# YASKAWA

# MPiec Series

Machine Controller

# EASY FOR YOU. CONSISTENT FOR EVERYONE.

### IEC

**A Familiar Programming Standard**

MotionWorks IEC complies with IEC 61131-3, and provides five globally recognized standard programming languages. It includes motion function blocks that adhere to the PLCopen standard. Experienced control engineers will find this software comfortably familiar, and learning to program with MotionWorks IEC has never been easier.

**Built-in YASKAWA Toolboxes**

Yaskawa toolboxes make programming common functions so easy, it's like having a YASKAWA engineer working by your side. Development time is reduced because standard code elements are already written and ready for use.

**Easy Connectivity, Worldwide**

An MPiec controller is your gateway to full control of a machine at any remote location with internet access. Keep a constant finger on the pulse of machine operation, from your own factory floor or anywhere worldwide.

**A Reusable Code Library**

Import and re-use previously developed logic to speed up new projects. Re-use your own work or draw on logic created by others.

**Web Server Updates**

MPiec controllers allow loading of programs and updating of firmware from any web browser, with no other software required. Browser-based controller status data helps reduce maintenance time and cost.
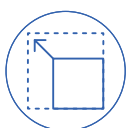
**Scalability**

All our single-axis to multi-axis MPiec controllers utilize the same MotionWorks IEC software platform, making programming and maintenance consistent for all machine sizes.

Today's customers need to keep a finger on the pulse of their machines at all times. Success means maintaining peak productivity, total reliability and endless freedom to interact with the systems they control. With easy-to-learn MotionWorks IEC software, your engineers start programming faster and stay connected more easily. The result? Faster machine commissioning and more rapid machine delivery to market.
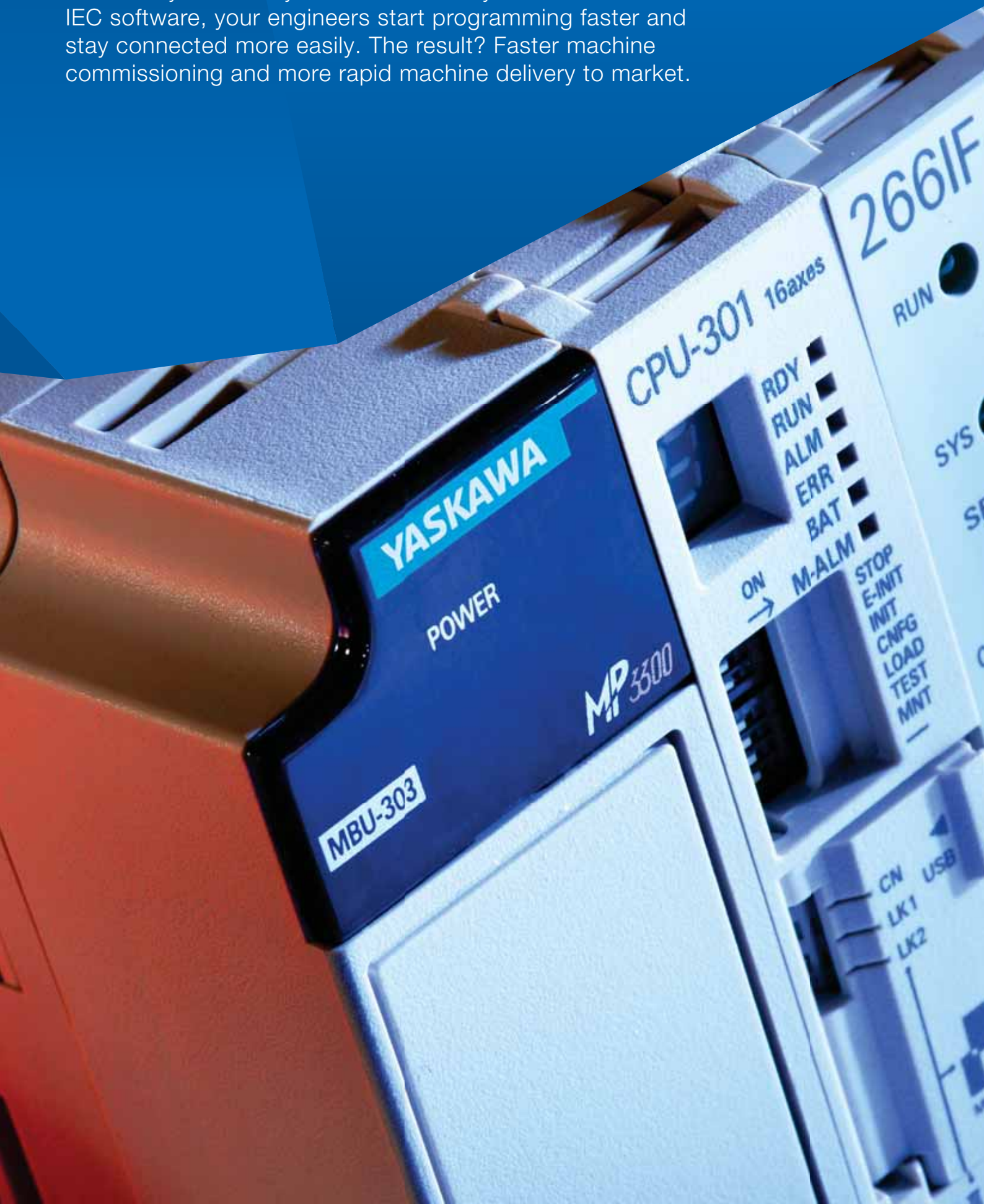
# MPiec Machine Controller Hardware

