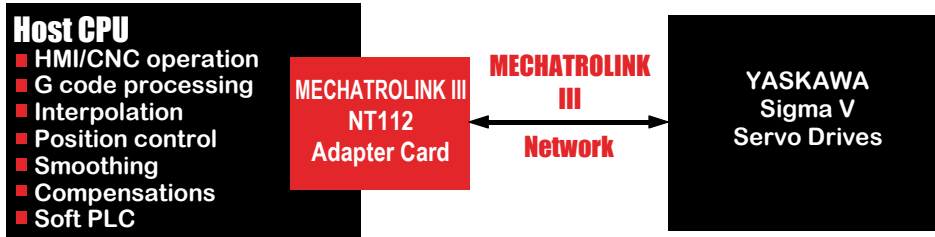


MECHATROLINK™ III with Sigma V Drives: Ethernet-Based Servo Interface from YASKAWA



Overview

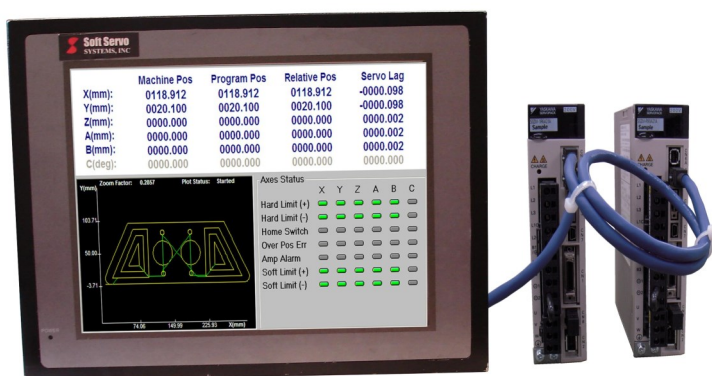
Soft Servo Systems offers a variety of PC-based CNC and general motion control (GMC) products for OEM machine builders. Each product is available with a choice of several servo and I/O communications hardware platforms, including MECHATROLINK III servo communications with YASKAWA's family of Sigma V servos.

MECHATROLINK™ III is a new 100 Mbps Ethernet-based digital servo communications technology from YASKAWA Electric Corporation that integrates up to 62 stations in one network, using a single Ethernet interface cable and a MECHATROLINK III PC card.

The new Sigma V servo motors and amplifiers from YASKAWA represent a massive leap forward in technology from their predecessors, and have many impressive features, such as performance, speed, accuracy, vibrationless motion, user-friendliness and fast setup times.

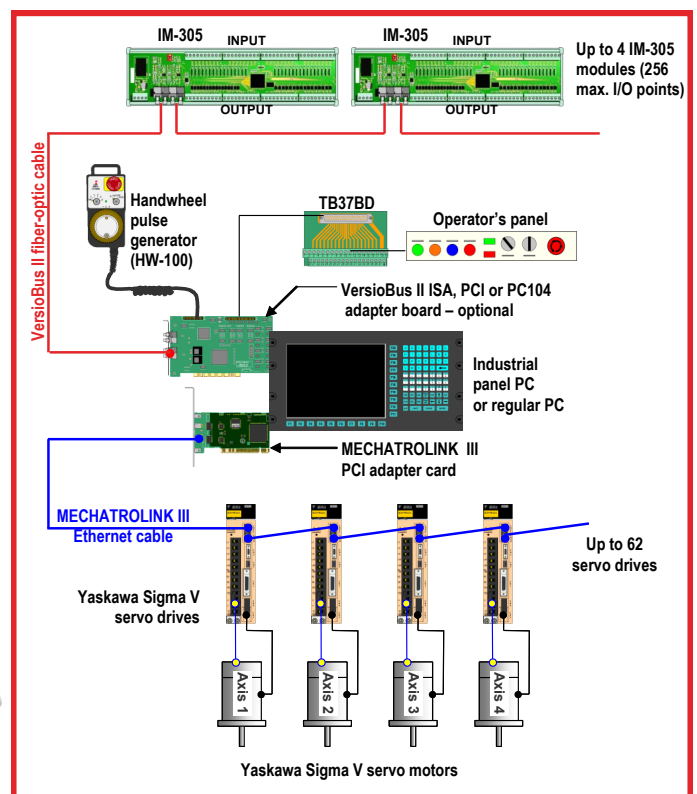
As one of the first third-party motion control providers of a system combining MECHATROLINK III and Sigma V technologies, Soft Servo Systems will offer YASKAWA Sigma V servo drives and motors bundled with our ServoWorks CNC and SMP general motion control products.

