

FACTORY AUTOMATION

# MITSUBISHI ELECTRIC SERVO SYSTEM CONTROLLERS

The leader in productivity, safety and environmental performance

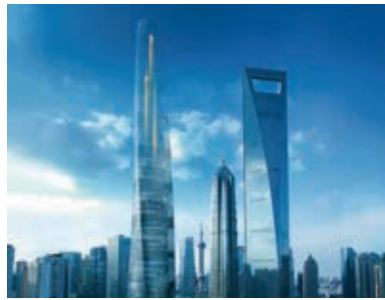


**SERVO SYSTEM  
CONTROLLERS**





## Automating the World



Our Factory Automation business is focused on "Automating the World" to make it a better, more sustainable environment supporting manufacturing and society, celebrating diversity and contributing towards an active and fulfilling role.

Mitsubishi Electric is involved in many areas including the following:

### **Energy and Electric Systems**

A wide range of power and electrical products from generators to large-scale displays.

### **Electronic Devices**

A wide portfolio of cutting-edge semiconductor devices for systems and products.

### **Home Appliance**

Dependable consumer products like air conditioners and home entertainment systems.

### **Information and Communication Systems**

Commercial and consumer-centric equipment, products and systems.

### **Industrial Automation Systems**

Maximizing productivity and efficiency with cutting-edge automation technology.

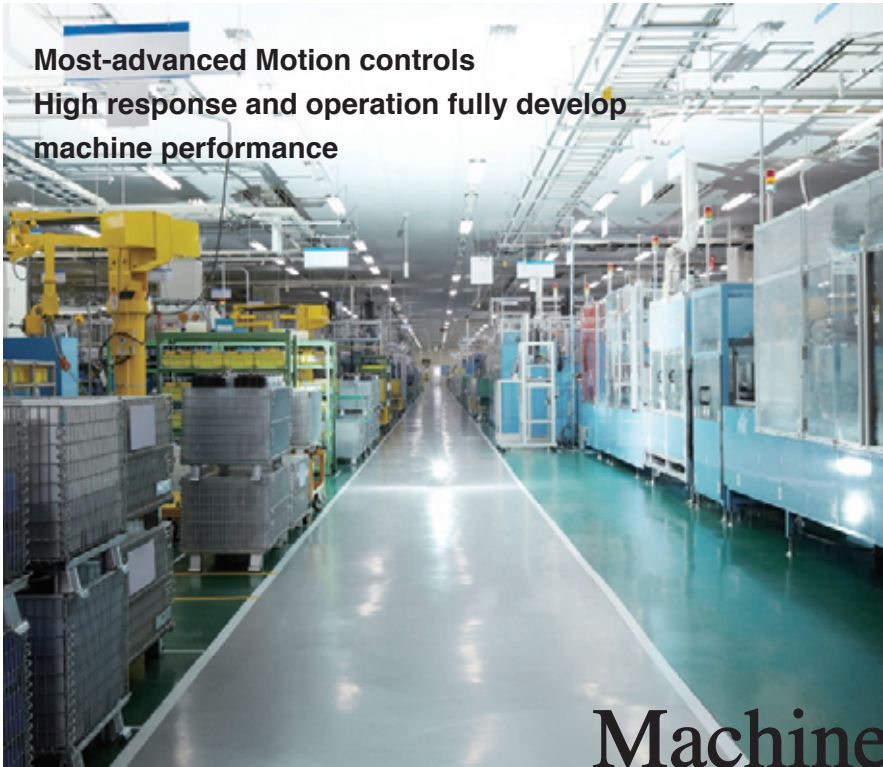


The Mitsubishi Electric Group is actively solving social issues, such as decarbonization and labor shortages, by providing production sites with energy-saving equipment and solutions that utilize automation systems, thereby helping towards a sustainable society.

# OVERVIEW

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# Harmony with machine, man, and the environment.



**Most-advanced Motion controls**  
**High response and operation fully develop**  
**machine performance**

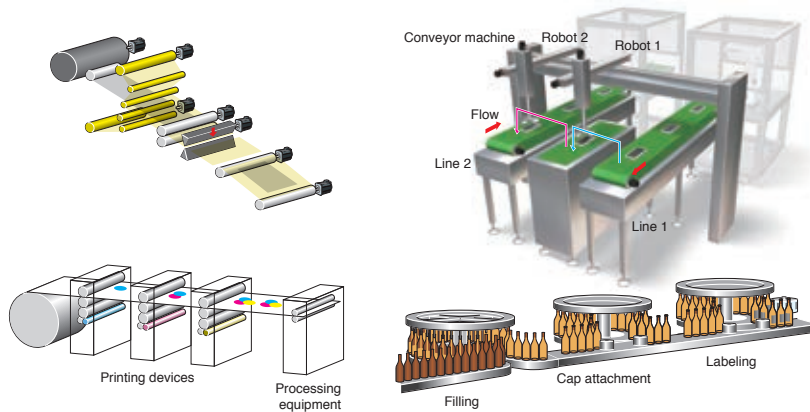
## Machine



**User-friendly Motion controllers with reliable safety observation functions**

## Expanding the applications

Now that High-mix Low-volume production is a big trend in the market, the Motion controllers are expected to be used in various applications. The Motion controllers and the Simple Motion modules are capable of various controls such as positioning control, speed control, torque control, tightening & press-fit control, synchronous control and cam control. They are applied to various machines such as X-Y tables, unwinding machines, packing machines and filling machines.