MPiec Machine Controllers offer a wide range of hardware for applications ranging from 1 to 62 axes. All controllers are equipped with the reliable MECHATROLINK motion network.

## MP2600iec

- Processor Speed: 200 MHz
- Motion Network: Dual Port RAM access
- Motion Networks Speed: As fast as 1 ms
- Network Capability: OPC, EtherNet/IP, Modbus TCP
- Axis Count: 1.5
- Option Card Slots: None (On board I/O)

## MP2300Siec / MP2310iec

- Processor Speed: 240 MHz
- Motion Network: MECHATROLINK-II
- Motion Networks Speed: As fast as 0.5 ms
- Network Capability: OPC, EtherNet/IP, Modbus TCP
- Axis Count: 4, 8 or 16
- Option Card Slots: 1 or 3

## MP3300iec

- Processor Speed: 400 MHz / 800 MHz
- Motion Network: MECHATROLINK-III
- Motion Networks Speed: As fast as 0.25 ms
- Network Capability: OPC, EtherNet/IP, Modbus TCP
- Axis Count: 4, 8, 20 or 32
- Option Card Slots: 1, 3 or 8

## MP3200iec

- Processor Speed: 1 GHz
- Motion Network: MECHATROLINK-III
- Motion Networks Speed: As fast as 0.25 ms
- Network Capability: OPC, EtherNet/IP, Modbus TCP
- Axis Count: 8, 16, 32 or 62
- Option Card Slots: 3, 5 or 8

# VIPA
# SLIO I/O

If you've wished that Input/Output could be FASTER and EASIER, VIPA SLIO is for you. The new YASKAWA decentralized I/O system is full of features that make connection simpler and I/O functions more efficient.

## Easy Web Interface

SLIO diagnostic and status information is accessible through a web interface, delivering complete system status data from any EtherNet/IP or Modbus TCP field-bus module into a standard browser. Remote access via Internet is also available.

## High Speed Backplane Bus

Achieve reaction times as fast as 20 microseconds with VIPA SLIO's high speed backplane bus. Connect as many as 64 modules at a time, while maintaining speeds up to 48 Mbit/s.

## One-touch Hardware Configurator

VIPA SLIO puts an end to hours of tedious manual I/O configuration. The MotionWorks IEC VIPA SLIO Hardware Configurator sets up a complete I/O system with the touch of a single button.
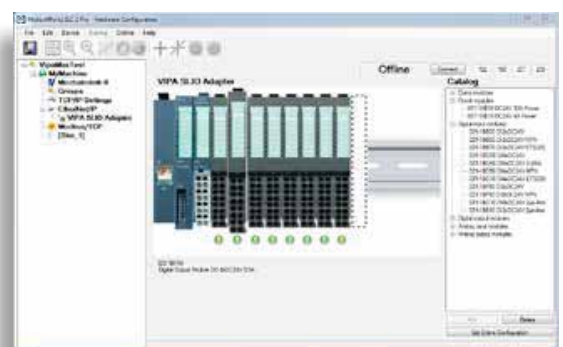
# Getting Connected

Easily connect all parts of your machine without a hassle - from machine controllers, parameter and monitor software, inverter drives, servo drives, VIPA HMIs, SLIO I/Os, to Motoman robots from YASKAWA.

