



# AC SERVO DRIVES PRODUCT RANGE

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## About YASKAWA



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For more than 90 years YASKAWA has been supplying mechatronic products and is one of the leading companies for motion control products worldwide. YASKAWA develops and manufactures Inverter Drives, Servo Drives and Motion Controllers and has introduced many

ground-breaking innovations over the past decades. YASKAWA products are used in all fields of machine building and industrial automation and have a high reputation for their outstanding quality and durability.

### What we do

Electronic drive technology, motion control, system engineering – three essentials for efficient and resource-saving production systems.

YASKAWA offers dedicated mechatronic solutions for industries such as packaging, lifting & handling, semiconductors, cranes & hoists, textiles, HVAC/fans & pumps, lifts & escalators, machine tools, woodworking, food & beverages and the automotive industry.

Since it was founded about 100 years ago YASKAWA has shaped technological innovation and the industrial development of our times. Today YASKAWA is one of the leading worldwide manufacturers of motors and drives, factory automation products and robots. Standard products as well as customised solutions from YASKAWA have gained broad acceptance and recognition in global markets.

Since 1963 YASKAWA has continuously developed its European business and expanded its market share. In 1998, the company completed its global production network for localised market supply by establishing a European factory in Cumbernauld, Scotland. For the past couple of years YASKAWA has been among the

top manufacturers of Servo Drives in Europe.

Well known for outstanding quality standards, YASKAWA serves and supports customers all over the world as a competent and qualified partner. Together with subsidiaries and partners, YASKAWA provides an international distribution networks including offices and production facilities in 25 countries to react instantly within 24 hours to customer demands.

YASKAWA key competences:

- ▶ Leading edge technologies in the fields of electric motors and drives, factory automation control products, mechatronics and robots
- ▶ Business network includes offices in 24 countries & production facilities in 6 countries
- ▶ Technology research & development to pursue innovation in mechatronics and automation technology as well as information technologies and environmental/human automation



## What makes YASKAWA a leader in Servo Technology

The company always shows its dedication by supplying high quality products and services. YASKAWA Servo Drives prove it with high levels of reliability and exceptionally low failure rates. With the release of its new  $\Sigma$ -V (Sigma-5) Series, YASKAWA has once again shown proven technological expertise and exceptional application suitability. The combination of compact size, high dynamics and efficiency, low maintenance and outstanding reliability cover all customer demands. Extensive research and development has allowed YASKAWA to remain at the forefront of motion control and automation technology. This technological leadership

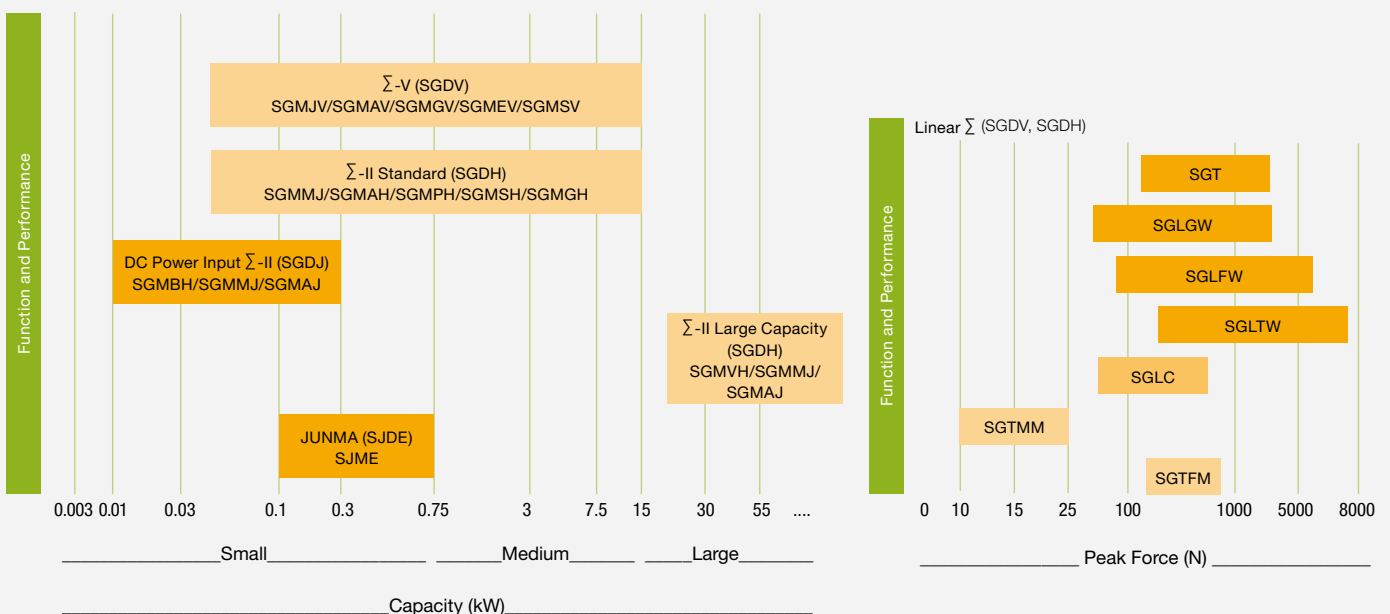
has helped to modernise industries such as mining, steel, cement, pulp and paper, chemical, automotive, packaging, machine tool and semiconductor. YASKAWA was the first manufacturer of factory automation and drive products that recognised the importance of combining and integrating mechanical, electronic and software engineering to optimise process and factory automation. "Mechatronic" as a concept was first adopted in 1972 by a YASKAWA engineer named Tetsuo Mori. It is a synonym for the close interaction and integration of the three areas of engineering. Today, Mechatronics is a key science in the field of industrial automation. With the production of more than 700,000 servo drives per year, YASKAWA is one of the biggest manufacturers worldwide.