## Reliable Safety observation function

Ensuring safety in the production site is an absolute requirement; therefore devices must comply with international safety standards. Q17nDSCPU is equipped with functions which achieve Performance Level d (PL d) as standard.

## User-friendly engineering environment

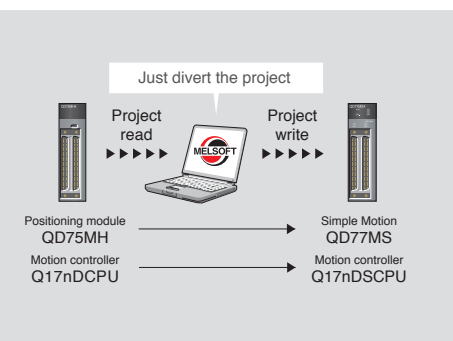
Pursuing Ease of use. The powerful functions are aimed at creating a more user-friendly engineering environment with the enhanced design and debugging efficiency, reduced downtime, and data protection, etc.



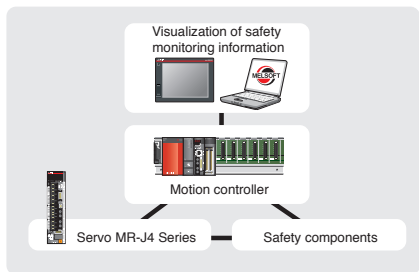
# Heritage

## Motion controller highly compatible with prior models

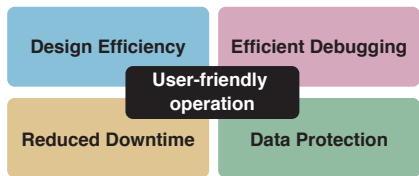
The Motion controller and the Simple Motion module are highly compatible with the previous servo amplifiers and Motion controllers, so the existing projects and programs can continue to be used.



# New approach for future Motion controls.

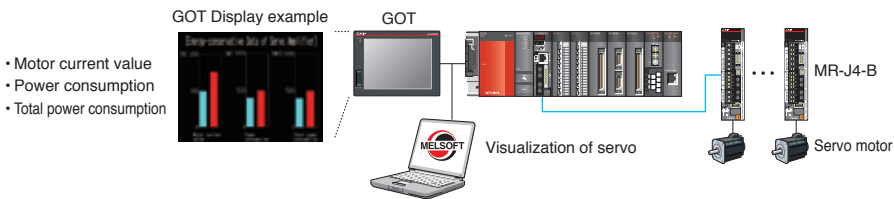


Safety components : Safety relay, CC-Link Safety compatible products, Contactor SD-Q Series



## Servo visualization

For energy conservation, understanding the consumption of electric power is vital. The Motion controller and the Simple Motion module have the “Optional data monitor function”. Information such as motor current value, power consumption and total power consumption of the servo amplifier and servo motor are available via the SSCNET III/H. You can check the information on the screen to save energy.



## Reduced wiring and space saving

The servo system controller used with MR-J4 series servo amplifier can dramatically reduce wiring and save space. With the SSCNET III/H compatible servo amplifier, the number of wires is greatly reduced compared with the pulse train type. With the 3-axis servo amplifier, the installation space is reduced by approximately 30% compared with the MR-J3-B.

## High compatibility with the previous controllers

Q17nDSCPU Motion controller and QD77MS Simple Motion module can utilize projects diverted from Q17nDCPU Motion controller and QD75MH Positioning module. There is no need to create new projects when replacing the modules.

## High compatibility with the previous amplifiers

The SSCNET III/H compatible Motion controller and Simple Motion module can connect MR-J3-B SSCNET III compatible servo amplifiers, so you can simply replace Q17nDCPU Motion controller or QD75MH Positioning modules with these Motion controllers or Simple Motion modules. MR-J4-B SSCNET III/H compatible servo amplifier can also be used with MR-J3-B SSCNET III compatible servo amplifier in a same system. You can continue to use the previous servo amplifiers.

# A complete system lineup to meet your production and manufacturing

Responding to expanding applications such as semiconductor and FPD manufacturing, packing machines, and cap tightening machines, coordinated with Mitsubishi Electric's other product lines such as displays and programmable controllers as well as servo amplifiers and Mitsubishi Electric allows you to freely create an advanced servo system.

## HUMAN MACHINE I/F

### Graphic Operation Terminal



GOT2000/GOT1000 series

### Personal computer



## CONTROLLER



iQ Platform Programmable controller

### Motion controller



SSCNET III/H compatible Motion controller

**Q173DSCPU**  
**Q172DSCPU**

### Stand-Alone Motion controller



SSCNET III/H compatible Stand-Alone Motion controller

**Q170MSCPU**  
**Q170MSCPU-S1**

## NETWORK

The new-generation optical network "SSCNET III/H" in pursuit of high response and reliability

