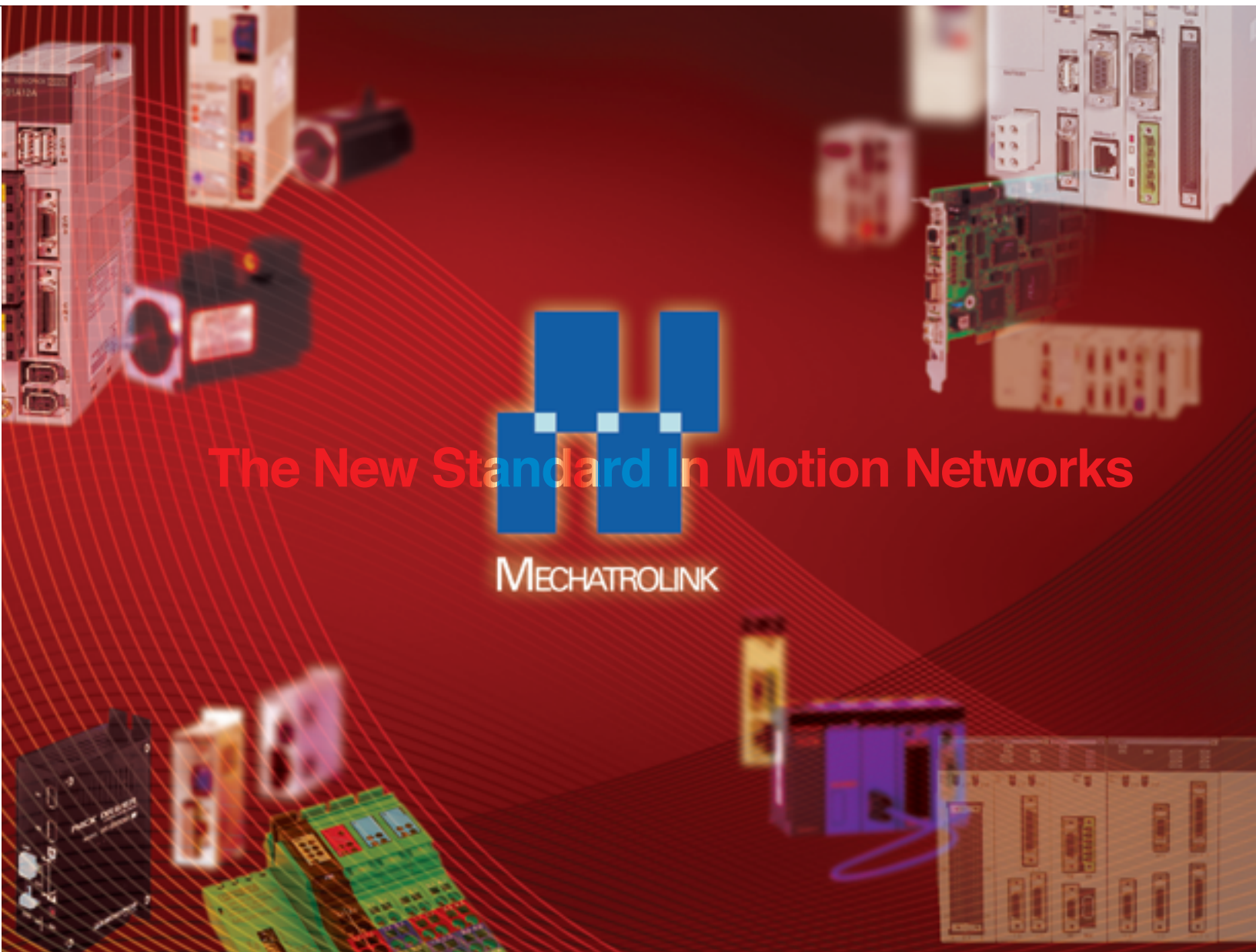




HIGH-SPEED FIELD NETWORK MECHATROLINK



The New Standard In Motion Networks

MECHATROLINK

MECHATROLINK

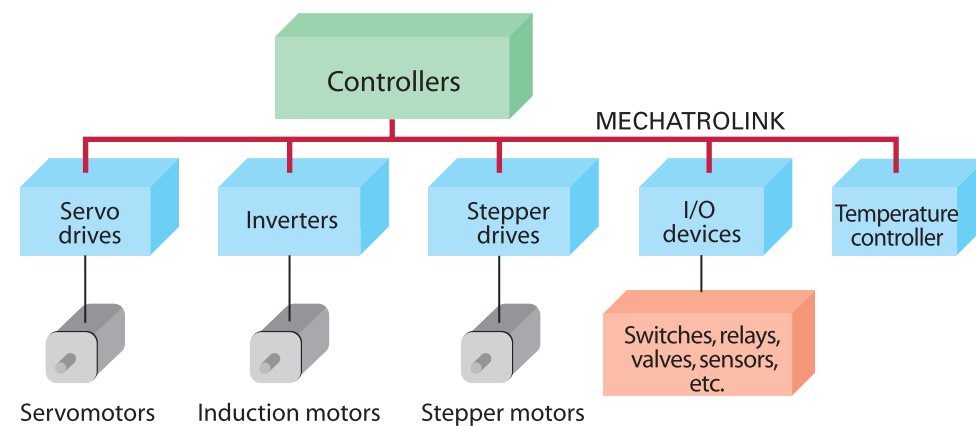


MECHATROLINK is the key technology for your system. Through total component integration, MECHATROLINK can reduce wiring, be used to make multi-function and high-performance systems, and simplify the tuning and maintenance of your system. MECHATROLINK can be used with a wide variety of machines to realize simplified work processes and to save time and money.