*VIPA HMI*

*Software*

**Modbus**/TCP

Ethernet

**EtherNet/IP**

**MECHATROLINK**

*SERVOPACK*

*SERVOPACK*

*SERVOPACK*

*MPiec Controller*

*Rotary Motors*

*Linear Motors*

*Direct Drives Motors*

*OPC Server*


*Web Server*


*YASKAWA*
*Inverter Drives*


*VIPA SLIO I/O*


*YASKAWA*
*Motoman Robots*

**A controller that gets you to the position you want, when you want it:**

- Deterministic high speed MECHATROLINK network
- MECHATROLINK retry function
- Dedicated CPU for your motion needs
- High CPU scan rate

**Program all of your controllers the same way every time:**

- Standard IEC 61131-3 programming languages
- Reusable PLCopen function blocks
- Reusable standard Yaskawa toolboxes
- Decades of high quality motion experience

**Your entire machine at your fingertips with Yaskawa controllers:**

- Sigma-5 servos via MECHATROLINK
- Built in web server
- OPC server
- EtherNet/IP
- Modbus TCP
- Wide range of HMIs and I/Os

# IEC-based Motion Programming

Only a few programming languages provide an environment for simply coding all of the functionality of a modern automated machinery. MotionWorks® IEC encourages the programmer to take advantage of the best of several programming languages within one development package.

## Reusable Code and YASKAWA Application-specific Toolboxes

Drawing on decades of motion experience, Yaskawa created toolboxes with pre-developed code for specific applications.
Leverage Yaskawa expertise to minimize programming time and effort. Libraries also enable importing and re-use of logic you've previously developed, saving even more time on subsequent projects.

| Function | Motion Works IEC | |
| --- | --- | --- |
| | Express | Professional |
| Number of Tasks | 1 | 16 |
| Number of Resources | 1 | 1 |
| IEC 61131-3 Languages | | |
|    Ladder Diagram | ● | ● |
|    Function Block | ● | ● |
|    Structure Text | ● | ● |
|    Sequential Function Chart | – | ● |
|    Instruction List | – | ● |
| POU Grouping | – | ● |
| Configurable Task Priority | – | ● |
| Configurable I/O Assignment | – | ● |
| Auto Save Setting | – | ● |
| Debug PowerFlow | – | ● |
| Password Protection | – | ● |
| Project Comparison | – | ● |

## MotionWorks IEC 3

- 10 different CAM function blocks available
- Open standards like PackML for packaging
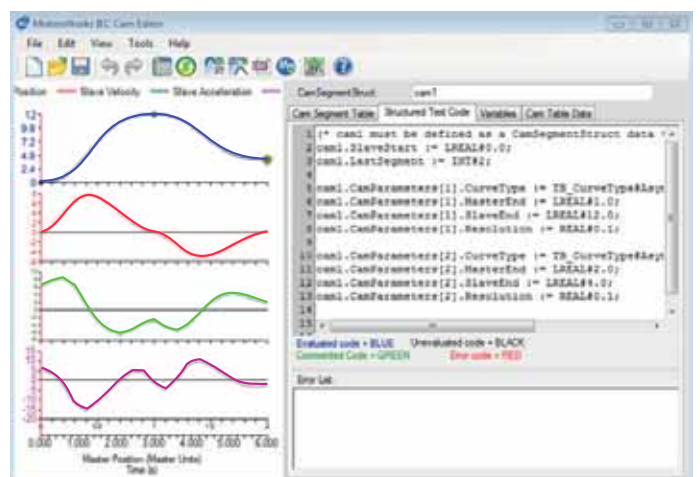- Supports implementation according FDA 21FR Part 11

**Benefits:**

- Rapid realisation of machine functions
- Reliability by validated function blocks
- Toolkit function blocks enable import and reuse of previously developed logic

## CAM Editor

- Supports 11 cam curve types
- Can read and write IEC 61131-3 code to generate cam tables at run time
- Supports multi step blended Cams and Cam in and out



**MotionWorks® IEC** *CAMeditor*

# For a wide Range of Applications

Using the MP3000iec Series of machine controllers improves handling and performance in a broad range of applications. With up to 52 MB of memory for user-data and up to 1 GHz CPU speed, even very complex applications with up to 62 axes can be controlled.



