YASKAWA

MACHINE CONTROLLERS
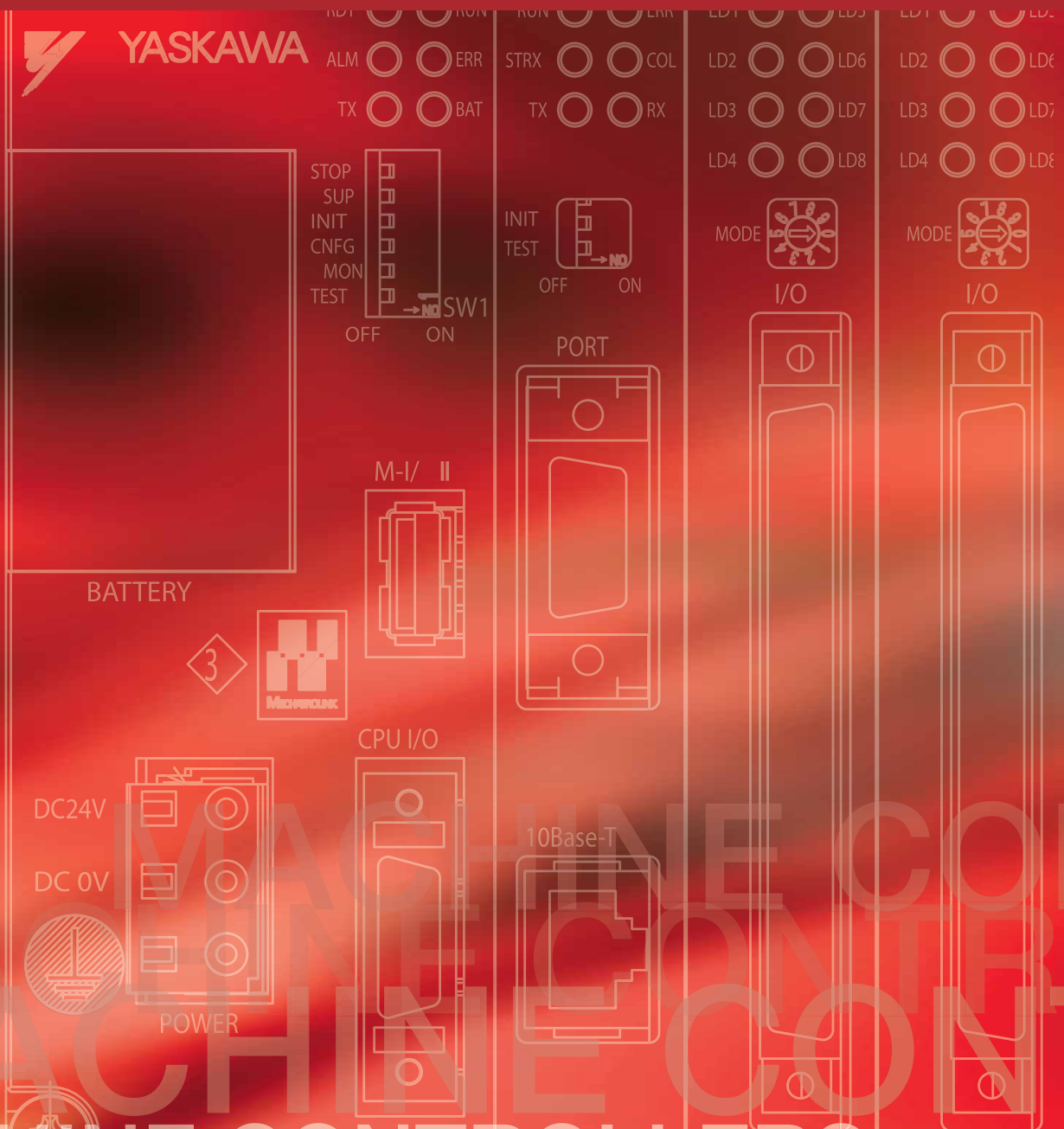## PRODUCT RANGE

YASKAWA

RDY		RUN		RUN		ERR		LD1		LD5		LD1		LD2
ALM		ERR		STRX		COL		LD2		LD6		LD2		LD6
TX		BAT		TX		RX		LD3		LD7		LD3		LD7
							LD4		LD8		LD4		LD8

