

Development of “SANMOTION” Q Series DC24V Servo Amplifier

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1. Introduction

Recently, there are needs for a small size and DC24V input AC servo amplifier as an actuator system that is installed in semiconductor manufacturing equipment and small robots. Particularly, there is a sign of rapid growth in the small robot field, and a great demand in the future can be expected.

However, in the past, we did not have a small servo amplifier that was able to drive DC24V (low voltage) as a standard series. From this background, the lineup of the “SANMOTION” Q series was expanded and the DC24V servo amplifier was developed.

In this text, the outline of the “SANMOTION” Q series DC24V servo amplifier is introduced.

2. Outline of the Product

2.1 Outline of the Product

The structure of the DC24V input servo amplifier is shown below and the specifications of the “SANMOTION” Q DC24V servo amplifier is shown in Table 1.

1. Capacity of the Amplifier
 - 30A
2. Combination Motor
 - 50W and 80W of “SANMOTION” P5 Series
 - P50B04005J (50W)
 - P50B04008J (80W)
3. Combination Sensor
 - Wiring saving incremental encoder
 - Absolute encoder “SANMOTION” model PA035
4. Command Interface
 - Analog input 1ch (speed command or torque command)
 - Pulse train positioning command (Photo coupler) differential input)
5. Control Mode
 - One control mode can be selected among speed control, torque control, and positioning control with the parameter switch.

2.2 Block Diagram

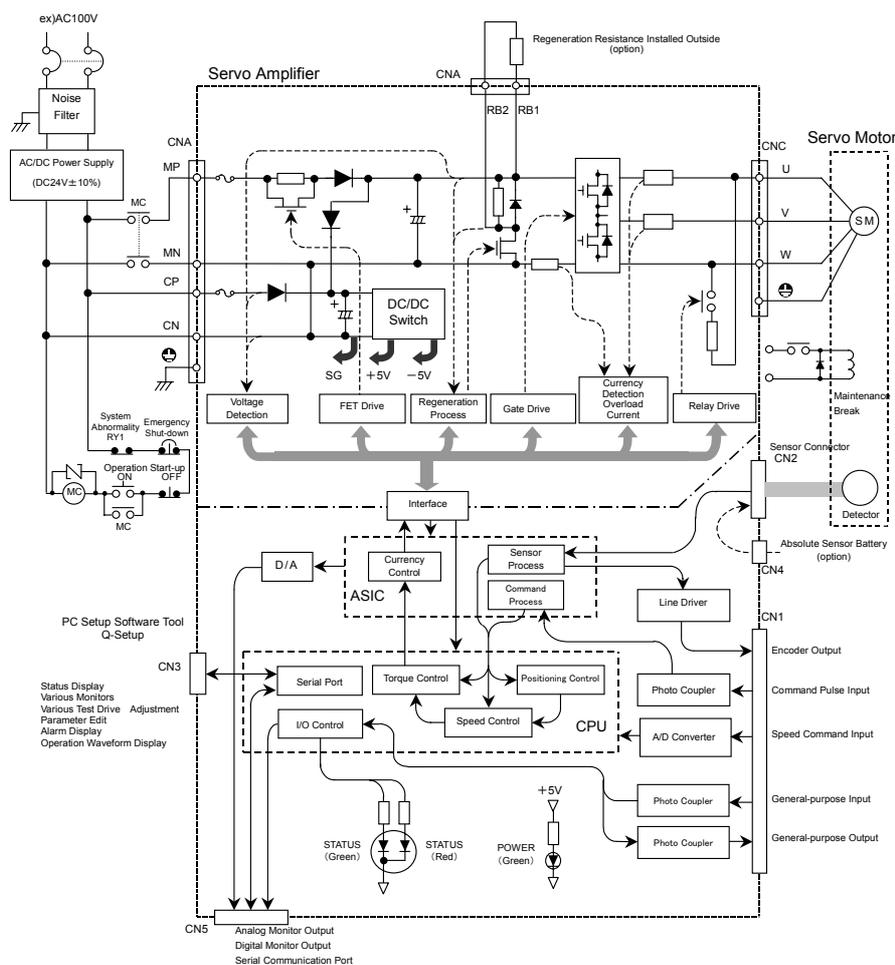
Fig. 1 shows the brief block diagram of the entire servo system.

The basic hardware structure consists of 2 boards of the power part (P2 board) and the amplifier control part (P1 board).