With MECHATROLINK

1 System Efficiency

For MECHATROLINK, a variety of controllers, servo drives, and stepper drives is available. This makes it an ideal choice for most machines. The  logo on a product guarantees that it is interoperable with other MECHATROLINK products.



With MECHATROLINK

2 High-Speed Network Control

High-speed communications at 10 Mbps provide high-performance and high-accuracy motion control because data for the actual position, speed, input/output status, and others can be communicated in real-time.

Transmission Specifications

	MECHATROLINK-II	MECHATROLINK-I
Baud Rate	10 Mbps	4 Mbps
Maximum Transmission Distance	50 m	50 m
Minimum Distance between Stations	0.5 m	0.3 m
Transmission Cable	Shielded twisted-pair wire	Shielded twisted-pair wire
Number of Stations	30	15
Topology	Bus	Bus
Transmission Cycle Time	250 μ s to 8 ms*	2 ms
Communications Method	Master/slave synchronous	Master/slave synchronous
Encoding	Manchester	Manchester
String Size	17 bytes or 32 bytes	17 bytes

* Depends on product specifications.
MECHATROLINK has two transmission speeds: 4 Mbps for MECHATROLINK-I (formerly MECHATROLINK) and 10 Mbps for MECHATROLINK-II.

With MECHATROLINK

3 Reduced Costs

Only one communication line is required to connect 30 stations on a network. This can greatly reduce costs and time for wiring. With connectors and cables used in the process automation and factory automation fields, MECHATROLINK makes the most reliable, versatile, and economically efficient systems. MECHATROLINK simplifies a motion control system so that it no longer requires the D/A converter for velocity/torque reference nor the pulse generator for position reference.

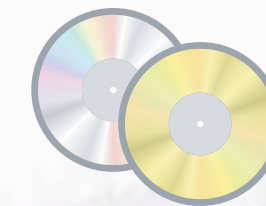
With MECHATROLINK

4 Support for Product Development

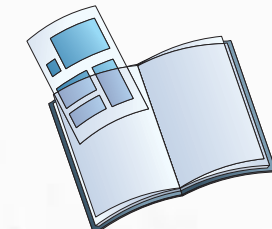
To assist in the development of new MECHATROLINK products, the MECHATROLINK Members Association (MMA) offers technical support to board, executive, and regular members. Technical information that can be downloaded from the MMA website is available to all members. With the MMA's support, you can develop new MECHATROLINK-compliant products without any unnecessary complications. MMA members can apply for MECHATROLINK compliance/certification testing conducted by the MMA.



Technical support



Download free software

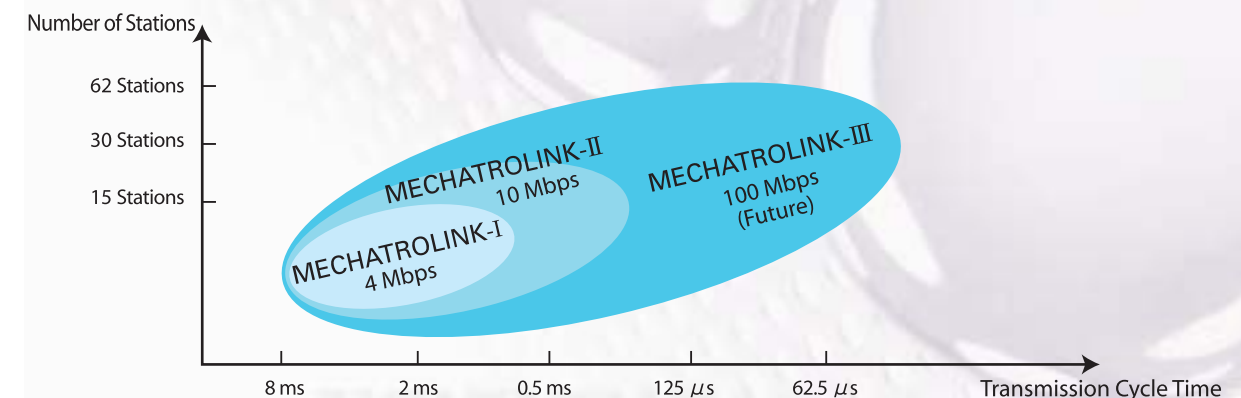


Download free technical information

With MECHATROLINK

5 Expandability

MECHATROLINK technology continues to evolve and has now grown from MECHATROLINK-II to MECHATROLINK-III. With new technology, MECHATROLINK-compliant products will always remain on the cutting edge.



MECHATROLINK-II

MECHATROLINK-II is a field network used to control several Factory Automation (FA) units such as servo drives, stepper drives, inverters, and I/O devices, with a single FA controller. MECHATROLINK-II has been developed as an open motion-control network in Japan. MECHATROLINK-II is specialized for use with motion control and can be used for synchronized multi-axis control. Also, a cyclic redundancy check (CRC) assures high-reliability communications.



