

“SANMOTION R” Series Servo Amplifier with CANopen Interface

Masahisa Koyama Kouichi Machida Haruhiko Chino Hiroaki Koike Tetsuya Yamamoto
Hideki Fukasawa Hiroshi Kanai

1. Introduction

Recently, open networks are continuing to spread in the FA industry, especially in Europe where various types of open networks are competing. Among those, CANopen has a high share in the market and is expected to be in demand in the future.

In addition, because the common power supply is a 3-phase 4-wire 380 - 480 VAC in foreign countries, servo amplifiers that support such power supplies are required.

Considering such situations, we developed a servo amplifier with CANopen interface that is targeted for overseas, especially the European market. The product lineup includes the single-phase 230 VAC input type that supports small capacity motors and the 3-phase 400 VAC input type that supports medium-to large capacity motors.

The single-phase 230 VAC input type achieved a smaller size that makes it compatible with the mounting area for the standard R amplifier. The 3-phase 400 VAC input type aims to gain new customers across Europe by including with both a general interface and CANopen interface.

This document introduces descriptions and features of the servo amplifier with CANopen interface.

2. Background of the Development

Open networking in the FA industry has following advantages:

- Enables transmission of a large amount of data.
 - Enables improved safety and productivity, not only by real time control information, but also by feedback from various sensor signals.
- Enables device distribution and centralized management
 - Enables control, monitoring, and management on a single line.
- Cost advantage through wire saving
 - Links can be easily established via computers.

We previously developed products that support SERCOS or DeviceNet networking to meet the trend of open networking. This

time, however, we developed a servo amplifier that supports CANopen interface due to the recent increase in communication speed as well as an increasing share of CANopen.

3. Specifications

Fig. 1 shows a photograph of the servo amplifier with CANopen interface.

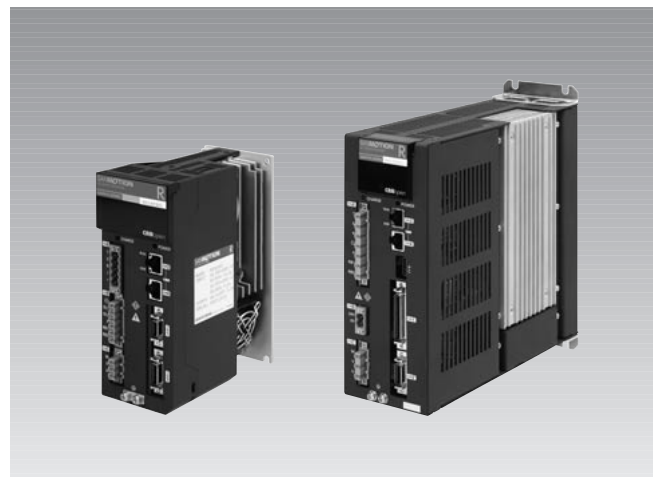


Fig. 1: Servo amplifier with CANopen interface

3.1 Specifications

Table 1 outlines specifications of the product.

- Product lineup
 - Single-phase 230 VAC input: 15 A, 30 A, 50 A
 - Combination servo motors: Q, R series, 30 W to 1.5 kW
 - 3-phase 400 VAC input: 25 A, 50 A, 100 A
 - Combination servo motors: Q2 series 0.5 Kw to 7 kW
- Combination sensors
 - Wireing-saving incremental encoder
 - Optical absolute encoder

Table 1 Specifications

Model No.	RS1A01AL	RS1A03AL	RS1L05AL	RS1C02AL	RS1C05AL	RS1C10AL	
Input voltage	Control power	Single-phase 200 to 230 VAC +10, -15% 50/60 Hz ±3 Hz			24 VDC ±10%		
	Main circuit power	Single-phase 200 to 230 VAC +10,-15% 50/60 Hz ±3 Hz			3-phase 380 to 480 VAC +10, -15% 50/60 Hz ±3 Hz		
Environment	Ambient temperature, humidity	Temperature: 0 to 55°C, Humidity: 90% or lower (No condensation)					
	Storage temperature, humidity	Temperature: -20 to 65°C, Humidity: 90% or lower (No condensation)					
	Altitude	ASL 2000 m or lower					
	Vibration	0.5 G frequency range 10 to 55 Hz, 2 hours in the X, Y, Z direction					
	Impact	2G					
Amplifier output	Rated current	2.5 Arms	5.2 Arms	12 Arms	4.8 Arms	12 Arms	20 Arms
	Maximum output current	7.9 Arms	15.5 Arms	26.5 Arms	12.9 Arms	29.2 Arms	52.9 Arms
Structure	Tray-type. Built-in power supply.						
Dimensions	Height [mm]	168	168	168	205	205	205
	Width [mm]	60	60	90	75	100	175
	Depth [mm]	130	130	130	235	235	235
Built-in functions	Protection function	Same as the R series					
	LED indication	Status indication, monitor indication, alarm indication, parameter setting, adjustment function, CANopen axis/ baud rate setting					
	Dynamic brake	Included					
	Regeneration processing	Included (external regeneration resistor)					
Input/output signal	Input signal	CANopen interface specifications			Same as the R series		
	Output signal	CANopen interface specifications			Same as the R series		
Communication	PC I/F	Same as the R series					
combination motor	Q1 series	R series standard combination (up to 1.5 kW)			None		
	Q2 series	R series standard combination (up to 1.5 kW)			500 W to 1.5 kW	2 to 4.5 kW	4.5 to 7 kW