## SERVO AMPLIFIER

### MR-J4-B/MR-J4W2-B/MR-J4W3-B



SSCNET III/H compatible servo amplifier

**MR-J4-B**  
**MR-J4-B-RJ**



SSCNET III/H compatible 2-axis servo amplifier

**MR-J4W2-B**



SSCNET III/H compatible 3-axis servo amplifier

**MR-J4W3-B**

## SERVO MOTOR

### Rotary servo motor



Small capacity, low inertia  
**HG-KR series**  
Capacity: 50 to 750 W



Small capacity, ultra-low inertia  
**HG-MR series**  
Capacity: 50 to 750 W



Medium capacity, medium inertia  
**HG-SR series**  
Capacity: 0.5 to 7 kW



Medium/large capacity, low inertia  
**HG-JR series**  
Capacity: 0.5 to 55 kW



Medium capacity, ultra-low inertia  
**HG-RR series**  
Capacity: 1 to 5 kW



Medium capacity, flat type  
**HG-UR series**  
Capacity: 0.75 to 5 kW

## SOLUTION



Mitsubishi Electric's e-F@ctory concept utilizes both FA and IT technologies, to reduce the total cost of development, production and maintenance, with the aim of achieving manufacturing that is a "step ahead of the times". It is supported by the e-F@ctory Alliance Partners covering software, devices, and system integration, creating the optimal e-F@ctory architecture to meet the end users needs and investment plans.

needs

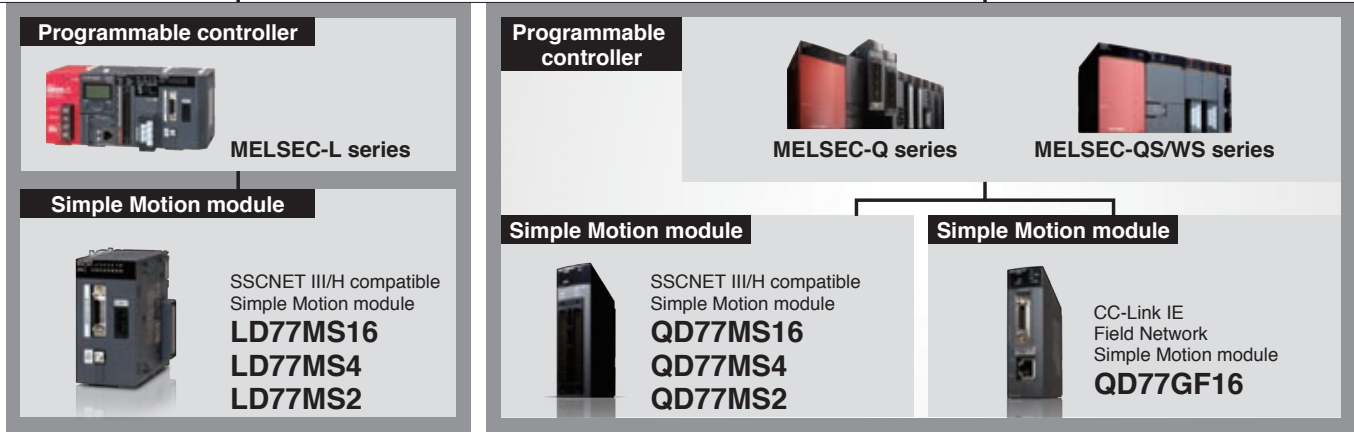


Motion controllers and Simple Motion modules are flexibly servo motors via SSCNET III/H.

## SOFTWARE



|  |                          |
|--|--------------------------|
| Motion Controller Engineering Software       | MELSOFT MT Works2        |
| Programmable Controller Engineering Software | MELSOFT GX Works2        |
| Servo Setup Software                         | MELSOFT MR Configurator2 |
| <b>Capacity selection software</b>           |                          |



## Ethernet-based Open Network CC-Link IE Field Network

**MR-J4-B-RJ010**  
+MR-J3-T10

CC-Link IE Field Network servo amplifier with Motion

**MR-J4-B-RJ010**  
+MR-J3-T10

## LOW-VOLTAGE SWITCHGEAR

|   |  |
|---|--|
| <p><b>Magnetic contactor</b></p> <p><b>MS-T</b></p> | <p><b>Molded-case circuit breaker</b></p> <p><b>WS-V</b></p> |
|---|--|

|   |   |   |  |
|---|---|---|--|
| <p><b>Linear servo motor</b></p>  |   |   |  |
| <p>Core type<br/><b>LM-H3 series</b><br/>Rating: 70 to 960 N</p>                  | <p>Core type (natural/liquid cooling)<br/><b>LM-F series</b><br/>Rating: 300 to 3000 N (natural cooling)<br/>Rating: 600 to 6000 N (liquid cooling)</p> | <p>Core type with magnetic attraction counter-force<br/><b>LM-K2 series</b><br/>Rating: 120 to 2400 N</p> | <p>Coreless type<br/><b>LM-U2 series</b><br/>Rating: 50 to 800 N</p> |
| <p><b>Direct drive motor</b></p>  |   |   |  |
| <p>Low-profile flange type<br/><b>TM-RG2M series</b><br/>Rating: 2.2 to 9 N·m</p> | <p>Low-profile table type<br/><b>TM-RU2M series</b><br/>Rating: 2.2 to 9 N·m</p>  | <p>High rigidity<br/><b>TM-RFM series</b><br/>Rating: 2 to 240 N·m</p>                                    |  |

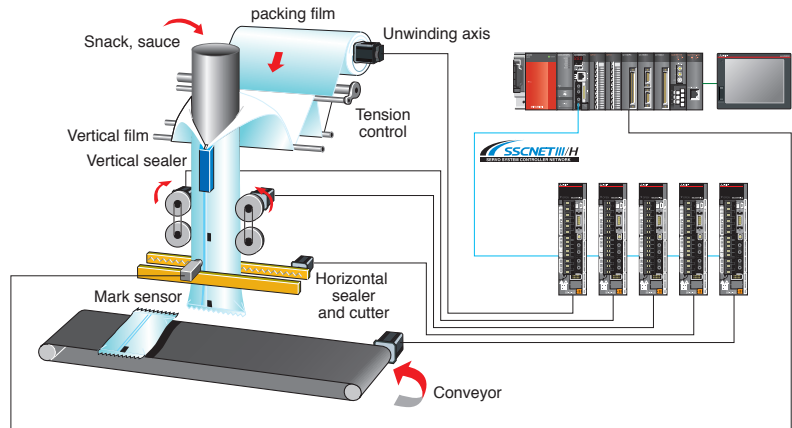


Mitsubishi Electric's integrated FA platform for achieving lateral integration of controllers & HMI, engineering environments and networks at production sites.