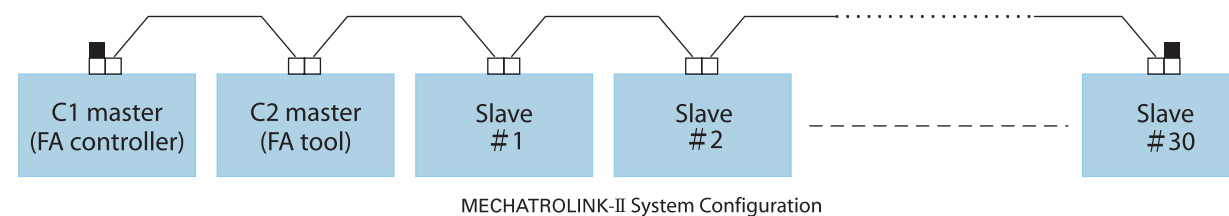
Features

- High-speed transmission (10 Mbps max.)
- Synchronous transmission
- Optimal cycle time for the number of stations and the amount of data being transmitted (Transmission cycle time: 250 μ s to 8 ms)
- Reduced wiring
- High-reliability communications with cyclic redundancy check (CRC) and other controls in ASIC for communications
- Two-mode master and slave ASIC enables one device to be both master and slave

System Configuration

A MECHATROLINK-II system is a bus network in which one C1 master station and a maximum of 30 slave stations can be connected. One C2 master station can also be connected if necessary. A terminator is needed on each end of the network to reduce signal reflection.

The following figure shows the configuration of the connected network.



Notes:

1. The black square (■) on the C1 master station and on the slave station on the far right represents a terminator.
2. A repeater must be used if 16 slave stations are used in a network that is more than 30 meters long or if more than 17 slave stations are used.

TERMS

- C1 master station
A network control station such as an FA controller. Each network must have one C1 master station.
- C2 master station
An FA tool. Only one C2 master station can be connected in each network.
- Slave station
FA devices such as servo amplifiers or I/O devices. The C1 master controls the slave stations. A maximum of 30 slave stations can be connected in one network.

Maximum Number of Slaves

MECHATROLINK-II can transmit 17 or 32-bytes of data per slave. The following table shows the maximum number of slaves to be connected in accordance with string size and transmission cycle.

Transmission Cycle Time (ms)	String Size	
	17 bytes	32 bytes
0.25	2	1
0.5	7	4
1.0	15	9
1.5	23	15
2.0	30	21
2.5	30	26
3.0	30	30
3.5	30	30
4.0	30	30
4.5	30	30
5.0	30	30
5.5	30	30
6.0	30	30
6.5	30	30
7.0	30	30
7.5	30	30
8.0	30	30

Note: This data in this table also serves as the communication specifications for MECHATROLINK-II. Some master devices may support fewer slaves than are listed here.

MECHATROLINK Connectors

A MECHATROLINK connector is similar to a USB connector with a locking mechanism that locks into the port. It can be easily and securely connected.



MECHATROLINK Connector

SEMI Standard

SEMI (E54) compliance and certification are pending. Being SEMI E54-compliant, MECHATROLINK is easily used with most semiconductor and LCD devices.

Behold the growth and versatility of MECHATROLINK family

Controllers

ALGO SYSTEM CO.,LTD ESA/GV s.r.l ISAC S.r.l. ITT.CO.,LTD.



Koyo Electronics Industries Co.,Ltd. LS Industrial Systems.Co.,Ltd. Manufacturing Data Systems,Inc. Mycom, Inc.



Omron Corporation OSAI S.p.A Soft Servo Systems,Inc.



Yaskawa Electric Corporation Yokogawa Electric Corporation TECHNO Co.,LTD



Servo Drives

Omron Corporation Yaskawa Electric Corporation



* The SI-T or SI-T/V7 option card is required for connecting the MECHATROLINK network.

Stepper Drives

Asahi Engineering Co.,Ltd. MELEC Inc. ORIENTAL MOTOR CO.,LTD. Mycom, Inc.



Sensors

PHOENIX CONTACT RKC INSTRUMENT INC. Yaskawa Electric Corporation



I/O Devices

Anywire Corporation PHOENIX CONTACT Yaskawa Electric Corporation



MECHATROLINK Support Tools

A rich array of support tools that assist the development of MECHATROLINK-compliant products is available.

Development Tools

Yaskawa Electric Corporation

MECHATROLINK ASICs



Two-mode Master & Slave
JL-080B*

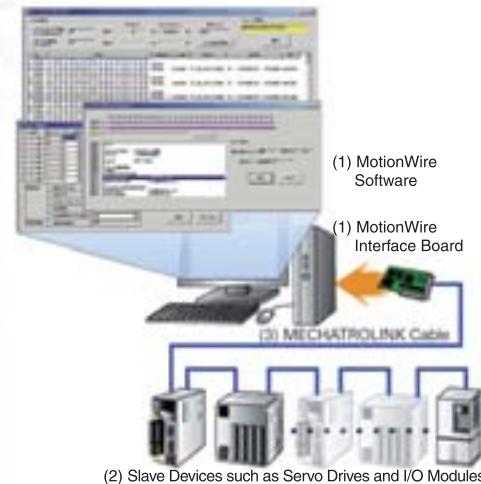
Slave only
JL-052C*

ASIC driver source codes can be downloaded from the Members Only area on the MMA website.

* Refer to the MECHATROLINK Product Brochure for information on models and packing units.

Yaskawa Information Systems Corporation

MotionWire StarterKit



(1) C1 Master Device

Hardware:

Mount the MECHATROLINK Interface Board for MotionWire in a personal computer as a MECHATROLINK-I or -II interface to send synchronous commands from a non-real-time operating system.

Software:

Windows-based software used for MECHATROLINK communication setting interface board mounted in a personal computer, sending MECHATROLINK commands, displaying communications data, and other similar functions. Software design makes MECHATROLINK easy to use.