*Handling Applications*



*Textile Applications*



*Food Packaging Applications*



*Filling and Packaging of Beverages*



*Woodworking Applications*



*Digital Printing Applications*

# System components

## MP2300Siec & MP2310iec

| Common Options MP2300Siec | | |
|---|---|---|
| **MP2300Siec Controller CPU with 1 Option Module Slot**<br><br>**MP2310iec Controller CPU with 3 Option Module Slots** | MECHATROLINK-II, EtherNet/IP and Modbus/TCP communications | |
| | 16 axis, one option module | PMC-U-MP23S16 |
| | 16 axis, three option modules | PMC-U-MP23116 |
| **Accessories** | Replacement Battery | JZSP-BA01 |
| | DIN Rail Clips (2 per set) | JEPMC-OP300 |
| | Option Slot Cover | JEPMC-OP2300 |
| | Panel Mounting Bracket for screw mounting | JEPMC-OP2300S-E |
| **Communication** | | |
| **I/O Option Cards** | Analog Inputs (AI-01) | JAPMC-AN2300 |
| | Analog Outputs (AO-01) | JAPMC-AN2310 |
| | Digital Output Module (DO-01) | JAPMC-DO2300 |
| | Digital I/O Module (LIO-01) | JAPMC-IO2300-E |
| | Digital I/O Module (LIO-02) | JAPMC-IO2301-E |
| | Digital I/O Module (LIO-04) | JAPMC-IO2303 |
| | Digital I/O Module (LIO-05) | JAPMC-IO2304 |
| | Multi-Function I/O Module (LIO-06) | JAPMC-IO2305-E |
| **Cables** | | |
| **MECHATROLINK-II Cables** | Cables available in different length | JEPMC-W6003-☐☐-E-G5 |
| | ☐☐: Cable Length (**A5**: 0.5 m, **01**: 1.0 m, **03**: 3.0 m, **05**: 5.0 m, **10**: 10.0 m, **20**: 20.0 m) | |
| **Option Card Cables (Pigtail)** | AI-01 | JEPMC-W6080-☐☐-E |
| | AO-01 | JEPMC-W6090-☐☐-E |
| | LIO-01/02 | JEPMC-W2061-☐☐-E |
| | LIO-04/05 | JEPMC-W6060-☐☐-E |
| | LIO-06 | JEPMC-W2064-☐☐-E |
| | ☐☐: Cable Length (**A5**: 0.5 m, **01**: 1.0 m, **03**: 3.0 m) | |
| **Network** | | **Model code** |
| **Network Termination Resistor** | Two (2) required to terminate ends of network (one included with MP2300Siec) | JEPMC-W6022 |

# MP3300iec & MP3200iec

| Common Options MP3300iec | | |
|---|---|---|
| **MP3300iec Controller CPU** | MECHATROLINK-III, EtherNet/IP and Modbus/TCP communications | |
| | CPU card with 4 axis capability (Standard Performance, 400 MHz) | PMC-U-MP33004 |
| | CPU card with 8 axis capability (Standard Performance, 400 MHz) | PMC-U-MP33008 |
| | CPU card with 20 axis capability (Standard Performance, 400 MHz) | PMC-U-MP33020 |
| | CPU card with 20 axis capability (Medium Performance, 800 MHz) | PMC-U-MP33320 |
| | CPU card with 32 axis capability (Medium Performance, 800 MHz) | PMC-U-MP33332 |
| **Power Supply & Base Unit Rack** | 24 VDC power supply with single slot base unit rack | JEPMC-BU3304-E |
| | 24 VDC power supply with three slot base unit rack | JEPMC-BU3303-E |
| | 24 VDC power supply with eight slot base unit rack | JEPMC-BU3302-E |
| | 230 VAC power supply with eight slot base unit rack | JEPMC-BU3301-E |
| **Accessories** | Replacement Battery | JEPMC-BA3001 |
| | Replacement CPU Faceplate | JEPMC-OP3301-1-E |
| | Option Slot Cover | JEPMC-OP3301-E |

