YASKAWA

ΣX Series

Feature 1 — Best motion performance in the industry

Feature 2 — Digital data solutions that start with servos
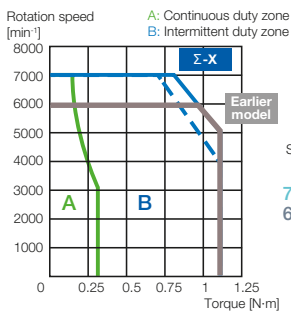

• Maximum motor rotation speed

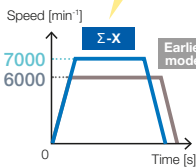The maximum rotation speed of the motor has increased from the earlier value of 6000 min⁻¹ to 7000 min⁻¹.

Applicable models:
All SGMXJ, SGMXA models

Σ-X **7000 min⁻¹**

Earlier model **6000 min⁻¹**

Torque-rotation speed characteristics (for SGMXJ-01A)

Rotation speed [min⁻¹]
A: Continuous duty zone
B: Intermittent duty zone

Σ-X
Earlier model

8000
7000
6000
5000
4000
3000
2000
1000
0

A   B

0   0.25 0.5 0.75 1   1.25
Torque [N·m]

Three-phase 200V — Single-phase 200V

Positioning Time

Improving maximum servomotor rotation speed can reduce positioning time, which can contribute to higher productivity.

Speed [min⁻¹]

Σ-X
Earlier model

7000
6000

0   Time [s]

• Minimum transmission period of 31.25 μs (in development)

(MECHATROLINK-4 communications)
The minimum period for updating communication data has been changed from 125 μs to 31.25 μs, enabling faster and more fine-grained commands.
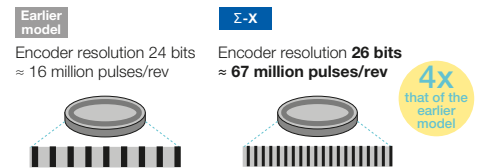
Earlier model

Σ-X

4x that of the earlier model
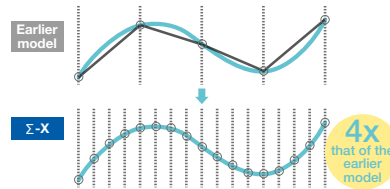
*MECHATROLINK-Ⅲ 125 μs min. communication data updating period.
Note: Minimum transmission periods are determined in combination with controllers.

• Speed frequency response

Speed frequency response has changed from 3.1 kHz for the earlier model to 3.5 kHz. Maximizing the following performance for the speed reference improves equipment productivity.

Σ-X **3.5 kHz**

Earlier model **3.1 kHz**

• Equipped with a high-resolution 26-bit encoder

The resolution of the encoder has been increased to 26 bits, four times that of the earlier model.

Earlier model — Encoder resolution 24 bits ≈ 16 million pulses/rev

Σ-X — Encoder resolution **26 bits** ≈ **67 million pulses/rev**
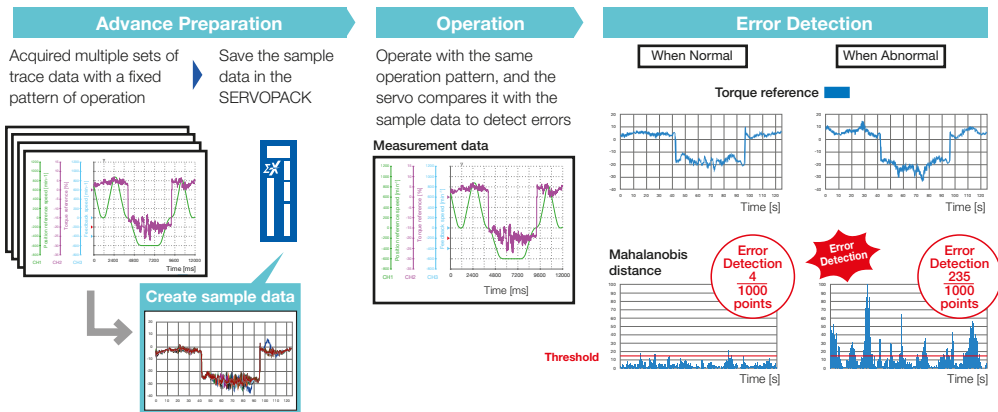
4x that of the earlier model

- Increased positioning resolution/stop precision → **Precision stops**
- Decrease in speed ripples → **Smooth movement and improved machining precision**
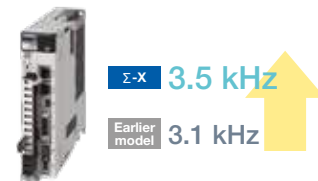
ΣX Error Detection Function

Σ-X raises the intelligence of the SERVOPACK. Its error detection function detects when equipment is operating in a way that may be "different than normal".