(2) Slave Devices

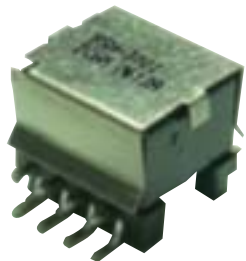
Any MECHATROLINK-compliant device can be used as a slave device.* All MECHATROLINK-compliant devices, including general-purpose devices, can be connected to a MECHATROLINK communication line.

(3) MECHATROLINK Cables and Terminators
MECHATROLINK-I or -II cables and terminators are necessary.*

* Not included in the MotionWire StarterKit.

Yaskawa Electric Corporation

MECHATROLINK-II Pulse Transformer



T202004DT*

* Refer to the MECHATROLINK Product Brochure for information on models and packing units.

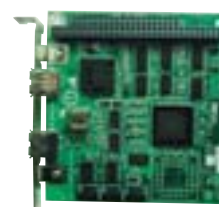
Yaskawa Electric Corporation

PCI Interface Card for MECHATROLINK-II Communications



JAPMC-NT110

PC/104 Interface Card for MECHATROLINK-II Communications



JAPMC-NT115P

Network Analyzer



87215-95121-S0103

Enables online monitoring of communications status. Trace and trigger functions are provided. The Windows-based software for the network analyzer must be installed on a personal computer. An RS-232C port is required for the PC.

Peripheral Devices

Yaskawa Controls Co., Ltd.

MECHATROLINK-II Communication Cables



JPMC-W6002-E

Yaskawa Electric Corporation

MECHATROLINK-II Repeaters



JPMC-REP2000

MECHATROLINK Applications

MECHATROLINK can be used for the control of a variety of highly precise machine motions. MECHATROLINK has been used in diverse applications, such as those for machine tools, industrial robots, and machines for mounting electronic parts and transferring, and is especially suitable for synchronous and interpolation motion controls. MECHATROLINK enables control of torque, positioning, and velocity – all of which are necessary to control your machines. Also, the control modes for velocity, torque, and position can be switched while the machine is running, so you can perfectly control the machine's complex motions.

Position Control

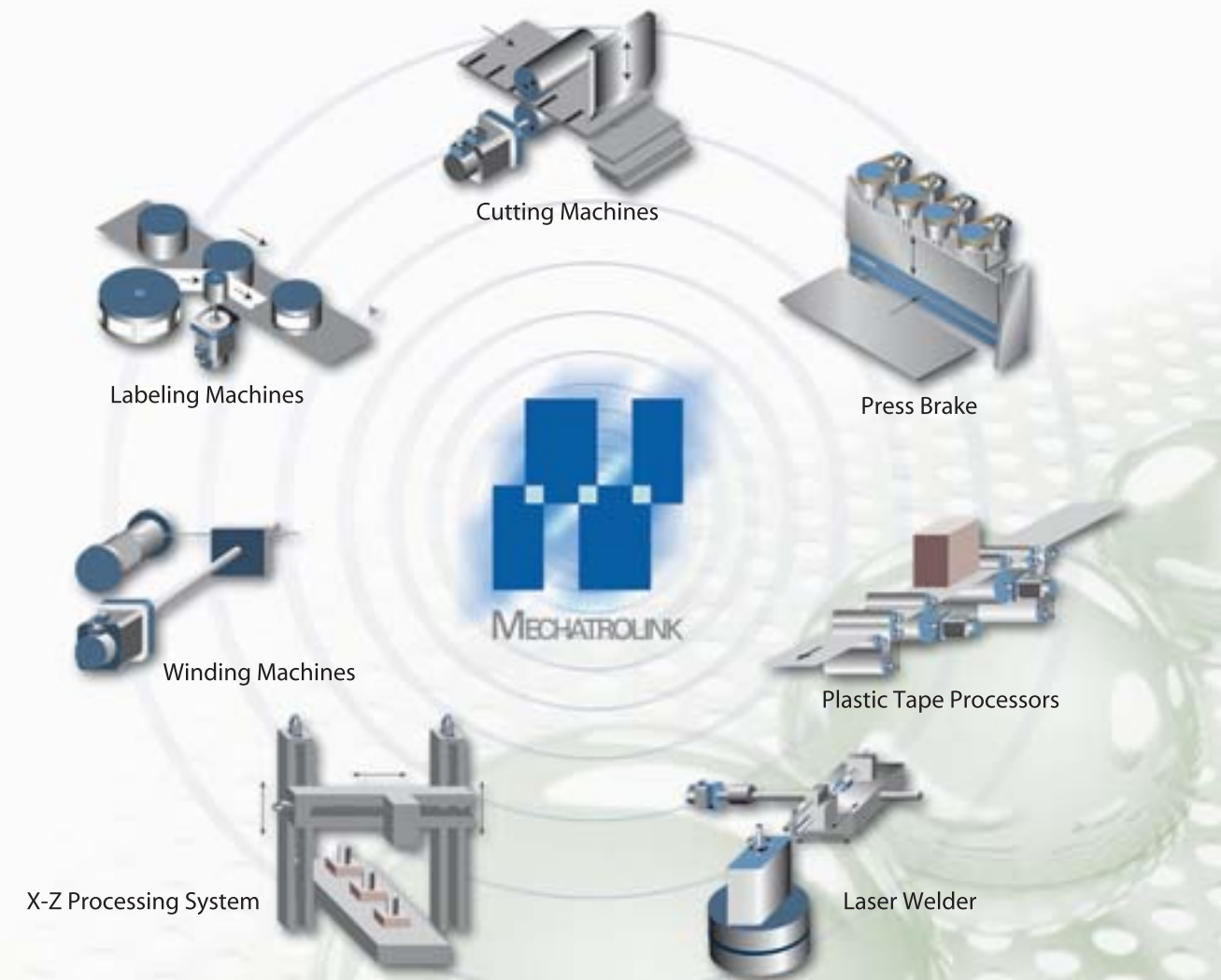
Advances to the target position, and stops or holds.