Our servo system controllers offering exceptional solutions for more advanced Motion control

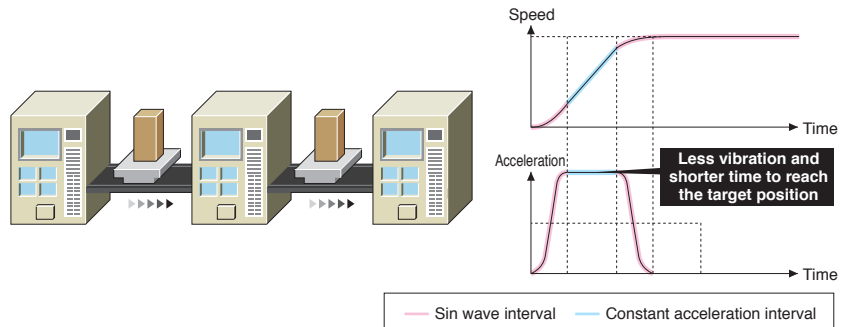
**CASE1 | Packing Machines** (Advanced synchronous control, Cam control, Mark detection function) Q17nDSCPU QD77MS LD77MS  
Q170MSCPU QD77GF

When the machine packs food, the whole process is synchronized by using synchronous control and cam control. The packing film is cut using the registration mark as a reference with the mark detection function.



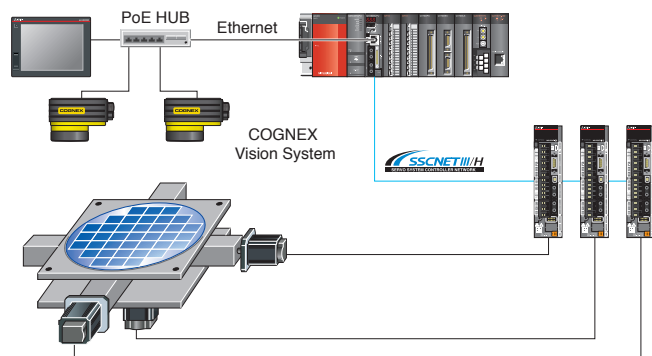
**CASE2 | Conveyor Machines** (Advanced S-curve acceleration/deceleration function) Q17nDSCPU  
Q170MSCPU

Vibration is minimized and a short tact time is achieved with the advanced S-curve acceleration/deceleration function by setting the smooth acceleration period (Sin wave interval) and maximum acceleration period (Constant acceleration interval).



**CASE3 | Alignment System** (Ethernet connection, Vision system, Target position change function) Q17nDSCPU  
Q170MSCPU

COGNEX Vision System is connected to the Motion CPU with Ethernet through the built-in PERIPHERAL I/F. Alignment time is reduced with the target position change function which uses the workpiece position data from the vision system for high-speed Motion control.



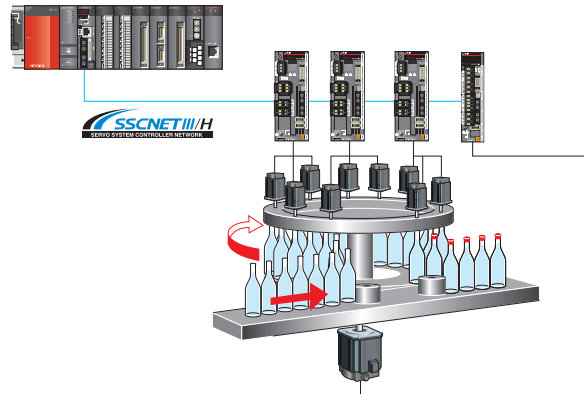


## CASE4

### Cap Tightening Machines (Position control, Torque control, Tightening & press-fit control)

Q17nDSCPU QD77MS LD77MS  
Q170MSCPU

Position control can be switched to torque control or vice versa. "Tightening & press-fit control" is also available, switching to torque control without the motor stopping the movement during the positioning. Since the current position is controlled in any control modes, the positioning is carried out smoothly even after switching back to position control.