An optional and affordable fiber-optic VersioBus I/O network is available to meet I/O needs.



MECHATROLINK III Features

- Transmission rate ten times faster than MECHATROLINK II (100 Mbps versus 10 Mbps)
- Industry-leading levels of high-speed cyclic transmission rate (maximum 31.25 μ sec)
- Applies Ethernet technology; STP Cat5e cables and RJ-45 connectors can be used, improving availability and cost of components. Small compact-type connectors (industrial mini connectors) are also available.
- Supports hot plugging – servo drives can be exchanged while the system is running



Hardware Connections in the MECHATROLINK III Interface System, Including Optional VersioBus I/O

Comparison of MECHATROLINK II and MECHATROLINK III

Function/Feature	MECHATROLINK II	MECHATROLINK III
Data Transfer Rate	10 Mbps	100 Mbps
Cycle Time	4 ms to 30 ms	31.25 μ sec to 64 ms
Maximum Number of Stations	30	62
Communications Technology	Proprietary digital servo communications technology	Ethernet
Data Size (bytes)	16 / 32	8 / 16 / 32 / 48 / 64
Maximum Length Between Stations	50 meters	100 meters
Total Network Length	50 meters	100 meters
Minimum Length Between Stations	50 cm	15 cm
Topology	Bus	Cascade / Star / Point to Point
Cyclic/Event-Driven Communication	Cyclic	Cyclic/Event-driven
Message	Yes (but not disclosed)	Yes (MEMOBUS)
Retry Function	Max. 7 stations (1 time per 1 station)	Max. 62 stations (n times per 1 station)
Gateway	N/A	MECHATROLINK III to MECHATROLINK II
Power	JL-080: 5V JL-052: 3.3V	3.3V/1.8V

VersioBus™ II Fiber-Optic Technology for I/O Communications

VersioBus II is a proprietary 5 Mbps real-time fiber-optic digital communications protocol for the I/O network, for connecting IM-305s to the PC.

Optional VersioBus II I/O can be added to the MECHATROLINK III interface system, if required, by including a VersioBus II adapter board in the system. Alone, this adapter board provides 32 points of local I/O and a handwheel connector.

If more than 32 points of I/O is required, an I/O network can be connected to the VersioBus II adapter board using IM-305 I/O modules. Each IM-305 provides 64 points of I/O, and up to four IM-305s can be daisy-chained together with VersioBus II fiber-optic cables, for a total of 256 points of I/O in addition to the 32 points of local I/O.

Breakout boxes are available for easier local I/O connections.

This optional fiber-optic I/O network features:

- No noise to interfere with system communications
- Reduced cables, quick and simple connections, and no maintenance of any connections – compare this to expensive twisted-pair wire cables, which can require considerable maintenance over the years.
- Highly reliable, durable and long lasting hardware components and cables
- Each fiber-optic cable goes up to 10 meters for distributed control (longer cable is available if required)
- The I/O interface modules are daisy-chainable for distributed control and multiple nodes
- Virtually no limit to how far the PC is from the machine or peripherals. The fiber optic cables can extend up to 100

YASKAWA's Sigma V Servo System

Overview

YASKAWA's highly-acclaimed new Sigma V servo system includes servo motors, servo amplifiers and a powerful set-up tool. This revolutionary Sigma V servo pack replaces and provides a significant technological leap over the successful Sigma II and Sigma III series of servo packs that have been proven in the market for many years for a wide range of applications. New intelligent software algorithms lay the foundation for outstanding performance.

The Sigma V series offers rotary, direct drive and linear motors, with a diverse motor lineup in a wide range of performance categories to meet varying market demands, and is ideal for the electronics, semiconductor, packaging, printing, machine tools, injection molding and metal forming industries.

Features

- High accuracy – precise positioning accuracy of up to 10 nm with standard products. A 20-bit incremental serial encoder provides more than a million information points per revolution.
- Fast positioning with short positioning times. A dedicated servo chip for the amplifiers has a 1.6 Hz speed loop bandwidth, cogging torque and torque ripple have been halved compared to the previous generation, and the settling time is less than 4 ms (compared with 50 ms for some competitors)
- High machine speed (the processor is three times faster than its predecessor)
- Easy set up – the auto tuning function has been optimized for the most sophisticated applications, even for a wide range of inertia ratios – for most applications, no manual adjustment is required, and no expert know-how is required to achieve optimum setting results
- Fast set up – the new auto tuning algorithm allows perfect setup in less than 2 hours. Seven interacting parameters can be tuned simultaneously, and the effects of a motor load can be simulated in the servo amplifier using a mathematical model that is part of the new control algorithm. This allows the complete motion control system to be tested before connecting the motor.
- Compact size – the servomotors were redesigned from scratch since the Series III system, and the number of parts was reduced by about 30%. A new stator design, advanced winding technologies and high density magnets also contribute to its compact size. Amplifier size is reduced due to their perfect adjustment to the new efficient servomotors. Result: Sigma V motors weigh 20% less and are 30% shorter than previous models.