Velocity Control

Turns the motor at the specified speed with user-defined acceleration/deceleration slopes.

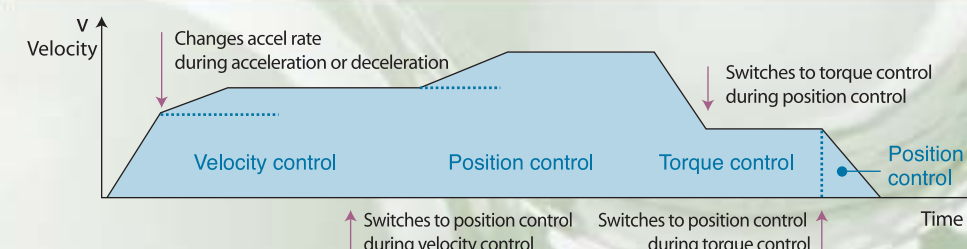
Torque Control

Generates constant torque independently of speed.



* MECHATROLINK can be used in many other applications, such as chip mounters and handling robots.

Online Switching Control Mode



Application Examples

- Injection molding machines: Velocity control → Torque control
- Packing machines: Position control or Velocity control → Velocity control

MECHATROLINK Members Association

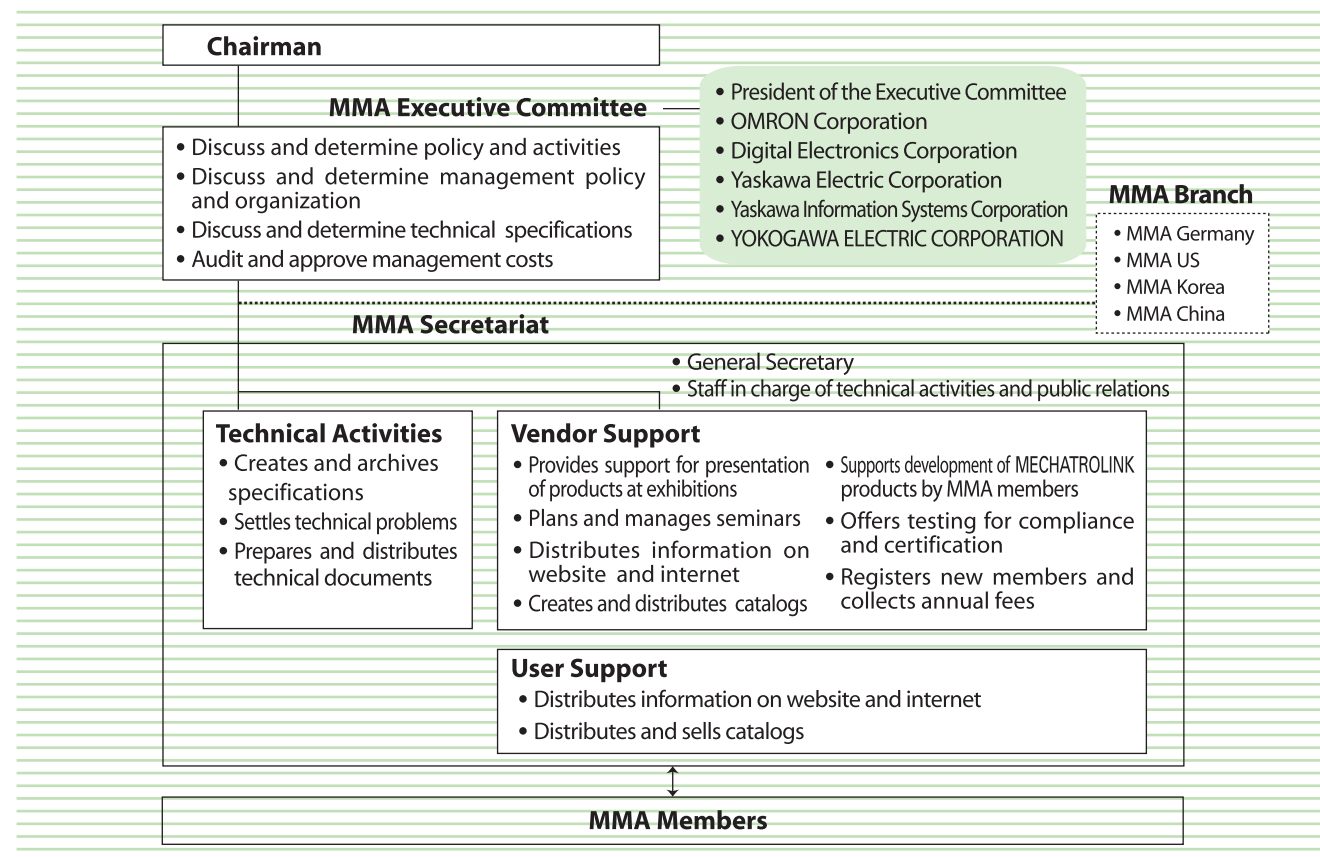
The MECHATROLINK Members Association is a group of MECHATROLINK product developers and users who promote the use of MECHATROLINK, a motion field network. All members support the construction and promotion of a larger MECHATROLINK family.