## About YASKAWA Servos

Research and development has been a major concern in the company's history. Great effort and inspiration has led to great inventions:

- 1966**  
First DC Servo Drive with large capacity
- 1983**  
First AC Servo Drive range for machine tool and robotic markets
- 1990**  
First fully digital AC Servo Drive with precise speed, torque and position control

## SERIES SERVOMOTOR TYPE / SERVOPACK TYPE – LINEAR $\Sigma$ -SERIES



# Specifications



SERVOPACK	Series	Σ-V Series	Σ-II Series (Standard)							
	Type	SGDV	SGDH							
	Features	<ul style="list-style-type: none"> <li>▶ Ultra-high performance in its class</li> <li>▶ Easy to set up</li> <li>▶ No servo adjustments</li> <li>▶ Superior flexibility</li> <li>▶ Compliance with all international standards and the RoHS directives</li> </ul>	<p><b>Ultra-high performance for high-speed positioning</b></p>							
	Power Supply	Single-phase 230 VAC Three-phase 200 VAC Three-phase 400 VAC	Single-phase 230 VAC Three-phase 200 VAC Three-phase 400 VAC							
	Capacity	50 W to 1.5 kW 500 W to 15 kW 500 W to 15 kW	50 W to 1.5 kW 500 W to 15 kW 500 W to 15 kW							
	Options	<table border="0"> <tr> <td style="padding-right: 10px;">Network</td> <td>MECHATROLINK, CANopen EtherCAT, POWERLINK</td> </tr> <tr> <td style="padding-right: 10px;">Motion Control</td> <td>MP2600iec, Indexer</td> </tr> </table>	Network	MECHATROLINK, CANopen EtherCAT, POWERLINK	Motion Control	MP2600iec, Indexer	<table border="0"> <tr> <td style="padding-right: 10px;">Network</td> <td>MECHATROLINK Profibus DP DeviceNet</td> </tr> <tr> <td style="padding-right: 10px;">Motion Control</td> <td>Indexer</td> </tr> </table>	Network	MECHATROLINK Profibus DP DeviceNet	Motion Control
Network	MECHATROLINK, CANopen EtherCAT, POWERLINK									
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Servomotor	Type	SGMJV	SGMAV	SGMEV	SGMGV	SGMSV	SGMMJ	SGMAH	SGMPH	SGMSH	SGMGH
	Features	Small-capacity, medium-inertia servomotor	Small-capacity, low-inertia servomotor	Small-capacity, flat, medium-inertia servomotor	Medium-capacity, medium-inertia servomotor	Medium-capacity, low-inertia servomotor	Small-capacity, ultra-compact	Small-capacity, low-inertia servomotor	Medium-inertia servomotor	Medium-capacity, low-inertia servomotor	Medium-capacity, medium-inertia servomotor
	Capacity	50 W to 750 W	50 W to 1.0 kW	200 W to 1.5 kW	300 W to 15 kW	1.0 to 5.0 kW	10 to 30 W	50 W to 750 W	100 W to 1.5 kW	1.0 to 5.0 kW	500 W to 15 kW