- High dynamics – smooth, vibration-free motion due to an automatic filter function with five different algorithms to suppress oscillations, and due to a new coupling between the motor and encoder that increases vibration resistance to 5G (twice as much as the previous model)
- Smooth running at low RPMs
- High efficiency – optimized servo motors, powerful serial encoders, servo amplifiers with the latest microprocessor technology, and powerful ASICS (Application Specific Integrated Circuit)
- Lower energy consumption – up to 30% less than the Sigma III series
- Low maintenance – the encoder has a 5 year battery life
- A built-in safe stop function eliminates the need for external contactors
- Operating temperature range of 0–55° C without de-rating
- The ability to handle 350% torque overloads for 3 to 5 seconds

Advantages for Machine Builders

- Short cycle time
- High throughput and production capacity
- Better product quality – an increase in surface cutting accuracy in machining applications to 1 micron, compared to 2 microns for Sigma III
- Less machine wear
- Short initial setup time and reduced changeover time
- Outstanding reliability
- Quiet operation









Yaskawa Sigma V
SGDV Servo Drive

YASKAWA Electric Corporation

YASKAWA Electric Corporation, established in 1915, is a global manufacturer of motors and drives, and the world's largest manufacturer of AC servos, AC inverters and machine controllers. Known for its high quality and backed by a global network of 10,000 employees and partners, YASKAWA is a technological leader in today's world. YASKAWA products provide unmatched reliability and trend-setting performance. For more information, visit www.YASKAWA.com.

Product Parts in the MECHATROLINK III Interface System

Part No.	Description	Specification	Photo
NT112	MECHATROLINK III PCI adapter board	<ul style="list-style-type: none"> For insertion in a host PC PCI slot Provides MECHATROLINK III industrial Ethernet connectors for the MECHATROLINK III network of YASKAWA Sigma V servo drives 	 <p>NT112</p>
FP-85, FP-105 or FP-114	VersioBus II adapter boards (PCI, ISA or PC104)	<ul style="list-style-type: none"> For insertion in a host PC (FP-85: ISA slot, FP-105: PCI slot, FP-114: PC104 stacking connector) Provides a connector for an optional VersioBus II I/O network of IM-305s Provides 32 points of on-board general I/O Provides an encoder and digital I/O connector for a handwheel 	 <p>FP-105</p>
IM-305	VersioBus II 64-point general I/O module	<ul style="list-style-type: none"> Provides built-in wire-entry screw terminals, LEDs and DIN rail mounting Up to 4 IM-305s can be daisy-chained for up to 256 points of additional I/O, with distributed control and multiple nodes 32 optically isolated output points (N-Ch MOSFET), and 32 optically isolated input points 	
TB37BD	37-pin breakout box	<ul style="list-style-type: none"> Provides screw terminal blocks for making connections between the VersioBus II adapter board and local I/O 37-pin screw terminal module with a single terminal block for wire entry screw terminals DIN rail mounting 	
HW-100	handwheel	<ul style="list-style-type: none"> A handheld manual pulse generator for manual jog operation of the machine or machine tool Emergency Stop button 5 axes available for single-axis control 4 multipliers: X1, X10, X100 or X1000 	
3S-FOB4P5-VB/ 3S-FOB10-VB	VersioBus II fiber-optic cable	<ul style="list-style-type: none"> For connecting VersioBus II hardware components 4.5 meters per IM-305 is included – more cable can be ordered 	

Future MECHATROLINK III Components

With an industry standard Ethernet servo network, third-party modular I/O systems (such as the AnyWire system) are expected to be developed for the MECHATROLINK III interface system. A gateway module would be included in the MECHATROLINK III Ethernet network. Then, any number of I/O modules can be connected to that Gateway with proprietary cables.

In addition, MECHATROLINK III-compatible components such as inverters, counter modules and I/O modules are expected to be available soon after the roll-out of the MECHATROLINK III interface system.