Name : MECHATROLINK MEMBERS ASSOCIATION (MMA)



Organization



Membership Categories and Privileges

Type of Members	Board Members	Executive Members	Regular Members	Registered Members
Admission fee	Free			
Annual fee (April to March)	500,000 yen*	200,000 yen*	100,000 yen*	Free
Annual fee (October to March)	1/2 of the above annual fee			Free
Participation in committee and general meetings	Authorized to participate the executive committee, subcommittee, and general meeting	Authorized to participate the subcommittee and general meeting		Not authorized
Downloading the technical documents from the website	Free			
Direct mails from the Association	Free			
Seminars	Charged			
Product presentation at seminar	Authorized		Not authorized	
Technical inquiries (by e-mail or telephone)	Free			Not authorized
Development support for vendors	Free (charged for some cases)			Not authorized
Introduction of products on the Association's website	Free			Not authorized
Advertisement on the Association's website	Free	Charged		Not authorized
Compliance certification test	50,000 yen*	100,000 yen*	200,000 yen*	—
Development and sale of products	Authorized			Not authorized
Participation in formulation of specifications	Authorized	Not authorized (Possible to receive the information on experimental specifications.)	Not authorized (Possible to receive the information on experimental specifications.)	Not authorized (Possible to read the formulated specifications.)
Acquisition of development ASIC	Possible to obtain ES and CS	Possible to obtain CS	Mass production	Not authorized

* Taxes included.

Membership Benefits

Join the MECHATROLINK Members Association if the following applies to you!

- Want to develop a controller that enables various motion control solutions by connecting to MECHATROLINK products.
- Want to develop equipment that can be connected to MECHATROLINK in order to increase business opportunities.
- Want to have an advantage in motion control by using MECHATROLINK.
- Want to develop MECHATROLINK-compliant products and take the MECHATROLINK compliance and certification test of these products.
- Want to understand MECHATROLINK technology deeply.
- Want a deeper understanding of MECHATROLINK technology.

If you join the MECHATROLINK Members Association,

- You can obtain an ID and password for authorized access to the MMA member's website.
- You can obtain the MECHATROLINK specifications.
- You can obtain the latest information on MECHATROLINK.
- You can obtain technical support for all the processes including product development.
- You can participate in PR activities for MECHATROLINK-compliant products.
- You can participate in exhibitions in collaboration with MMA.
- You can participate in MMA general meetings and development seminars.
- You will be sent the E-mail magazine with the latest MECHATROLINK information.
- You will be able to purchase the MECHATROLINK connector kit and make your own cable.



Seminar



Exhibition

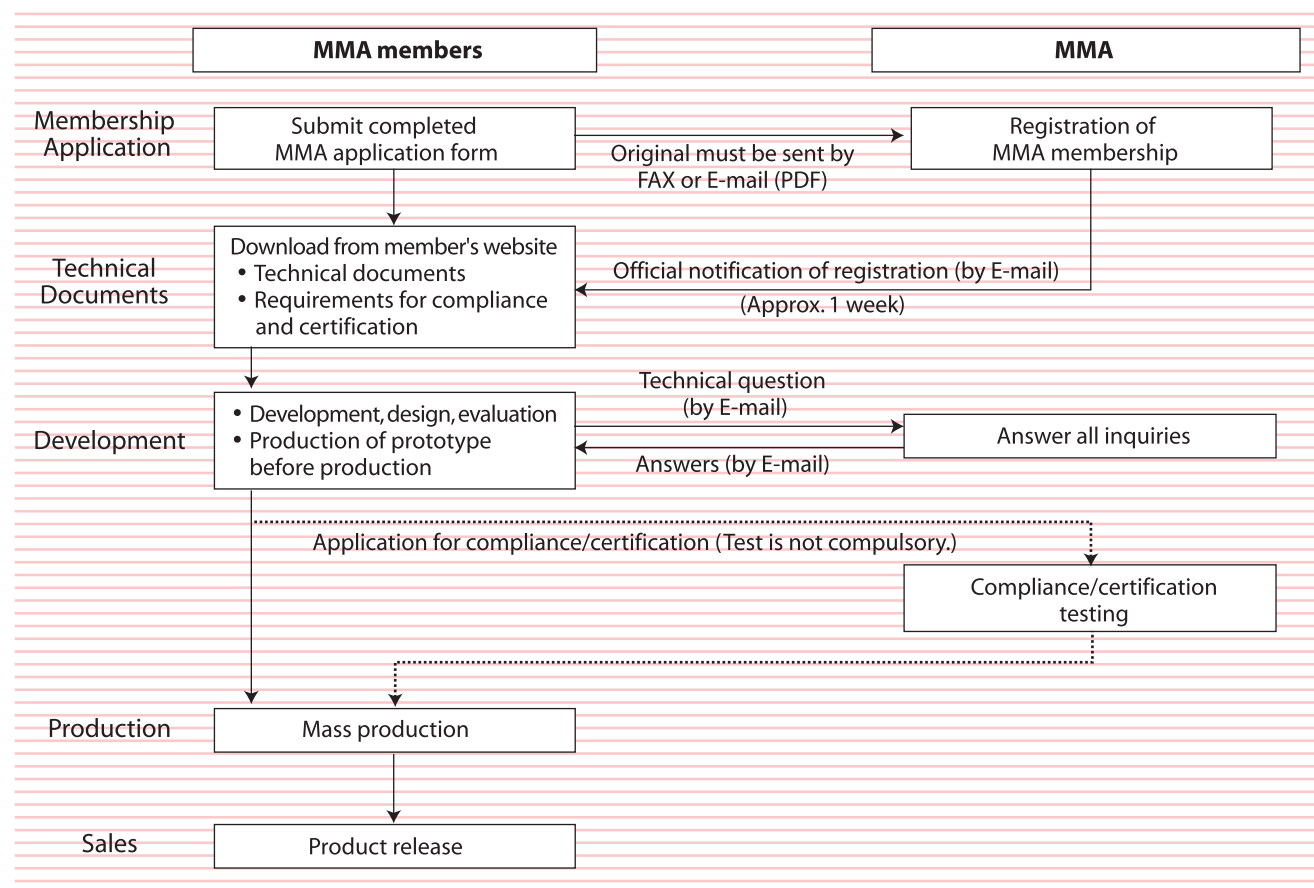


General Meeting

From Membership to Product Release

The following flowchart illustrates how to join the MECHATROLINK Members Association (MMA) and how MMA works with members to develop and release MECHATROLINK-compliant products.