| Common Options MP3200iec | | |
|---|---|---|
| **MP3200iec Controller CPU** | MECHATROLINK-III, EtherNet/IP and Modbus/TCP communications | |
| | CPU card with 4 axis capability (High Performance, 1 GHz) | PMC-U-MP32004 |
| | CPU card with 8 axis capability (High Performance, 1 GHz) | PMC-U-MP32008 |
| | CPU card with 16 axis capability (High Performance, 1 GHz) | PMC-U-MP32016 |
| | CPU card with 32 axis capability (High Performance, 1 GHz) | PMC-U-MP32032 |
| | CPU card with 62 axis capability (High Performance, 1 GHz) | PMC-U-MP32062 |
| **Power Supply** | 100 - 200 VAC Input | JEPMC-PSA3012-E |
| | 24 VDC | JEPMC-PSD3012-E |
| **Base Unit Rack** | 3 Slot | JEPMC-BUB3003-E |
| | 5 Slot | JEPMC-BUB3005-E |
| | 8 Slot | JEPMC-BUB3008-E |
| **Accessories** | Replacement Battery | JEPMC-BA3001 |
| | Replacement Power Supply Side Cover | JEPMC-OP3001 |
| | Replacement Base Unit Rack Side Cover | JEPMC-OP3002 |
| | Option Slot Cover | JEPMC-OP2300 |

| Communication | | |
|---|---|---|
| **I/O Option Cards** | Analog Inputs (AI-01) | JAPMC-AN2300 |
| | Analog Outputs (AO-01) | JAPMC-AN2310 |
| | Digital Output Module (DO-01) | JAPMC-DO2300 |
| | Digital I/O Module (LIO-01) | JAPMC-IO2300-E |
| | Digital I/O Module (LIO-02) | JAPMC-IO2301-E |
| | Digital I/O Module (LIO-04) | JAPMC-IO2303 |
| | Digital I/O Module (LIO-05) | JAPMC-IO2304 |
| | Multi-Function I/O Module (LIO-06) | JAPMC-IO2305-E |

| Cables | | |
|---|---|---|
| **MECHATROLINK-III Cables** | Cables available in different length | JEPMC-W6012-□□-E |
| | □□: Cable Length (**A2**: 0.2 m, **A5**: 0.5 m, **01**: 1.0 m, **02**: 2.0 m, **03**: 3.0 m, **04**: 4.0 m, **05**: 5.0 m) | |

| Network | | Model code |
|---|---|---|
| **MECHATROLINK-III Network Accessories** | Hub, 8 Slave Ports | JEPMC-MT2000-E |
| | Adaptor, Ethernet to Mechatrolink | JEPMC-MT2020-E |
| | I/O Module; 64 In 64 Out | JEPMC-MTD2310-E |
| | Analog Module; 8 In (for MP3200iec only) | JEPMC-MTA2900-E |
| | Analog Module; 4 Out (for MP3200iec only) | JEPMC-MTA2910-E |

# Specification

## MP2300Siec

| Operating Environment | |
|---|---|
| **Ambient Temperature** | 0 °C to 55 °C |
| **Humidity** | max. 95% RH (non condensing) |
| **Storage Temperature** | -25 °C to 85 °C |
| **Altitude** | 2,000 m above sea level or lower |
| **Pollution Level** | Conforms to JIS B 3502 Pollution Degree 1 |
| **Corrosive Gas** | There must be no combustible or corrosive gas |
| **Mechanical Conditions** | |
| **Vibration Resistance** | Conforming to JIS B 3502: |
| | 10 to 57 Hz with single amplitude of 0.075 mm |
| | 57 to 150 Hz with fixed acceleration of 9.8 m/s² |
| | 10 sweeps each in X, Y, and Z directions (sweep time: 1 octave/min.) |
| **Shock Resistance** | Size of shock: Peak acceleration of 147 m/s² (15 G) |
| | Duration: 11 ms 3 times each in the X, Y, and Z directions |
| **Electrical Conditions** | |
| **Noise Resistance** | Conforming to EN 61000-6-2, EN 55011 (Group 1, Class A) |
| | Power supply noise (FT noise): 2 kV min., for one minute |
| | Radiation noise (FT noise): 1 kV min., for one minute |
| **Ground** | Ground to 100 Ω max. |
| **Cooling Method** | Natural cooling |
| **Contoller Details** | |
| **CPU Speed** | 240 MHz SH4 |
| **Number of option module slots** | 1 |
| **User Variable Memory** | 1.75 MB |
| **Power Unit** | Input Voltage: 24 Vdc (±20%) |
| | Input Current: 1.0 A max (at rated input/output) Current Consumption: 1.0 A max |
| | Battery: Battery for memory retention attachable |
| **Motion Network** | MECHATROLINK-II: 1 channel |
| | SERVOPACK and I/O for up to 20 slave nodes connectable (SERVOPACK for up to 16 axes) |
| | Baud rate: 10 Mbps (MECHATROLINK-II) |
| **Communication Function** | Ethernet: 10Base-T or 100Base-TX |
| **Ethernet Protocols** | Ethernet/IP and Modbus TCP/IP standard on all units |
| **Software** | MotionWorks IEC Express |
| | MotionWorks IEC Pro |