3.2 Features and performance

This product inherits assets from the existing R series to realize features and performance that are equivalent to the standard R series.

In addition, it supports R Setup Software for improved maintainability, which enables use under environments equivalent to the standard R series.

3.3 Exterior and structure

Miniaturization and low-cost has been achieved by consolidating the control block and interface block on a single PCB.

The single-phase 230 VAC input unit that supports small capacity motors is compatible with the installation for the standard R series, which means that the user can easily replace the standard interface with the CANopen interface without changing the cabinet design of the user device.

Table 2 CANopen interface specifications

Bus connection, medium	Comply with CAN-Standard ISO 118988 (High-speed CAN)
Communication profile	Comply with CiA DS-301 V 4.02.
Device profile	Comply with CiA DSP-402 V2.0
Communication port	RJ45 connector (2 ports)
baud rate	10 kbit/s, 20 kbit/s, 50 kbit/s, 125 kbit/s, 250 kbit/s, 500 kbit/s (default), 800 kbit/s, 1 Mbit/s
Node address	127 Max.
Communication object	SDO (Service Data Object), PDO (Process Data Object), EMCY (Emergency), NMT (Network management), SYNC (Synchronization Object), Node Guarding, Heart Beat
PDO Transmission mode	Synchronous transmission/Asynchronous transmission
Operation mode	Profile Position Mode (p.p), Profile Velocity Mode (p.v), Homing Mode (h.m), Interpolated Position Mode (i.p)

3.4 CANopen interface specifications

Table 2 shows CANopen interface specifications.

It complies with DSP-402 V2.0, a communication specification dedicated for servo amplifiers, and supports European controllers.

The following four operation modes are supported.

- Profile Position Mode(P.P)
- Profile Velocity Mode(P.V)
- Homing Mode(H.P)
- Interpolated Position Mode(I.P)

4. Conclusion

We developed the servo amplifier with CANopen interface as described in this document.

This product has realized features and performance equivalent to those of the standard R series while achieving small size and low cost by consolidating the interface block and control block. It provides superior cost performance compared to other competitive products by both domestic and international manufacturers.

We expect that open networking in the motion control fields will be further enhanced, focusing on safety and real-time abilities.. As communication speeds up, it is expected to lead to real time control, with improved safety by duplex communication.

In the field of machine tools and NC machine tools, it is anticipated that synchronous control is the key technology. By synchronously controlling multiple devices, coordinated operations will be possible, which further improves performance and productivity of the machine.

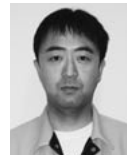
Networks such as IEEE 1394, generally used for personal computers, and SynqNET, which specializes in motion control, are constantly being introduced in the FA field.

We will assess the trend of open networking and plan to satisfy the needs of customers by providing product groups that support open networking.



Masahisa Koyama

Joined Sanyo Denki in 1990.
Servo Systems Division, 2nd Design Dept.
Worked on the development and design of servo amplifiers.



Koichi Machida

Joined Sanyo Denki in 1994.
Servo Systems Division, 2nd Design Dept.
Worked on the development and design of servo amplifiers.



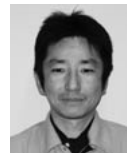
Haruhiko Chino

Joined Sanyo Denki in 1983.
Servo Systems Division, 2nd Design Dept.
Worked on the development and design of servo amplifiers.



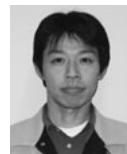
Hiroaki Koike

Joined Sanyo Denki in 1988.
Servo Systems Division, 2nd Design Dept.
Worked on the development and design of servo amplifiers.



Tetsuya Yamamoto

Joined Sanyo Denki in 1993.
Servo Systems Division, 2nd Design Dept.
Worked on the development and design of servo amplifiers.



Hideki Fukasawa

Joined Sanyo Denki in 1991.
Servo Systems Division, 2nd Design Dept.
Worked on the development and design of servo amplifiers.



Hiroshi Kanai

Joined Sanyo Denki in 1997.
Servo Systems Division, 2nd Design Dept.
Worked on the development and design of servo amplifiers.