STOP
SUP
INIT
CNFG
MON
TEST

INIT
TEST

MODE

MODE

OFF   ON

SW1

OFF   ON

I/O

I/O

PORT

M-I/ II

BATTERY

3

MECHATROLINK

CPU I/O

DC24V

DC 0V

10Base-T

POWER

MACHINE CONTROLLERS

About YASKAWA

Contents

For almost 100 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.

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 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

YASKAWA

YASKAWA Motion Controller MP2000 Series

Ideal Motions with the MP2000 Series. The MP2000 Series Machine Controllers are based on three essentials, from which ideal Motion Control can be achieved on a wide variety of machines.

Maximizes speed with accurate motion control

High speeds in program processing and network communication are essential to maximize the output of intricate machines. The high-speed CPU used in the MP2000 Series shortens the execution time of commands. Also, with the MECHATROLINK motion network used in the MP2000 Series, high-accuracy and high-speed Motion Control on multiple axes is realized.

Widens application range with perfect control

Excellent synchronization of the controller is important in applications that require synchronous control on multiple axes. The MP2000 Series can meet such requirements in various applications and improve machine precision.

Increases efficiency with easier programming and maintenance

For high-level control, greater efficiency in programming and maintenance is necessary. The easy-to-use Windows-based editing techniques of the MPE720 engineering tool enable efficient creation and editing of ladder programs. To shorten the time required for design and maintenance, the efficiency of the methods used for system settings, program management, and displays has been improved.

The controller series utilizes advantages derived from three key areas:

► **The ability to process large-capacity programs at high speed**

► **To carry out complete synchronous control of multiple axes**

► **Improved efficiency in simplified portable programming**

MOTION CONTROLLERS

Machine Controller		
For General Industries		**For Semiconductors and Electronic Parts**
► Cartesian Coordinate Robots ► Cutter ► Burring Machines ► Wood Working Machines ► Painting Machines ► Linear Interpolation ► Circular Interpolation ► Constant Speed Control ► Passing Point Signal Output	► Winding Machines ► Printing Machines ► Glass Cutters ► Food Processors ► Injection Molding Machines ► Electronic Cam ► Electronic Shafts ► Phase Control ► Speed Synchronization	► Electronic Parts Assembling Machines ► Loaders, Unloaders ► Chip Bonding Machines ► Probes ► Liquid Crystal Manufacturing Equipment ► Independent Multi-axis Control ► External Positioning ► Indefinite Length Positioning ► High-speed Positioning
Panel Machine Controller MP2500		
Multi-axis high-performance Machine Controller **MP2100, MP2200, MP2300, MP2300S, MP2300Siec/MP2310iec, MP2310, MP2400, MP2600Siec, MP3200iec**		

Motion Control

Specifications

Classification	Machine Controllers for general industrial machines, semiconductors and electrical components			
Model	Board-type Machine Controller	Flexible Machine Controller	All-in-one Machine Controller	Compact All-in-one Machine Controller
	MP2100, MP2100M	MP2200	MP2300, MP2310	MP2300S
Features	▶ Half-size PCI card ▶ High-speed, simple communications and controls with PC ▶ Reduced wiring	▶ All-in-one machine controller ▶ Nine open slots for the optional modules for various communication protocols, servo IF and I/O ▶ Reduced cycle time with the synchronized processing of the sequence and motion controls	▶ All-in-one machine controller ▶ Three open slots for the optional modules ▶ Reduced wiring ▶ Multitasking and high-performance motion control ▶ Optional modules for expansion	▶ All-in-one machine controller ▶ MECHATROLINK and Ethernet (100 Mbps) communications available ▶ One open slot for the optional modules ▶ Easy programming ▶ Distributed system constructed with CPU synchronous functions of MECHATROLINK slaves