The Σ-X detects equipment errors by comparing sample data stored in the SERVOPACK with operation data. It is useful for detecting equipment errors caused by deterioration over time, judging the quality of products and confirming assembly accuracy.
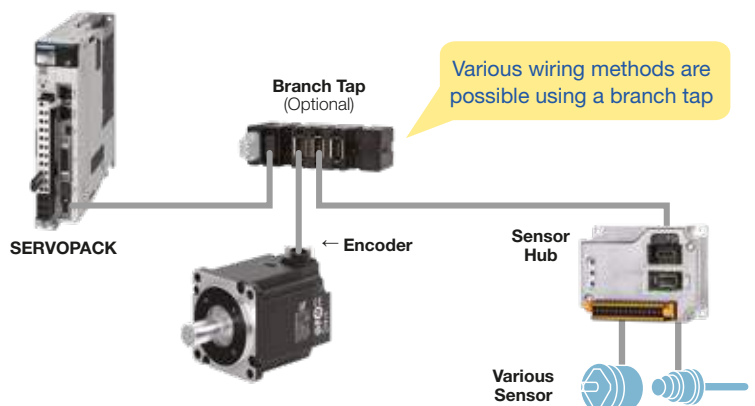
Advance Preparation

Acquired multiple sets of trace data with a fixed pattern of operation

Save the sample data in the SERVOPACK

Create sample data

Operation

Operate with the same operation pattern, and the servo compares it with the sample data to detect errors

Measurement data

Time [ms]

Error Detection

When Normal — When Abnormal

Torque reference

Time [s] — Time [s]

Mahalanobis distance

Error Detection 4 /1000 points

Error Detection

Error Detection 235 /1000 points

Threshold

Time [s] — Time [s]

ΣX + Σ-LINK Ⅱ

Motion and sensor data on same time axis is collected using Σ-LINK Ⅱ. Along with reducing the man-hours required for data processing. Σ-X also enables errors to be detected by identifying changes in equipment.

Features
- Able to connect to multiple commercially-available sensors via a sensor hub
- Able to reduce wiring inside equipment

SERVOPACK

Branch Tap (Optional)

Various wiring methods are possible using a branch tap

← Encoder

Sensor Hub

Various Sensor

Product Lineup

Servomotor

Rotary Servomotors

Model	SGMXA	SGMXJ	SGMXG
Rated Output	50 W - 1.0 kW	50 W - 750 W	850 W - 7.5 kW

SGMXA
- Low inertia, high speed
- 26-bit encoder
- Maximum rotation speed: 7000 min^{-1}

SGMXJ
- Medium inertia, high speed
- 26-bit encoder
- Maximum rotation speed: 7000 min^{-1} (50 W - 200 W)

SGMXG
- Medium inertia, high torque
- 26-bit encoder
- For feed shaft driving (high-speed feed)

SERVOPACKs

Σ-XS (Single-axis)

Interface	Analog Voltage/Pulse Train	MECHATROLINK-4/III	EtherCAT
Model	SGDXS-□□□A00A	SGDXS-□□□A40A	SGDXS-□□□AA0A

Analog Voltage/Pulse Train — SGDXS-□□□A00A
- Select and use analog voltage speed/torque reference and pulse train position reference by configuring parameter settings

MECHATROLINK-4/III — SGDXS-□□□A40A
- Select MECHATROLINK-4 or MECHATROLINK-III from the same hardware
- Enables torque, position, and speed control as well as synchronized phase control that relies on exceptional precision

EtherCAT — SGDXS-□□□AA0A
- Implements the CiA 402 CANopen drive profile for EtherCAT communications (real-time Ethernet communications)
- Provides an EtherCAT interface for the Σ-X series' high-level servo control performance, advanced tuning functions, and full featured actuator control

Σ-XW (Two-axis)

Interface	MECHATROLINK-4/III	EtherCAT	
Model	SGDXW-□□□A40A	SGDXW-□□□AA0A	
Name			Fully-Closed Module
Model			SGDV-OFA01A

MECHATROLINK-4/III — SGDXW-□□□A40A
- Select MECHATROLINK-4 or MECHATROLINK-III from the same hardware
- Enables torque, position, and speed control as well as synchronized phase control that relies on exceptional precision
- Use regenerative energy from multiple axes as drive energy

EtherCAT — SGDXW-□□□AA0A
- Implement the CiA 402 CANopen drive profile for EtherCAT communications (real-time Ethernet communications)
- Provides an EtherCAT interface for the Σ-X series' high-level servo control performance, advanced tuning functions, and full-featured actuator control
- Use regenerative energy from multiple axes as drive energy

Fully-Closed Module — SGDV-OFA01A
- High-accuracy, high-response positioning by using feedback signals from a detector installed on the machine
- Compatible with high-resolution external encoders

Σ-LINK II Related Products

Name	Sensor Hub	Branch Tap
Model	JUSP-SL2HD440□AA	JUSP-SL2J3AA

Sensor Hub — JUSP-SL2HD440□AA
- Connect multiple limit switches, relays, or other devices to the encoder wiring

Branch Tap — JUSP-SL2J3AA
- Connect multiple encoder wirings and sensor hubs