Σ-II Series		JUNMA Series	Direct Drive Σ Series		Linear Σ Series	
SGDH/SGDM	SGDJ	SJDE	SGDV	SGDH	SGDV	SGDH
<b>Large Capacity</b>	<b>DC power input</b>	<b>No servo adjustments</b>	<b>Ultra-high performance in its class</b>	<b>Ultra-high performance in its class</b>	<b>For linear motors ultra-high performance and high resolution</b>	<b>For linear motors ultra-high performance</b>
Three-phase 200 VAC Three-phase 400 VAC	24 VDC 48 VDC	Single-phase 230 VAC	Single-phase 230 VAC Three-phase 200 VAC	Single-phase 230 VAC Three-phase 200 VAC	Single-phase 230 VAC Three-phase 200 VAC Three-phase 400 VAC	Single-phase 230 VAC Three-phase 200 VAC Three-phase 400 VAC
22 to 37 kW 22 to 75 kW	10 to 80 W 10 to 300 W	100 to 750 W	200 W to 1.5 kW 500 W to 3.0 kW	50 W to 1.5 kW 200 W to 3.0 kW	50 W to 1.5 kW 500 W to 3.0 kW 500 W to 5.0 kW	50 W to 1.5 kW 500 W to 15 kW 500 W to 15 kW
MECHATROLINK Profibus DP DeviceNet			MECHATROLINK CANopen EtherCAT POWERLINK	MECHATROLINK Profibus DP DeviceNet	MECHATROLINK, CANopen EtherCAT, POWERLINK	MECHATROLINK Profibus DP DeviceNet
			Indexer, MP2600iec	Indexer	Indexer, MP2600iec	Indexer

SGMUH	SGMMJ	SGMAJ	SJME	SGMCS	SGLGW	SGLFW	SGLTW	SGLC	SGT	SGTMM	SGTMF
Large capacity with serial encoder	For battery-driven transfer system with serial encoder		Resolution of 10,000 pulses/rev	Direct drive motor with high resolution	Linear motor coreless GW type	Linear motor iron-core FW type	Linear motor iron-core TW type	Linear motor with cylinder shape (stick)	Linear Slider SGT	Linear Slider (Σ-Trac-μ)	Linear Slider (Σ-Trac-MAG)
22 to 75 kW	10 to 30 W	50 to 300 W	100 to 750 W	Instant peak torque 6.0 Nm to 600 Nm	Peak force 40 to 3000 N	Peak force 86 to 5400 N	Peak force 380 to 7500 N	Peak force 60 to 840 N	Peak force 220 to 2400 N	Peak force 10 to 25 N	Peak force 270 to 720 N

## Profiles

### $\Sigma$ -V Series

### Type SGDV



With greatest stability and best response (1.6 kHz) in its class, YASKAWA's new AC servo drives enable high-frequency and high-precision positioning. Combine servo amplifiers with high-speed servomotors of 6000 min<sup>-1</sup> or with linear motors for maximum machine performance. User-friendly servo drives drastically reduce time needed for setup, servo adjustment and troubleshooting.

#### Features

##### 1. Easy to set up

- ▶ Easy to set parameters with the setup wizard
- ▶ On-screen monitoring of servo wiring
- ▶ Parameter converter can automatically convert  $\Sigma$ -I and  $\Sigma$ -II series

##### 2. Easy to adjust

- ▶ Plug and play with tuning-less function
- ▶ New advanced autotuning for maximum machine performance
- ▶ New one-parameter tuning for fine adjustments

##### 3. Unrivaled performance

- ▶ Quickened response for reduced settling time for positioning
- ▶ High-resolution encoder for high-precision positioning and microfabrication (Resolution: 1,048,576 pulses/revolution)
- ▶ Enhanced vibration suppression

##### 4. Options

- ▶ Network: MECHATROLINK, CANopen, EtherCAT, POWERLINK
- ▶ Motion Control: Indexer, MP2600iec

### $\Sigma$ -II (Standard)

### Type SGDH



Enhance your productivity with vibration suppression in addition to the less-deviation control used in the  $\Sigma$ -II series.