Program capacity	▶ Sequence: 100 k steps
	▶ Motion: 800 k characters
		▶ Sequence: 220 k steps
		▶ Motion: 1.6 M characters
			▶ MP2300
			   Sequence: 100 k steps
			   Motion: 800 k characters
			▶ MP2310
			   Sequence: 140 k steps
			   Motion: 1.2 M characters
				▶ Sequence: 100 k steps
				▶ Motion: 800 k characters

Number of controlled axes	▶ Up to 16/32 axes	▶ Up to 256 axes	▶ MP2300: up to 48 axes ▶ MP2310: up to 64 axes	▶ Up to 32 axes
Control functions	▶ Position control (positioning, linear interpolation, circular interpolation, helical interpolation), synchronized phase control, speed control, torque control ▶ Electronic CAM/Shaft	▶ Position control (positioning, linear interpolation, circular interpolation, helical interpolation), synchronized phase control, speed control, torque control ▶ Electronic CAM/Shaft	▶ Position control (positioning, linear interpolation, circular interpolation, helical interpolation), synchronized phase control, speed control, torque control ▶ Electronic CAM/Shaft	▶ Position control (positioning, linear interpolation, circular interpolation, helical interpolation), synchronized phase control, speed control, torque control ▶ Electronic CAM/Shaft
Accel/decel processing	▶ Linear, multi-stage linear, non-symmetric, S-curve	▶ Linear, multi-stage linear, non-symmetric, S-curve	▶ Linear, multi-stage linear, non-symmetric, S-curve	▶ Linear, multi-stage linear, non-symmetric, S-curve
Program language	▶ Ladder diagram ▶ Textual language (numerical operations, logic operations, etc.)	▶ Ladder diagram ▶ Textual language (numerical operations, logic operations, etc.)	▶ Ladder diagram ▶ Textual language (numerical operations, logic operations, etc.)	▶ Ladder diagram ▶ Textual language (motion, sequence)
I/O	▶ DI: 5 points, DO: 4 points (can be extended by distributed I/O) ▶ MP2100: can be extended by I/O module	▶ Can be extended by I/O module	▶ DI: 8 points, DO: 4 points[*1] (can be extended by I/O module)	▶ Can be extended by I/O module and distributed I/O

Communication	▶ MECHATROLINK
	   MP2100: 1 line
	   MP2100M: 2 lines
		▶ MECHATROLINK
		▶ General-purpose serial communications (RS-232C, RS-422/485), Ethernet, DeviceNet, PROFIBUS and MP-Link with optional communications module
			▶ MECHATROLINK
			▶ Ethernet (100 Mbps)[*2]
			▶ General-purpose serial communications (RS-232C, RS-422/485), Ethernet, DeviceNet, PROFIBUS and MP-Link with optional communications module
				▶ MECHATROLINK
				▶ Ethernet (100 Mbps)
				▶ RS-232C, DeviceNet, PROFIBUS and MP-Link with optional communications module

International standard	UL, c-UL, CE (for further information, contact YASKAWA Europe GmbH)			

