational status analysis

By downloading “SANMOTION Motor Setup Software” from Sanyo Denki’s website and using it on a PC, various operations can be performed with ease, including control parameter settings, operational status monitoring and trial operation. Moreover, fault analysis is made easy with a drive record function which records data upon fault occurrence (e.g. speed, position and current) in the memory.

As the above description indicates, the new product is a user-friendly stepping driver which is space-saving, uses less wiring and offers better follow-up performance of position commands. This makes it the optimal product for use in semiconductor-related equipment, food-related equipment and industrial machinery.



■ “SANMOTION R 3E Model” 75A Servo Amplifier

We have added a 75A current capacity model to the AC servo amplifier “SANMOTION R 3E Model” lineup. This new model is optimal for the drive of servo motors with rated outputs of 1.8 kW to 3.5 kW.

The new model includes the following features.

1. Evolved Performance

Equipped with a function to shorten positioning time, this model can significantly reduce a machine’s tact time.

With an improved function to turn off motor torque, “SANMOTION R 3E Model” conforms to the international standard of “SIL3”/IEC61508, “PL=e”/ISO13849-1. This means “SANMOTION R 3E Model” can be used with peace-of-mind even on equipment such as medical devices which require a high degree of reliability.

2. Eco-efficient

Power loss during operation has been reduced by 11%. Furthermore, the power consumption monitor function makes it possible to monitor the amount of power used by a piece of machinery.

3. Easy to Use

The new model is equipped with a virtual motor operation function, servo adjustment assist function, drive recorder function and so on, making it possible to conduct device startup, servo adjustment and troubleshooting in a short period of time.

Moreover, the amplifier height has been made the same as that of the small-capacity amplifier (current voltage: 10 to 50 A), and downsizing has been achieved, along with weight reduction.

As such, the new servo amplifier has evolved insofar as basic servo performance such as high responsivity and energy-saving ability, at the same time as being space-saving, possessing safety features and being easy to use.

This makes it ideal for a variety of applications, including robots, machine tools and injection molding machines.

The details of this new model are provided in the “New Product Introduction” section of this Technical Report.



■ “SANMOTION” Compact, Large Thrust, Low Magnetic Attractive Force Linear Servo Motor

Linear servo motors significantly contribute to improvement in the speed and accuracy of machinery due to direct linear drive not requiring a mechanism such as a ballscrew, etc. for rotational-linear motion conversion. On linear servo motors which use a permanent magnet it is possible to increase the thrust density (thrust generated per unit volume), therefore it is easy to downsize, however there is a large magnetic attractive force between the permanent magnet and iron core (a force which works in the vertical direction against the thrust), therefore there is a need to increase the support stiffness of the equipment.

The new model is a compact, lightweight linear servo motor which generates a large thrust and has only a small magnetic attractive force therefore it offers both high acceleration and user-friendliness.

The new model includes the following features.

1. Compact and lightweight with large thrust

The rated thrust density and instantaneous thrust density of the newly conceived “C-Mag Type” is approximately twice and 1.5 times that of conventional models, respectively, making it a linear servo motor which is compact and lightweight with a large thrust. Another model in the lineup, the “Twin Type” has a rated thrust density and instantaneous thrust density approximately 1.4 times and approximately 1.13 times higher than conventional models, respectively.

2. High response (high acceleration)

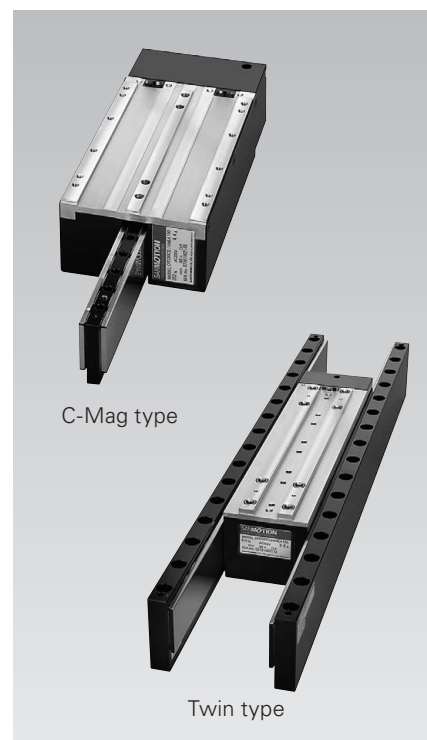
The new model is compact, lightweight and generates a large thrust, therefore enabling acceleration/deceleration drive at high acceleration. It achieves an acceleration rate of approximately 3G with a load mass eight to ten times greater than the mover (armature coil).

3. Small magnetic attractive force

The new model only has a small magnetic attractive force on equipment. Particularly in the case of the newly conceived “C-Mag Type”, the magnetic attractive force on equipment is zero. As such, equipment mechanisms can be simplified and support mechanisms such as linear guides can be downsized, making for a user-friendly linear servo motor.

With features such as these, the new model is optimal for applications such as semiconductor manufacturing equipment, FPD manufacturing equipment, chip mounters, bonders and transfer equipment and can significantly contribute to the downsizing and high responsiveness of equipment.

The details of this new model are provided in the “New Product Introduction” section of this Technical Report.



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Joined Sanyo Denki in 1986

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Involved in the Research and development of servo systems as well as the development and management of production systems.