#### Features

- ▶ Flux vector control achieves powerful drive characteristics for all types of machinery

##### 1. Maximum speed

- ▶ 6000 min<sup>-1</sup>
- ▶ Models: SGMMJ, SGMAH, SGMPH, SGMSH, SGMGH
- ▶ Improves machine productivity

##### 2. 13/17-bit encoder as a standard feature

- ▶ Enables extra-fine processing and high-precision mounting with improved accuracy of absolute position and vibration suppression on stopping

##### 3. Greatly reduced torque ripple

- ▶ Assures even smoother rotation

##### 4. Options

- ▶ Network: MECHATROLINK, DeviceNet, Profibus DP
- ▶ Motion Control: Indexer

## Type SGDH

## $\Sigma$ -II (Large Capacity)

Full-scale large-capacity AC servo drives following on from the concept of  $\Sigma$  series. The smaller, lighter SGMVH servomotors with lower inertia perform better than conventional models. These servo drives contribute to motorization and energy savings for applications requiring great power. Those using general-purpose servomotors and those using servomotors with low inertia such as injection molding machines, servo pressing machines and liquid spin coaters in which wafers of a larger aperture ratio are needed.

### Features

- 1. A wide range of motor specifications**
  - ▶ 230 VAC: (22 kW to 37 kW), 400 VAC: (22 kW to 75 kW)
- 2. Small and light-weight**
  - ▶ SERVOPACK: volume: 50% smaller\*
  - ▶ Servomotor: volume: 11% to 30% smaller\*, mass: 21% to 49% lighter\*
- 3. Can be used for control of torque, speed, or position**
- 4. Full conformance to global standards**

(\* Compared with YASKAWA's conventional models)



## Type SGDJ

## $\Sigma$ -II (DC Power Input)

Compact and high-performance servo drives powered by a battery for making battery-powered transport systems, such as clean robots and clean Automatic Guided Vehicles (AGV), more efficient.

### Features

- 1. Wide selection with compact, thin body**
  - ▶ Twelve motor models are available with three types: standard, with gears and with brakes
  - ▶ Two input methods are available: analog input for speed/torque control and pulse input for position control
- 2. High performance and high reliability**
  - ▶ Maximum positioning speed of 4500 min<sup>-1</sup> to 5000 min<sup>-1</sup> for motors, high accuracy at high speeds with high-resolution serial encoders and smooth operation at low speeds
  - ▶ Motor's protective enclosure is IP55-compliant, has great resistance to vibration and shock and complies with global standards



## Profiles

### JUNMA Series

### Type SJDE



YASKAWA new AC servo drives in the JUNMA series are the easiest in the world to set up and the smallest in their class. Without any difficult servo adjustments, such as parameter and gain settings, JUNMA servo drives can be handled as easily as a stepping motor.

#### Features

- 1. A wide range of models**
  - ▶ Rated output: 100 W, 200 W, 400 W, 750 W (with 230 VAC input)
  - ▶ Resolution: 1,000 to 10,000 P/R
  - ▶ Motor options: applicable for servomotors with 24 VDC brakes
  - ▶ Interface: pulse train, MECHATROLINK
- 2. World's smallest driver**
- 3. New autotuning function** simplifies setup with only reference pulses and resolution

### Direct Drive $\Sigma$ -Series

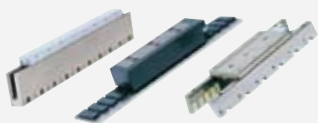


Driving a load directly without gears simplifies a machine's structure and achieves a powerful and smooth operation at any speed without any noise. (Instant peak torque: 6.0 Nm to 600 Nm; maximum speed: 250 min<sup>-1</sup> to 500 min<sup>-1</sup>)

#### Features

- 1. High-resolution encoder** (20-bits; 1048576 P/R) achieves high-precision indexing
- 2. No backlash by gears** results in reduced settling time and precise operation at high frequencies
- 3. The converting current** for the d-q axis controls torque with great precision