*1 Available with MP2300 only   *2 Available with MP2310 only

Machine Controllers for general industrial machines, semiconductors and electrical components				I/O	Vision Sensor
All-in-one Machine Controller	Compact simplified Machine Controller	Panel Machine Controller	Drive-based Machine Controller	General-purpose high-speed I/O, distributed I/O	Machine Vision System
MP2300Siec/MP2310iec	MP2400	MP2500	MP2600iec		MYVIS YV250
► Standard programming languages IEC61131-3 ► PLCopen function blocks ► Open slots for option modules MP2300Siec: 1 MP2310iec: 3 ► Webserver/OPC-server	► Small footprint and reduced wiring ► MECHATROLINK and Ethernet (100 Mbps) communications available ► Easy-to-program sequence program and motion program (no ladder logic program) ► Motion control of up to 16 axes	► Controller with integrated touch panel for improved usability ► Reduced wiring ► MotionScreen, a graphic tool, eliminates the need for complicated programming in human-machine interface (HMI) development ► Remote maintenance ► Built-in vision system model available	► Option modul for Sigma-5 Servopack ► Standard programming languages IEC61131-3 ► PLCopen function blocks ► Webserver/OPC-server	► High-speed data refreshing by high-speed communication ► Reduced wiring and cost ► High noise immunity and compact size for machine embedding	► For integrated image processing in servo systems ► Sub pixel function ► MECHATROLINK and Ethernet communications are available ► PCI-bus model is also available
	► Motion: 800 k characters	► Sequence: 100 k steps ► Motion: 800 k characters			► Program: 512 k bytes ► Template: Compact Flash (CF) card ► Frame memory: 48 screens
► 4-8-16 axes	► Up to 16 axes Control functions	► Up to 16 axes	► 1 axis		Number of cameras connected: 4
► Position control, gearing, speed control, torque control	► Position control (positioning, linear interpolation, circular interpolation, helical interpolation), synchronized phase control, speed control, torque control	► PTP control, interpolation, speed control, torque control, position control, phase control ► Electronic CAM/Shaft	► Position control, gearing, speed control, torque control	► 16-point IN/16-point OUT, 24 VDC ► 32-point IN/32-point OUT, 24 VDC ► 64-point IN/64-point OUT, 24 VDC ► 4 channels analogue input ► 8 channels analogue input ► 4 channels analogue output ► 2 channels analogue output ► 2 channels counter ► 2 channels pulse output	Image processing functions: ► Gray-scale pattern matching ► Binary image analysis
► Linear	► Linear, multi-stage linear, non-symmetric, S-curve	► Linear, multi-stage linear, non-symmetric, S-curve	► Linear		
► IEC61131-3 languages ► PRO: LD, FBD, IL, ST, SFC ► Express: LD/FBD, ST	► Textual language (motion, sequence)	► Ladder logic program ► Textual language (numerical operations, logic operations, etc.)	► IEC61131-3 languages ► PRO: LD, FBD, IL, ST, SFC ► Express: LD/FBD, ST		► SH-C
► Can be extended by I/O module and distributed I/O	► Can be extended by distributed I/O	► DI: 5 points, DO: 4 points (can be extended by distributed I/O)	► DI: 8 points, DO: 8 points, AI: 1 channel, AO: 1 channel, 1 Encoder input, can be extended by distributed I/O		
► MECHATROLINK-II ► Ethernet (100 Mbps): - EtherNet/IP - Modbus TCP	► MECHATROLINK ► Ethernet (100 Mbps)	► MECHATROLINK ► RS-232C, RS-422/485	► MECHATROLINK-II ► Ethernet (100 Mbps): - EtherNet/IP - Modbus TCP	► MECHATROLINK	► RS-232C ► MECHATROLINK ► Ethernet
UL, c-UL, CE (for further information, contact YASKAWA Europe GmbH)					

IEC Machine Controllers

The Yaskawa MP Controller series facilitate a new realm of possibilities in the world of machine control. Governed by internationally standardized functions, the IEC based MP series are machine controllers with a potent motion engine at its core. It includes a built-in web server and is compatible with international network protocols.

MP3200iec — High performance

The new high performance machine controller MP3200iec provides a solution for machines with high complexity. With eight open slots for local I/O modules it combines many proven technologies into one platform.

Features

► Simple parameter set-up with wizard-aided input
► The SigmaWin+ wiring check function checks your wiring in a single operation
► Realtime trace of adjustment state means you can check instantly
► Even without servo adjustment and with load changes, oscillation- and vibration-free drive is possible up to 20 times the load moment of inertia.
► The reference filter and feedback gain adjustment functions have a new automatic feed forward gain adjustment for optimal adjustment performance. The friction compensation function automatically cancels out the effect of friction on machine characteristics.

MP2300Siec and MP2310iec — Compact and flexible

MP2300S iec models have one open slot for local I/O modules, while the MP2310 iec models have three open slots.