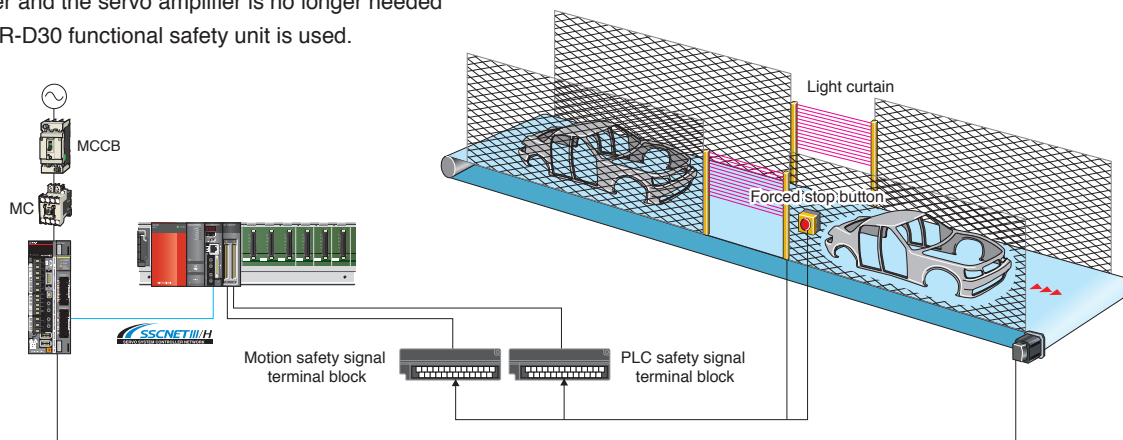


## CASE5

### Safety System (Safety signal comparison function)

Q17nDSCPU QD77MS LD77MS

A safety system is simply structured using the light curtain, forced stop button or safety fence, etc. The wiring for power shutoff between the Motion controller and the servo amplifier is no longer needed when MR-D30 functional safety unit is used.



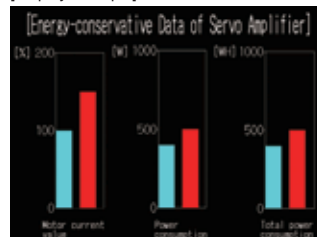
## CASE6

### Servo Visualization (Optional data monitor function)

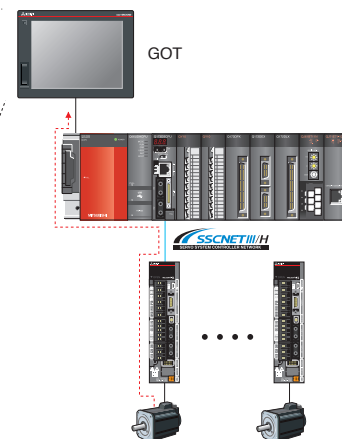
Q17nDSCPU QD77MS LD77MS  
Q170MSCPU

The motor current value, power consumption and total power consumption of the servo amplifier and servo motor via SSCNET III/H are visible on the user-designed graphic operation terminal screen. The ability to check the information helps you to save power.

[Display example]



- Motor current value
- Power consumption
- Total power consumption

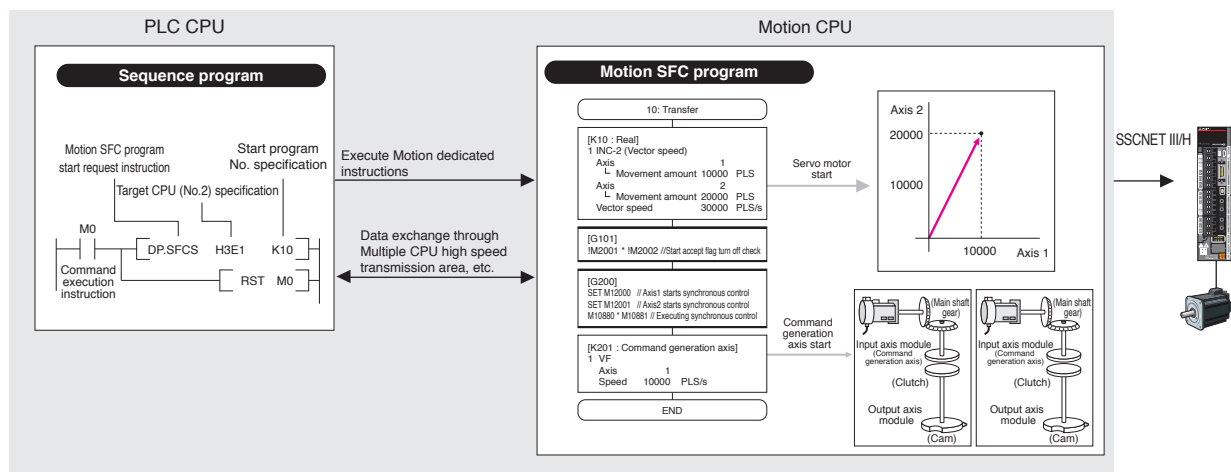


## Coordinated with a wide range of applications and controls

### Features of Motion Controller

The Motion controller is a CPU module used with PLC CPU for Motion control.

- Using Motion SFC program, the Motion CPU separately operates the controls from the PLC CPU.
- CPU loads are distributed by sharing tasks between Motion CPU and PLC CPU for advanced Motion control.
- Advanced Motion control is achieved, such as position follow-up and tandem operation.
- High-speed input and output are possible with direct management of various modules, such as I/O, analog, and high-speed counter.