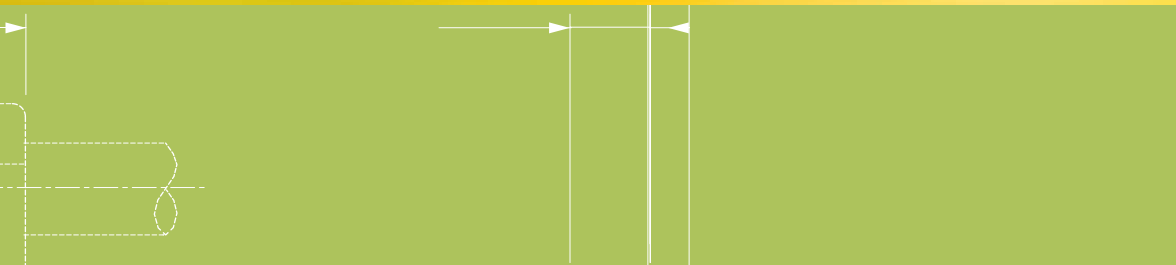
### Linear $\Sigma$ -Series



Assures high-speed and high-precision positioning by converting to a direct feeding mechanism

#### Features

- 1. Coreless GW type linear servomotor** (40 N to 3000 N, 19 models)
  - ▶ No magnetic attraction achieves a longer guide life
  - ▶ No cogging
- 2. Iron-core TW type linear servomotor** (380 N to 7500N, 14 models)
  - ▶ Negation of magnetic attraction enables a longer guide life
- 3. Iron-core FW type linear servomotor** (86 N to 5400 N 12 models)
- 4. SGD V and SGD H servopacks** are available for use as servomotor drivers for both rotary and linear motors



## $\Sigma$ -Stick Series

Easy installation of linear servomotors with new cylinder shape.

### Features

1. **Faster positioning** with greater precision than with ball-screw system
2. **Easy to maintain** and greater repeatability with high accuracy because ball screw is eliminated
3. **Easier to install** than ball-screw system
4. **A wide range of models:** maximum force from 60 N to 840 N



## $\Sigma$ -Trac Series

Effective in reducing the size of multi-axis machinery in semiconductor equipment, electronic packaging equipment and biological/medical equipment.

### Features

1. **Compact size** (1/3 of YASKAWA's conventional models)
  - ▶ Compact system with a shorter slide compared to ball-screw drives
  - ▶ X-Y table configuration
2. **Permanent-magnet configuration with moving magnets**
  - ▶ For simple design of drive systems
  - ▶ Easy wiring with cable-free installation
3. **Repeatability at sub-micron level**
  - ▶ Two types of encoder systems: 0.078  $\mu\text{m}$  or 0.016  $\mu\text{m}$
  - ▶ High accuracy and repeatability of 0.5  $\mu\text{m}$