Features

► Compact, flexible machine controller for medium complexity machines
► IEC61131-3 Programing with PLCOpen function blocks and Yaskawa Tool box including e.g. kinematic calculations or PackML to implement Packaging standards
► Machine controller solution up to 16 Axes
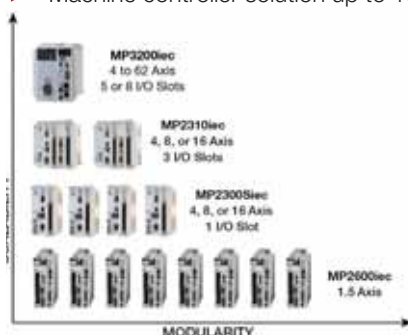
Drive-based Machine Controller   MP2600iec

Small size and powerful controller option for Sigma-5 SERVOPACKs.

Features
► 1,5 axis control
► Open standards EtherNet/IP and Modbus/TCP
► IEC61131-3 programming standard for efficient software handling
► PLCopen Function Blocks
► Reusable Code – Libraries enable importation of previously developed logic

Programming Environment MotionWorks IEC

Ladder Logic is perfect for representing digital sensory data. Structured Text is a great solution for mathematical algorithms and assignments, while Function Block Diagrams are best suited for motion control. These languages seamlessly and predictably cooperate with one another. Variables and outputs from a program structure can be referenced by other programs, providing the ultimate automation development environment.

Features
► Ladder Diagram
► Function Block Diagram
► Instruction List
► Structured Text
► Sequential Function Chart

Tasks
► Motion task
► 16 tasks for plc program

Fastest task = motion task

Standard Programming Languages

MotionWorks® IEC Software complies to the IEC 61131-3 standard, assuring that programs can be developed and executed with predictable behavior.

PLCopen Function Blocks

YASKAWA developed the motion control interface to comply with PLCopen, yet preserved the motion algorithms developed over decades of accumulated motion control experience.

YASKAWA Toolbox

This toolbox provides templates for users to create function blocks on their own. The templates provide suggested information and formats for effective function block creation. Other specialized functions developed by YASKAWA Engineers are periodically added to this toolbox.

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Profiles

MP2100/MP2100M — Board-type Machine Controller

Features

▶ Motion programs can be easily made on your personal computer with 51 motion application program interfaces (APIs)
▶ Motion APIs are available to realize motion control using your industrial personal computer (IPC)
▶ Motion network MECHATROLINK (10 Mbps) as a standard feature

MP2200 — Flexible Machine Controller

Features

▶ Optimal system can be created with a variety of optional modules for motion control, communications and I/O
▶ Expanded capability with 4 additional racks with 9 slots per rack
▶ Motion control up to 256 axes
▶ CPU module (CPU-01/CPU-02) for the MP2200 can be used to realize a high-speed motion control cycle of 0.5 ms

MP2300 — All-in-one Machine Controller

Features

▶ Three slots for optional modules and one basic module including standard functions of CPU, MECHATROLINK communications and I/Os
▶ Multitasking function provides advanced Motion Control with up to 48 axes (when two SVB-01 modules are mounted)
▶ Optional modules for expansion

MP2300S — All-in-one Machine Controller

Features

▶ One slot for optional modules and one basic module including standard functions of CPU, MECHATROLINK communications and Ethernet (100 Mbps)
▶ Distributed system can be constructed with the CPU synchronous functions of MECHATROLINK slaves
▶ Motion control of 32 axes (when one SVB-01 module is mounted)

All-in-one Machine Controller — MP2310

Features

▶ Three slots for optional modules and one basic module including standard functions of CPU, MECHATROLINK communications and Ethernet (100 Mbps)
▶ Multitasking function provides advanced Motion Control with up to 64 axes (when three SVB-01 modules are mounted)
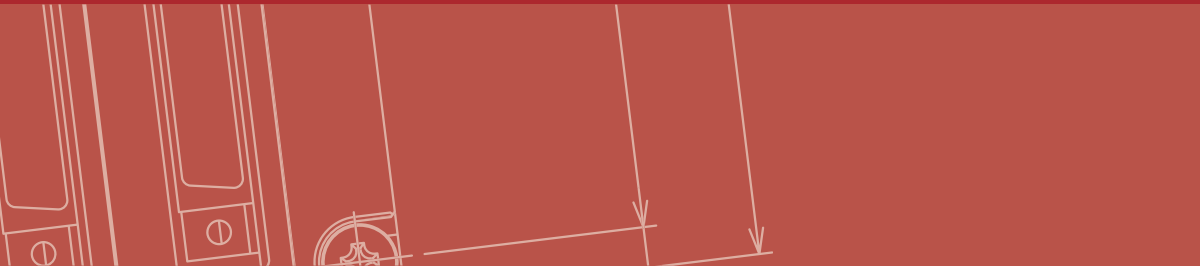▶ Optional modules for expansion