### Advanced Motion control



SSCNET III/H compatible  
MELSEC-Q series

**Q173DSCPU**  
**Q172DSCPU**

- For a large or medium scale system
- Maximum number of controlled axes:  
32 axes (Q173DSCPU), 16 axes (Q172DSCPU)
- A PLC CPU or a C Controller is selectable according to your application
- Up to 96 axes can be controlled by use of three modules of the Q173DSCPU
- Supports the safety observation function and the vision system



SSCNET III/H compatible  
MELSEC-Q series

**Q170MSCPU**  
**Q170MSCPU-S1**

- Highly cost-effective product for a small scale system
- Integrates a power supply, a PLC, and a Motion controller
- Maximum number of controlled axes: 16 axes
- The program capacity:  
60k steps (Q170MSCPU-S1), 30k steps (Q170MSCPU)
- Supports the vision system

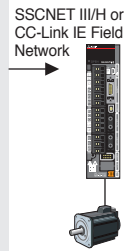
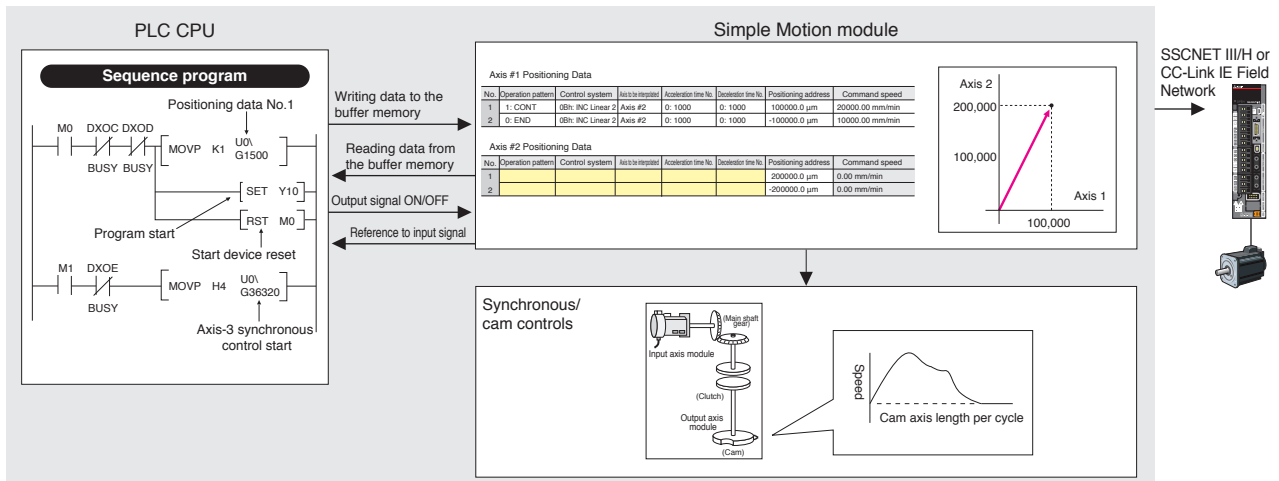




## Features of Simple Motion Module

The Simple Motion module is an intelligent function module which performs positioning control by following the instructions of PLC CPU.

- The positioning functions are used in the same manner as those of the Positioning module.
- Linear interpolation control and other controls can be achieved easily just by writing positioning data to the buffer memory with sequence programs.
- Positioning/advanced synchronous/cam controls are performed with simple parameter setting and a start from a sequence program.
- Supports only MELSOFT GX Works2 as an engineering software.



### Advanced control but simple to use just like Positioning modules



SSCNET III/H compatible  
MELSEC-Q series

**QD77MS16**  
**QD77MS4**  
**QD77MS2**



- For customers who need a module allowing user to use a wide-range of Motion controls - advanced synchronous control, cam control, speed-torque control (tightening & press-fit control), etc. - more easily just with the sequence programs.
- Maximum number of controlled axes:  
16 axes (QD77MS16), 4 axes (QD77MS4), and 2 axes (QD77MS2)
- Equipped with all the functions of the QD75MH Positioning module



SSCNET III/H compatible  
MELSEC-L series

**LD77MS16**  
**LD77MS4**  
**LD77MS2**



- For customers who need more compact and lower cost products
- Maximum number of controlled axes:  
16 axes (LD77MS16), 4 axes (LD77MS4), and 2 axes (LD77MS2)
- Equipped with all the functions of the QD75MH Positioning module



















CC-Link IE Field Network compatible  
MELSEC-Q series

**QD77GF16**



- For customers who prefer to use open network
- Maximum number of controlled axes: 16 axes
- Equipped with all the functions of the QD75MH Positioning module

## Function Comparison of Motion Controller and Simple Motion Module

|                                | Motion controller  |  |  |   | Simple Motion module   |  |  |   |   |   |
|--------------------------------|--|--|--|---|--|--|--|---|---|---|
|                                | Q173DSCPU<br>Q172DSCPU   |  | Q170MSCPU<br>Q170MSCPU-S1  |   | QD77MS16<br>QD77MS4<br>QD77MS2   |  | LD77MS16<br>LD77MS4<br>LD77MS2   |   | QD77GF16  |   |
| Module type                    | CPU module   |  |  |   | Intelligent function module  |  |  |   |   |   |
| Servo amplifier                | MR-J4-B<br>           | MR-J4W2-B<br> | MR-J4W3-B<br> | MR-J4-B-RJ<br> | MR-J4-B<br> | MR-J4W2-B<br> | MR-J4W3-B<br> | MR-J4-B-RJ<br> | MR-J4-B-RJ010<br>+ MR-J3-T10<br> |   |
| Servo motor                    |                       |  |  |   |           |  |  |   |   |  |
| Servo amplifier interface      |                       |  |  |   |           |  |  |   |   |  |
|                                | 2 systems<br>1 system  |  | 1 system   |   | 1 system   |  |  |   |   |   |
| Maximum number of control axes | 32 axes<br>16 axes   |  | 16 axes  |   | 16 axes<br>4 axes<br>2 axes  |  |  |   | 16 axes   |   |
| Operation cycle                | 0.22 ms or more  |  |  |   | 0.88 ms or more  |  |  |   |   |   |
| Programmable controller        | MELSEC-Q series<br> |  | Q03UD or equivalent<br>Q06UDH or equivalent  |   | MELSEC-Q series  |  | MELSEC-L series  |   | MELSEC-Q series   |   |
| Engineering environment        | MT Works2  |  | MR Configurator2 (Note-1)  |   | GX Works2  |  | MR Configurator2 (Note-1)  |   |   |   |
| Programming                    | Motion SFC   |  |  |   | Point table  |  |  |   |   |   |

(Note-1): MELSOFT MR Configurator2 is included in MELSOFT MT Works2.