# MP2600iec

| Operating Environment | |
|---|---|
| **Ambient Temperature** | 0 °C to 55 °C |
| **Humidity** | max. 95% RH (non condensing) |
| **Storage Temperature** | -25 °C to 85 °C |
| **Altitude** | 1,000 m above sea level or lower |
| **Pollution Level** | Conforms to JIS B 3502 Pollution Degree 2 |
| **Corrosive Gas** | There must be no combustible or corrosive gas |
| **Mechanical Conditions** | |
| **Vibration Resistance** | Conforming to JIS B 3502: <br> 4.9 m/s² |
| **Shock Resistance** | 19.6 m/s² |
| **Contoller Details** | |
| **CPU Speed** | 200 MHz |
| **User Variable Memory** | 4 MB |
| **Inputs** | 8 programmable digital inputs <br> 1 ch., +/- 10 V, 16 bit analog input |
| **Outputs** | 8 programmable digital outputs <br> 1 ch., +/- 10 V, 16 bit analog output |
| **Pulse Counter** | RS-422-compatible pulse counter input (quadrature, pulse and direction, and up/down counter modes) with 5, 12, and 24 V position latch inputs |
| **Communication Function** | Ethernet: 2× 100Base-TX |
| **Ethernet Protocols** | Ethernet/IP and Modbus TCP/IP; OPC (Client and Server required) |
| **Software** | MotionWorks IEC Express <br> MotionWorks IEC Pro |
| **Servo Details** | |
| **Sequence Input** | Number of Inputs: 7 (1 registration input latches external encoder in 5 μs) <br> Functions: The signal allocation and positive/negative logic can be modified. Forward run prohibited (P-OT), reverse run prohibited (N-OT), forward torque limit (/P-CL), reverse torque limit (/N-CL), general-purpose input signal (/SI0 to /SI6) |
| **Sequence Output - Fixed** | Servo Alarm (ALM) |
| **Sequence Output - Allocated** | Number of Outputs: 3 <br> Functions: The signal allocation and positive/negative logic can be modified. Positioning completion (/COIN), speed coincidence detection(/V-CMP), servomotor rotation detection (/TGON), servo ready (/S-RDY), torque limit detection (/CLT), speed limit detection(/VLT), brake (/BK), warning (/WARN), near (/NEAR) |

# Specification

## MP3200iec

| Operating Environment | |
|---|---|
| **Ambient Temperature** | 0 °C to 55 °C |
| **Humidity** | max. 95% RH (non condensing) |
| **Storage Temperature** | -25 °C to 85 °C |
| **Altitude** | 2,000 m above sea level or lower |
| **Pollution Level** | Conforms to JIS B 3502 Pollution Degree 1 |
| **Corrosive Gas** | There must be no combustible or corrosive gas |

| Mechanical Conditions | |
|---|---|
| **Vibration Resistance** | Conforming to JIS B 3502: |
| | 10 to 57 Hz with single amplitude of 0.075 mm |
| | 57 to 150 Hz with fixed acceleration of 9.8 m/s² |
| | 10 sweeps each in X, Y, and Z directions (sweep time: 1 octave/min.) |
| **Shock Resistance** | Size of shock: Peak acceleration of 147 m/s² (15 G) |
| | Duration: 11 ms 3 times each in the X, Y, and Z directions |