From MMA Membership Application to Product Release



MECHATROLINK Certification Test

The certification test guarantees your MECHATROLINK product to be complied with MECHATROLINK specifications. The purpose of the certification test is to confirm conformance and interoperability on each product of multiple manufacturers. The certificated product is allowed to use MECHATROLINK logo for certification that indicates MECHATROLINK-compliant product.

Certification Test Limitations

A certification test is performed using limited MECHATROLINK specifications, which are defined by the specification of the product being tested. The original characteristics of the product such as the functions, performances, reliability, etc. are not subject to examination in the certification test. Each manufacturer must guarantee these characteristics themselves. In addition, the product conformance to the MECHATROLINK specifications is only applicable to the version of the hardware and software of the product when the test is performed. A general rule is that when the product version changes, another certification test is necessary.

Certification Test Details

- The certification test includes the following items.
- Verification of MECHATROLINK communications circuit and components
 - Noise resistance
 - MECHATROLINK communication compliance
 - Interconnectability

MECHATROLINK Logo for Certification

The MECHATROLINK logo for certification indicates that a product meets MECHATROLINK specifications. Any product that displays this logo can be safely used. MECHATROLINK products that have passed our certification test will be allowed to display this logo.



Test Site

Certification Test Organization

Applications for the certification test must be sent to the MMA secretariat.

MECHATROLINK Members Association Website

URL: <http://www.mechatrolink.org>

The MMA website provides the following information.

General Area

- About MECHATROLINK
- Guide to the MECHATROLINK Members Association (Download the membership agreement and application form.)
- Members list (Includes only members who have given their permission.)
- MECHATROLINK-compliant products
- Contract manufacturers
- News & Events
- MECHATROLINK Products of MMA Members Brochure

Members Only Area

- News and events
- Technical information (Download the latest technical documents.)
- Compliance/Certification testing (Download the application form and test specifications.)
- Q & A



MECHATROLINK Products of MMA Members Brochure

A MECHATROLINK products brochure that lists MECHATROLINK-compliant products manufactured by MMA members is available for public distribution.



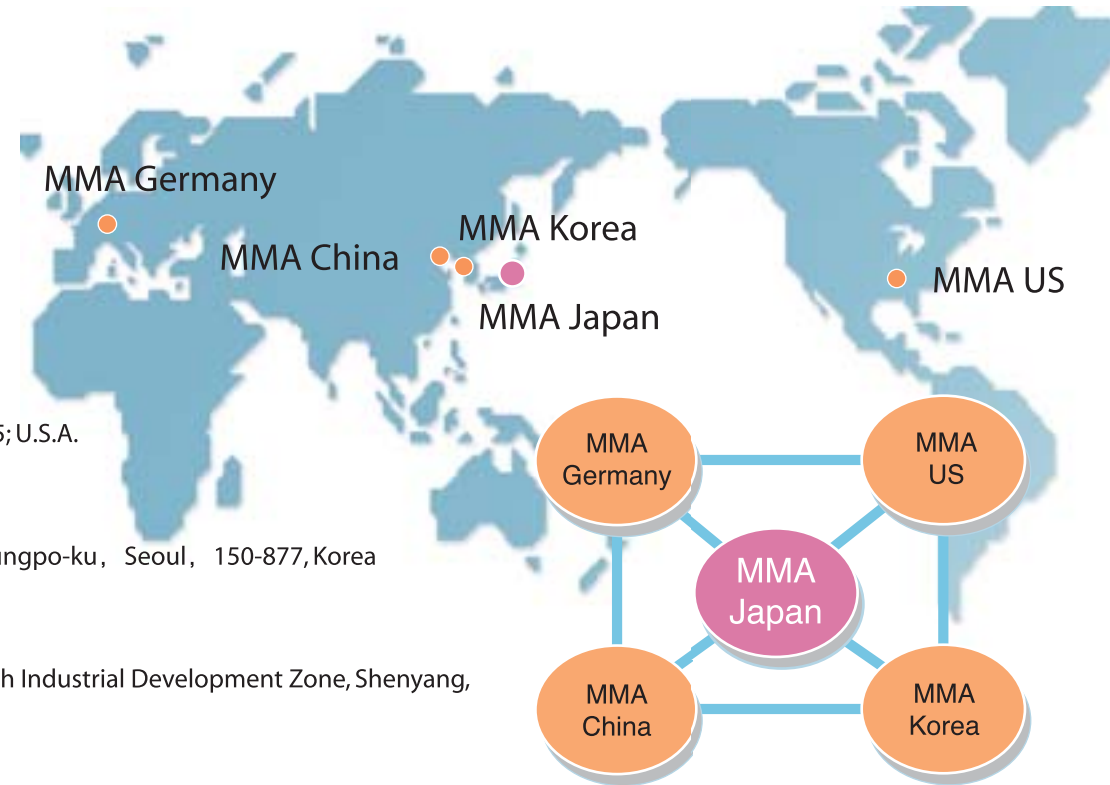
Brochure Cover

Global Network

The MECHATROLINK Members Association (MMA) is actively promoting MECHATROLINK to make it a widely used open network throughout the world. To promote MECHATROLINK abroad and support MECHATROLINK users, MMA has established four offices in the major markets overseas. These regional offices will create a more conducive environment for technical support, public relations, and member enrollment by providing information and holding training sessions.