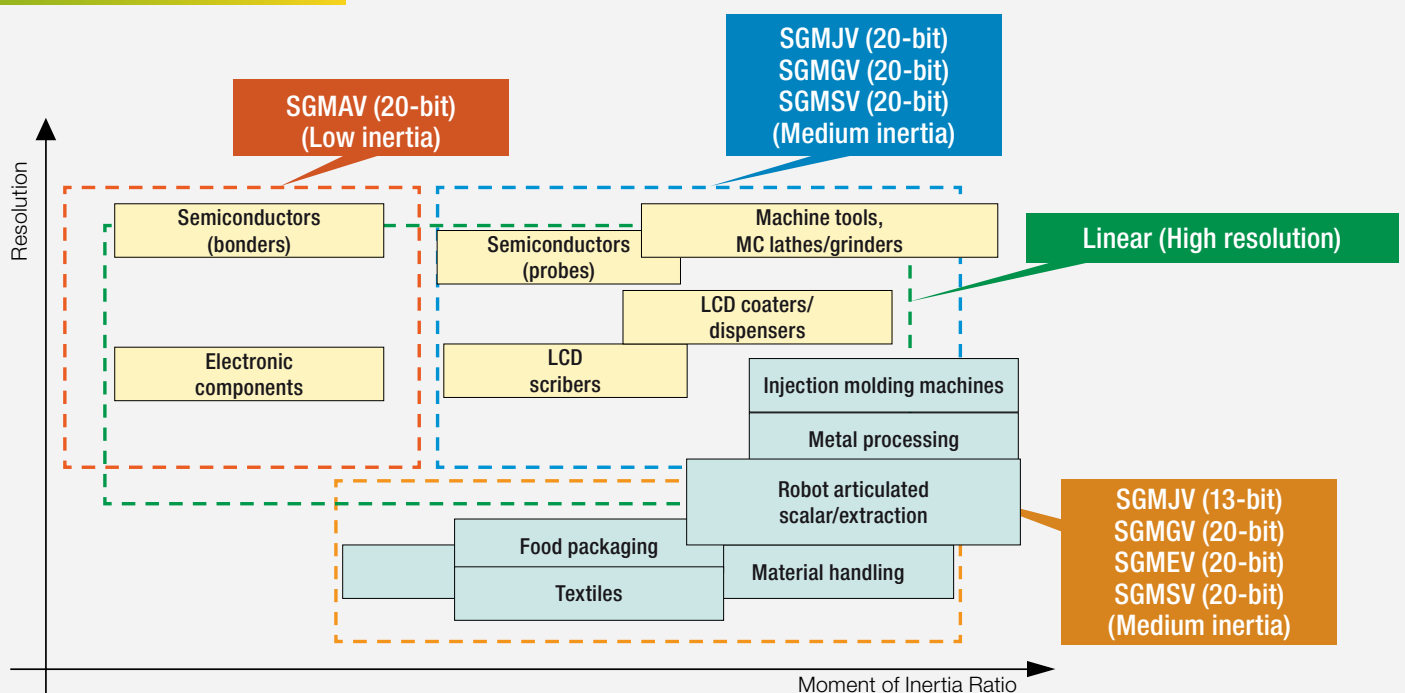


## Applications

Σ-V Motor line-up to handle a wide range of applications and markets

	SGMJV	SGMAV	SGMSV	SGMEV	SGMGV
Chip mounters	●	●			
PCB drilling stations	●				
Semiconductor equipment		●			
IC handlers	●				
Die bonding machines		●			
Wire bonding machines		●			
Robots	●	●	●		●
Material handling machines			●	●	●
Food processing	●	●	●	●	●
Machine tools			●		●
Transfer machines	●	●	●	●	●
Testing & inspection units	●	●			
Electronic parts assembling		●			
Automated machines	●				
Packaging		●	●	●	●
Metal processing					●
General handling	●	●	●	●	●
Electronic parts assembling machines		●			
Winding machines	●	●			

## Markets





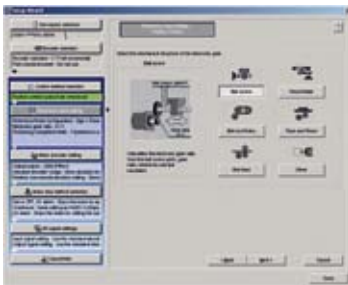
## Software

### SigmaWin+ – PC Software for AC Servomotor Drive Control

SigmaWin+ is a Windows-based engineering software tool to adjust/upgrade the Yaskawa  $\Sigma$ -V series of servo drives. With a wizard to help you write in an interactive dialogue style, each setting for the servo drives is easily made following a series of dialog boxes. Two versions of SigmaWin+ are available: SigmaWin+ Standard with user-friendly functions and SigmaWin+ Professional with an extended range of functions including tunings.

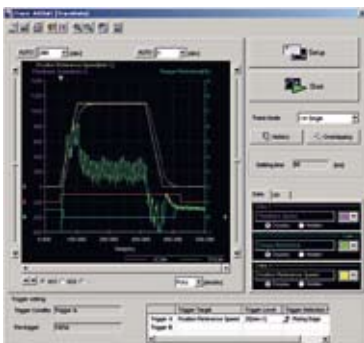
#### Servo Set-up Wizard\*

Edit parameters from the PC and download them to multiple machines. Monitoring and offset adjustment are simple too, for faster set-up.



#### Trace Function\*

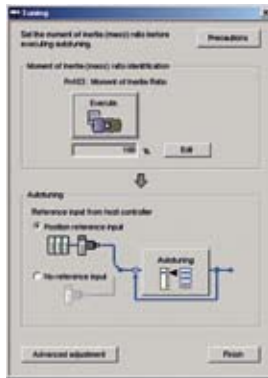
Display data stored in SERVOPACK memory directly from the PC, just like an oscilloscope. Graphed data can be printed and stored too.



\* Also available for  $\Sigma$ -II

#### Advanced Autotuning

Using SigmaWin+, set the servo drive to run so that you can tune the parameters and the optimum settings for the load moment of inertia, the servo gains and the filter for the connected machine will be automatically set. Get up and running quickly after hooking up the motor.



#### Maintenance\*

Faster troubleshooting alarm diagnostic function: Presumes possible causes of the alarm and immediately displays suggested corrective actions.



#### Wiring Check Function\*

The SigmaWin+ wiring check function checks your wiring in a single operation.





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