Engineering Tool for Machine Controllers in MP2000 Series — MPE720 Ver. 7

Features

▶ Quickened response and enhanced operability with new design
▶ Displays are arranged in your choice of layouts
▶ Easy program management of both conventional ladder programs and those made with the ladder works editor
▶ Easy programming with auto-generation function of I/O variables and servo-axis variables

   Note: for machine controllers in the MP900 series, use the MPE720 Ver. 5 engineering tool

Simplified Data Logger Software Package for Machine Controllers — MPLOGGER

Features

▶ Display controller data in an MS Excel sheet
▶ Easy-to-make HMI
▶ Display table format and historical trend graph
▶ Real-time monitor

Applications

YASKAWA meets your need

Requirements for industrial machinery are diversified and need features such as high speed and precision, compact design, excellent reliability, low maintenance, and applicability for many kinds of productions. To respond to these demands, YASKAWA manufactures an extensive selection of controllers to meet your needs.

We offer a wide range of controllers including machine controllers, general-purpose I/Os and vision systems. You can choose ladder diagram, SFC, or motion language for programming.

A wide range of interfaces is available for your motion control and range from simple, generic ones using analogue signals to sophisticated networks. Systems can be designed to control from one to 256 axes.

		MP3200iec IEC	MP2300iec IEC	MP2600iec IEC	MP2100	MP2200	MP2300	MP2300S
Printing		●	●		●	●	●	●
	Digital	●			●			
Food	Processing	●			●	●	●	
	Packaging	●	●	●	●	●	●	●
Inspection & testing		●	●		●	●	●	●
Semiconductor equipment		●			●	●	●	●
	Chip mounters	●			●	●		
	PCB drilling stations	●	●		●	●	●	●
	Electronic parts assembly	●	●		●	●	●	●
	Die bonders	●			●	●		
Transfer machines		●	●		●	●	●	●
General handling		●	●	●			●	●
Winding			●	●		●	●	●
Textile		●	●		●	●	●	●
Feeding		●	●	●			●	●
Metal processing					●	●	●	●

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MECHATROLINK

MECHATROLINK is the key technology for your system. Through total component integration, Mechatrolink reduces wiring. It enables the set-up of multi-function and high-performance systems while simplifying tuning and maintenance of the system. MECHATROLINK is used in a wide variety of applications to simplify work processes and to save time and money.

System efficiency

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

High-speed communication

High-speed communication provides high-performance and high-accuracy Motion Control because data for the actual position, speed, input/output status and other parameters are communicated in real-time.

Reduced cost

Just one communication line can connect up to 21 stations in a network. This can greatly reduce costs and wiring time.
With connectors and cables used in the process and factory automation fields, MECHATROLINK makes the most reliable, versatile and economically efficient systems. It simplifies a Motion Control system so that it no longer requires the A/D converter for velocity/torque reference nor the pulse generator for position reference.

MECHATROLINK can be used for the control of a variety of high precision machines. It is especially suitable for synchronous and interpolation motion controls. MECHATROLINK enables the user to perfectly control torque, velocity and positioning even in complex movements.

► Cutting machines

► Press brakes

► Plastic tape processors

► Laser welders

► X-Z processing systems

► Winding machines

► Labelling machines

► Chip mounters and handling robots

► Printing machines

MECHATROLINK Members Association (MMA)
Global Support and Product Development

To assist the development of new MECHATROLINK products, the MECHATROLINK Members Association (MMA) offers technical support to board, executive and regular members.
All members can download technical information on http://www.mechatrolink.org.
MMA support enables the development of new compliant products without unnecessary complications.

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