# SERVO SYSTEM CONTROLLER

■ Featured functions

|  | Motion controller   |   | Simple Motion module   |  |          |
|--|---|---|--|--|----------|
|  | Q173DSCPU<br>Q172DSCPU  | Q170MSCPU<br>Q170MSCPU-S1   | QD77MS16<br>QD77MS4<br>QD77MS2   | LD77MS16<br>LD77MS4<br>LD77MS2   | QD77GF16 |
| Control mode                           | <ul style="list-style-type: none"> <li>Position control</li> <li>Torque control</li> <li>Synchronous control</li> <li>Advanced synchronous control</li> </ul>   | <ul style="list-style-type: none"> <li>Speed control</li> <li>Tightening &amp; press-fit control</li> <li>Cam control</li> </ul>  | <ul style="list-style-type: none"> <li>Position control</li> <li>Torque control</li> <li>Advanced synchronous control</li> </ul>   | <ul style="list-style-type: none"> <li>Speed control</li> <li>Tightening &amp; press-fit control <sup>(Note-1)</sup></li> <li>Cam control</li> </ul>   |          |
| Positioning control                    | <ul style="list-style-type: none"> <li>Linear interpolation</li> <li>Path control</li> <li>Position follow-up control</li> <li>High-speed oscillation control</li> </ul>  | <ul style="list-style-type: none"> <li>Circular interpolation</li> <li>Helical interpolation</li> <li>Speed control with fixed position stop</li> <li>Speed/position switching control</li> </ul>   | <ul style="list-style-type: none"> <li>Linear interpolation</li> <li>Path control</li> <li>Position/speed switching control</li> </ul>   | <ul style="list-style-type: none"> <li>Circular interpolation</li> <li>Speed/position switching control (ABS)</li> <li>Speed/position switching control (INC)</li> </ul>   |          |
| Acceleration/deceleration control      | <ul style="list-style-type: none"> <li>Trapezoidal acceleration/deceleration</li> <li>Advanced S-curve acceleration/deceleration</li> </ul>   | <ul style="list-style-type: none"> <li>S-curve acceleration/deceleration</li> </ul>   | <ul style="list-style-type: none"> <li>Trapezoidal acceleration/deceleration</li> </ul>  | <ul style="list-style-type: none"> <li>S-curve acceleration/deceleration</li> </ul>  |          |
| Manual control                         | <ul style="list-style-type: none"> <li>JOG operation</li> <li>JOG operation simultaneous start</li> </ul>   | <ul style="list-style-type: none"> <li>Manual pulse generator operation</li> </ul>  | <ul style="list-style-type: none"> <li>JOG operation</li> </ul>  | <ul style="list-style-type: none"> <li>Manual pulse generator operation</li> <li>Inching operation</li> </ul>  |          |
| Function to change the control details | <ul style="list-style-type: none"> <li>Current value change</li> <li>Torque limit value change</li> <li>Acceleration/deceleration time change</li> </ul>  | <ul style="list-style-type: none"> <li>Target position change</li> <li>Speed change</li> </ul>  | <ul style="list-style-type: none"> <li>Current value change</li> <li>Torque limit value change</li> <li>Acceleration/deceleration time change</li> </ul>   | <ul style="list-style-type: none"> <li>Target position change</li> <li>Speed change</li> <li>Override</li> </ul>   |          |
| Home position return type              | <ul style="list-style-type: none"> <li>Proximity dog type 1</li> <li>Scale home position signal detection type</li> <li>Count type 2</li> <li>Data set type 1</li> <li>Dog cradle type</li> <li>Stopper type 2</li> <li>Dogless home position signal reference method</li> </ul>  | <ul style="list-style-type: none"> <li>Proximity dog type 2</li> <li>Count type 1</li> <li>Count type 3</li> <li>Data set type 2</li> <li>Stopper type 1</li> <li>Limit switch combined type</li> </ul>   | <ul style="list-style-type: none"> <li>Proximity dog type</li> <li>Scale home position signal detection type</li> <li>Count type 2</li> <li>Data set type</li> </ul>   | <ul style="list-style-type: none"> <li>Count type 1</li> </ul>   |          |
| Sub function                           | <ul style="list-style-type: none"> <li>Forced stop</li> <li>Software stroke limit</li> <li>Amplifier-less operation</li> <li>Optional data monitor</li> <li>ROM operation</li> <li>Error history</li> <li>Safety observation</li> <li>Software security key</li> <li>Limit switch output</li> <li>Driver communication</li> </ul> | <ul style="list-style-type: none"> <li>Hardware stroke limit</li> <li>Absolute position system</li> <li>Unlimited length feed</li> <li>Mark detection</li> <li>M-code output</li> <li>Digital oscilloscope</li> <li>Vision system</li> <li>High-speed reading</li> <li>Cam auto-generation</li> </ul> | <ul style="list-style-type: none"> <li>Forced stop</li> <li>Software stroke limit</li> <li>Amplifier-less operation <sup>(Note-1)</sup></li> <li>Optional data monitor <sup>(Note-1)</sup></li> <li>Flash ROM backup</li> <li>Module error collection</li> <li>Safety observation</li> <li>Driver communication <sup>(Note-1)</sup></li> </ul> | <ul style="list-style-type: none"> <li>Hardware stroke limit</li> <li>Absolute position system</li> <li>Unlimited length feed</li> <li>Mark detection</li> <li>M-code output</li> <li>Digital oscilloscope</li> <li>Cam auto-generation</li> </ul> |          |

(Note-1): Available only with the QD77MS and LD77MS.