Table 1 Specifications of the “SANMOTION” Q DC24V Servo Amplifier

| | | Item | QS1J03◇□□ | |
|---------------------|--|--------------------------|---|--|
| Basic Specification | Control Function | | Speed Control, Torque Control, Positioning Control (*select One Control Method) | |
| | Control Method | | MOSFET-PWM Method Sine Wave Drive | |
| | Input Power Supply (main Circuit/ control) | | DC24V±10% | |
| | Environment | Operation Ambient Temp. | 0~55°C (depends on the motor combination and mounting condition) | |
| | | Storage Temp. | -20~+65°C | |
| | | Operation/ Storage Temp. | 90%RH≧ (should be no condensation) | |
| | | Vibration | Acceleration : 0.5G(4.9m/S ²) Frequency Range : 10~55Hz | |
| | | Shock | Acceleration : 2G(19.6m/S ²) | |
| | Structure | | Plate Case + Extruded Aluminum Fin | |
| | Mass | | 600g | |
| Performance | Speed Control Range | | 1:5000 | |
| | Frequency Characteristic | | 500Hz(at digital speed command) | |
| Installed Functions | LED Display | | Control Power ON : Green LED Internal Status Display : 2-color LED | |
| | Dynamic Break | | Installed | |
| | Regeneration Processing | | Installed | |
| | Applied Load Inertia | | Within applied inertia of combined servo motors | |
| | Full Closed loop Support | | × (not supported) | |
| | Monitor Output | Speed Monitor | 0.5V±10%(at 1000min ⁻¹) | |
| Current Monitor | | 0.5V±10%(at 100%) | | |
| I/O Signal | Positioning Output | Output Form | Encoder Signal (A,B,Z) Phase Line Driver Output (RS232C communication was used for absolute positioning reading) | |
| | | Pulse division rate | N/8192(N=1~8191), 1/N(N=1~64) or 2/N(N=3~64) | |
| | Sequence Input Signal | | •Photo Coupler Input: 4 points (common) (select function with parameter setting) | |
| | Sequence Output Signal | | •Photo Coupler Output: 2 points (common independent) (select function with parameter setting) •Photo Coupler Output: 3 points (common) (Select function with alarm code output or parameter setting) | |

Fig. 1 Block Diagram



3. Features

1. The control part uses the same CPU + gate array structure as the AC input servo amplifier "SANMOTION" Q series to keep high performance.
2. Regeneration resistance, DB resistance, and the processing circuit were built into the amplifier to differentiate from the competitors' amplifiers. The external installation of the regeneration unit is unnecessary by having built the regeneration processing circuit into the amplifier, and there is no bad influence of power voltage rise on other equipment that shares the power-supply for the DC24V amplifier.
3. The standard specification is able to accommodate positioning command, speed command, and torque command by installing both analogue/pulse train interface.
4. The connector for sensor connection is considered to use the same connector as in the "SANMOTION" Q series of the AC input servo amplifier, to have interchangeability.
5. The same personal computer I/F (Q setup software) can be used as the "SANMOTION" Q series of the AC input servo amplifier, and parameter edit, state monitor, wave form trace, and test mode drive can be executed easily.
6. The connectors such as analog monitor output, digital monitor output, and serial communication port are prepared for as an option, and abundant start-up support functions and tools can be used.
7. The power supply is able to accommodate both common and separate use of the main circuit power supply and control power so that customers have choices.
8. An approximate 50% decrease in size was realized compared with the "SANMOTION" Q amplifier of the AC input to contribute to the miniaturization of customers' devices.

3.1 External Form and Structure of the Amplifier

Fig. 2 shows the external view and Fig. 3 shows the external dimensions of the amplifier.

The structure adopts sheet metal case + extrusion aluminum fin, and is considered the effect on EMC.

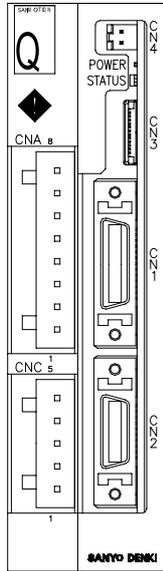


Fig. 2 Amplifier

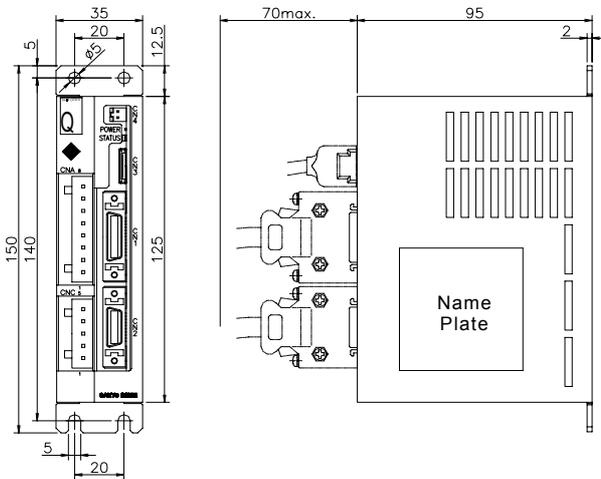


Fig. 3 External Dimensions

External dimension: W35*H150*D95[mm]
 (w/o the back installation metal fittings:
 W35*H125*D95[mm])

4. Conclusion

This time, we developed the amplifier, which can be the basis of a small size, DC input servo system by maintaining the performance of the "SANMOTION" Q series.

In the future, we intend to keep working on the lineup expansion for further capacity development and miniaturization for the growing market demands for small size, DC input.



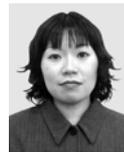
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