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MMA Germany	Am Kronberger Hang 2 65824 Schwalbach Germany • Phone : +49-6196-569420 • e-mail : mma@mechatrolink.de
MMA US	2121 Norman Drive South; Waukegan, IL 60085; U.S.A. • Phone : +1-847-887-7231 • e-mail : mma-us@mechatrolink.org
MMA Korea	7F Doore Bldg. 24, Yeoido-Dong, Youngdungpo-ku, Seoul, 150-877, Korea • Phone : +82-2-368-8875 • e-mail : mma-kr@mechatrolink.org
MMA China	Building A No.6, Jinhui street, Hunnan High-Tech Industrial Development Zone, Shenyang, 110168, P.R. China • Phone : +86-24-23819111 • e-mail : mma-cn@mechatrolink.org



4 Registered Members

- AB&T s.r.l.
- AD-MYCOM CORPORATION
- ASAHI ENGINEERING CO., LTD.
- Biese S.p.A.
- Campat Machine Tool
- CKD Corporation
- CLEVELAND MOTION CONTROLS
- CNI INFORMATICA
- COSMOTECHS CO., LTD
- D.Electron S.r.l.
- Doosan Mecatec Co., Ltd.
- DS4 LASER TECHNOLOGY s.r.l.
- DSP Control Group, Inc.
- DYNAX CORPORATION
- EMMEGI S.p.A.
- ESA/GV s.r.l.
- FUJI ELECTRIC SYSTEMS Co., Ltd.
- HI-P Tech Corporation
- International Laboratory Corporation
- Interface Corporation
- Innovation Development System Inc.
- InnoServ, Inc.
- ICP DAS Co., LTD.
- ICW-Ingenieurbuero Christian Woelz
- I.M.A. Industria Macchine Automatiche S.p.A.
- ISAC S.r.l.
- Japan minicomputer systems co., Ltd.
- KYOPAL CO., LTD
- K.MECS CO., LTD/Elektro Beckhoff GmbH
- LS Industrial Systems Co., Ltd
- Manufacturing Data Systems, Inc.
- MEIDENSHA CORPORATION
- MICROTEAM OY
- M/S LARSEN AND TOUBRO LIMITED EMSYS
- M-tech
- Omron Electronics SpA
- OMRON YASKAWA Motion Control BV
- POU YUEN TECH CORP., LTD.
- Red Lion Controls
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- Sankyo Seisakusho Co.
- SCM GROUP S.p.a. MORBIDELLI
- SEOUL PRECISION MACHINE Co., Ltd.
- Shenyang Golding NC TECH. Co., Ltd.
- SINO L.DIGITAL LTD.
- SUN-WA TESCOM CORPORATION
- SYSTEC Inc.
- TECHNOWAVE Inc.
- Techno-Holon Corp.
- TECO Electric & Machinery Co., Ltd.
- TOP Engineering Co., Ltd.
- Trio Motion Technology Ltd.
- Trust Automation Inc.
- Turck
- TURBOTEK
- T.P.A.s.p.a. Technologie Prodotti Automazione
- WACOM KOREA CO., LTD.
- Yaskawa Electric Europe GmbH
- YASKAWA ELECTRIC KOREA CORPORATION
- YASKAWA ELECTRIC TAIWAN CORPORATION
- ZF Italia S.r.l.

Member List (As of September 2006)

1 Board Members

- OMRON Corporation
- Digital Electronics Corporation
- YASKAWA ELECTRIC CORPORATION
- YASKAWA INFORMATION SYSTEMS Corporation
- YOKOGAWA ELECTRIC CORPORATION

2 Executive Members

- ALGOSYSTEM CO., LTD.
- EIKO SOKKI CO., LTD.
- Hivertec, inc.
- KOYO ELECTRONICS INDUSTRIES CO., LTD.
- MYCOM, INC.
- PHOENIX CONTACT Development & manufacturing Inc.
- Tyco Electronics AMP K.K.
- YASKAWA CONTROLS CO., LTD.
- YASKAWA ELECTRIC AMERICA, INC.

3 Regular Members

- AMADA Co., LTD.
- ANYWIRE CORPORATION
- AVAIL CORPORATION
- DAIDEN CO., LTD.
- FA System Engineering CO., LTD.
- Hurco Automation Ltd.
- ITT CO., LTD.
- M·SYSTEM CO., LTD.
- MELEC Inc.
- Micronet Co.
- MURATA MACHINERY, LTD.
- Komatsu Engineering Corp.
- OMRON Europe B.V.
- ORIENTAL MOTOR Co., LTD.
- OSAI S.p.A
- PMT CORPORATION
- RKC INSTRUMENT INC.
- SG Corporation
- Sanmei Electronics Co., Ltd.
- ShigaYamashita Co., Ltd.
- Soft Servo Systems, Inc.
- SOLITON HI-TEC Co., LTD.
- TECHNO

(Authorized Disclosure)



MECHATROLINK is the trademark of MECHATROLINK Members Association.

Contact:

If you want to join the MECHATROLINK Members Association or have any inquiries, please contact us below:



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