| Electrical Conditions | |
|---|---|
| **Noise Resistance** | Conforming to EN 61000-6-2, EN 55011 (Group 1, Class A) |
| | Power supply noise (FT noise): 2 kV min., for one minute |
| | Radiation noise (FT noise): 1 kV min., for one minute |
| **Ground** | Ground to 100 Ω max. |
| **Cooling Method** | Natural cooling or forced-air cooling |

| Contoller Details | |
|---|---|
| **CPU Speed** | 1 GHz PowerPC |
| **Number of option module slots** | 0, 3, 5 or 8 |
| **User Variable Memory** | 52 MB |
| **Power Unit** | Input Voltage: Two options available: 24 VDC or 100/200 VAC |
| | Input Current: DC power: 5.0A, AC power: 4.0A (at rated input/output fully loaded with option cards) |
| | Battery: Battery for memory retention attachable at the bottom of the CPU unit |
| **Motion Network** | MECHATROLINK-III: 1 channel, 2 connectors |
| | SERVOPACK and I/O for up to 62 slave nodes connectable (SERVOPACK for up to 62 axes) |
| | Baud rate: 100 Mbps (MECHATROLINK-III) |
| **Communication Function** | Ethernet: 10Base-T or 100Base-TX |
| **Ethernet Protocols** | Ethernet/IP and Modbus TCP/IP standard on all units, User specific protocols can be written using Y_DeviceComm firmware library |
| **Software** | MotionWorks IEC Express |
| | MotionWorks IEC Pro |

# MP3300iec

| Operating Environment | |
|---|---|
| **Ambient Temperature** | 0 °C to 60 °C (forced cooling is required if 55°C is exceeded.) |
| **Humidity** | max. 95% RH (non condensing) |
| **Storage Temperature** | -25 °C to 85 °C |
| **Altitude** | 2,000 m above sea level or lower |
| **Pollution Level** | Conforms to JIS B 3502 Pollution Degree 2 |
| **Corrosive Gas** | There must be no combustible or corrosive gas |
| **Mechanical Conditions** | |
| **Vibration Resistance** | Conforming to JIS B 3502: |
| | Continuous vibration: 5 to 9 Hz with single amplitude of 1.75 mm |
| | 9 to 150 Hz with fixed acceleration of 4.9 m/s² |
| | Intermittent vibration: 5 to 9 Hz with single-amplitude of 3.5 mm |
| | 9 to 150 Hz with fixed acceleration of 9.8 m/s² |
| | 10 sweeps each in X, Y, and Z directions for both intermittent and continuoust vibration |
| **Shock Resistance** | Size of shock: Peak acceleration of 147 m/s² (15 G) |
| | Duration: 11 ms 3 times each in the X, Y, and Z directions |
| **Electrical Conditions** | |
| **Noise Resistance** | Conforming to EN 61000-6-2, EN 61000-6-4 and EN 55011 (Group 1, Class A) |
| | Power supply noise (FT noise): 2 kV min., for one minute |
| | Radiation noise (FT noise): 1 kV min., for one minute |
| | Ground noise (impulse noise): 1 kV min., for 10 minutes |
| | Electrostatic noise (contact discharge method): 6 kV or more, 10 times |
| **Ground** | Ground to 100 Ω max. |
| **Cooling Method** | Natural cooling or forced-air cooling |
| **Contoller Details** | |
| **CPU Speed** | 400 MHz |
| **Number of option module slots** | 1, 3 or 8 |
| **User Variable Memory** | 32 MB |
| **Power Unit** | Input Voltage: 24 Vdc |
| | Input Current: 1.0 A max (at rated input/output) for 1 slot module |
| |               1.5 A max (at rated input/output) for 3 slots module |
| | Battery: Battery for memory retention attachable at the bottom of the CPU unit |
| **Motion Network** | MECHATROLINK-III: 1 channel, 2 connectors |
| | SERVOPACK and I/O for up to 20 slave nodes connectable (SERVOPACK for up to 20 axes) |
| | Baud rate: 100 Mbps (MECHATROLINK-III) |
| **Communication Function** | Ethernet: 10Base-T or 100Base-TX |
| **Ethernet Protocols** | Ethernet/IP and Modbus TCP/IP standard on all units, User specific protocols can be written using Y_DeviceComm firmware library |
| **Software** | MotionWorks IEC Express |
| | MotionWorks IEC Pro |

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**YASKAWA**