Outline

Motion Controller

Simple Motion Module

Network

Servo Amplifier

Engineering Environment

SSCNET III/H compatible  
MELSEC-Q series Motion controller

## Q173DSCPU/Q172DSCPU

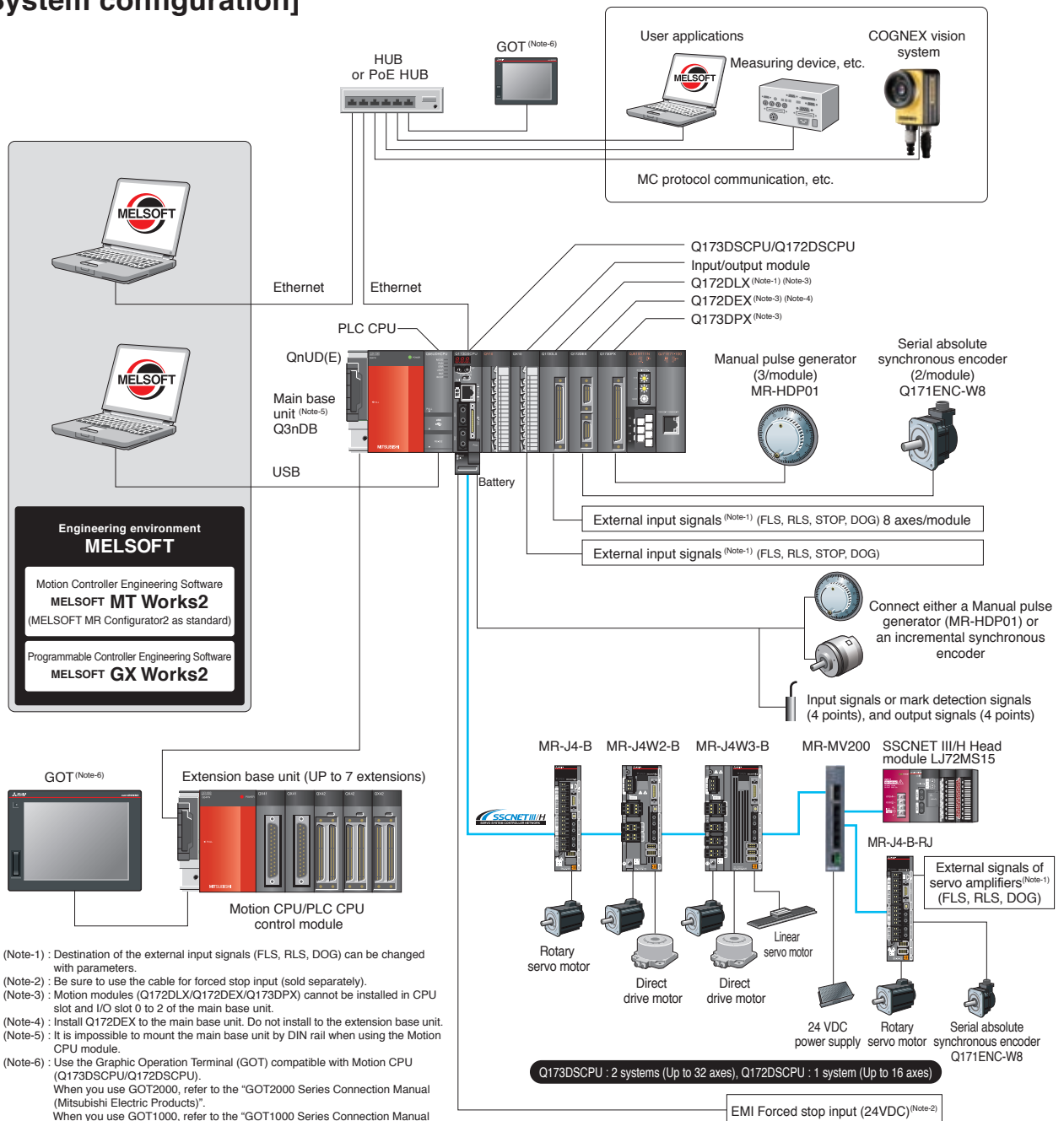


## Multiple CPU System for High-Speed Motion Control



- The Q-series Motion controllers can configure a Multiple CPU system with Programmable controllers.
- Over 100 types of Q series modules are available, which enhances system scalability.
- Up to 96 axes of servo motors can be controlled by using three modules of the Q173DSCPU.
- Position/speed/torque/advanced synchronous controls, etc. are available.
- The safety observation function is available as standard.
- The COGNEX vision system can be connected directly with Ethernet connection.
- The MELSEC-L series I/O modules, analog I/O module, and high-speed counter module can be used when the SSCNET III/H Head module LJ72MS15 is connected in the system.

### [System configuration]



SSCNET III/H compatible  
MELSEC-Q series Motion controller

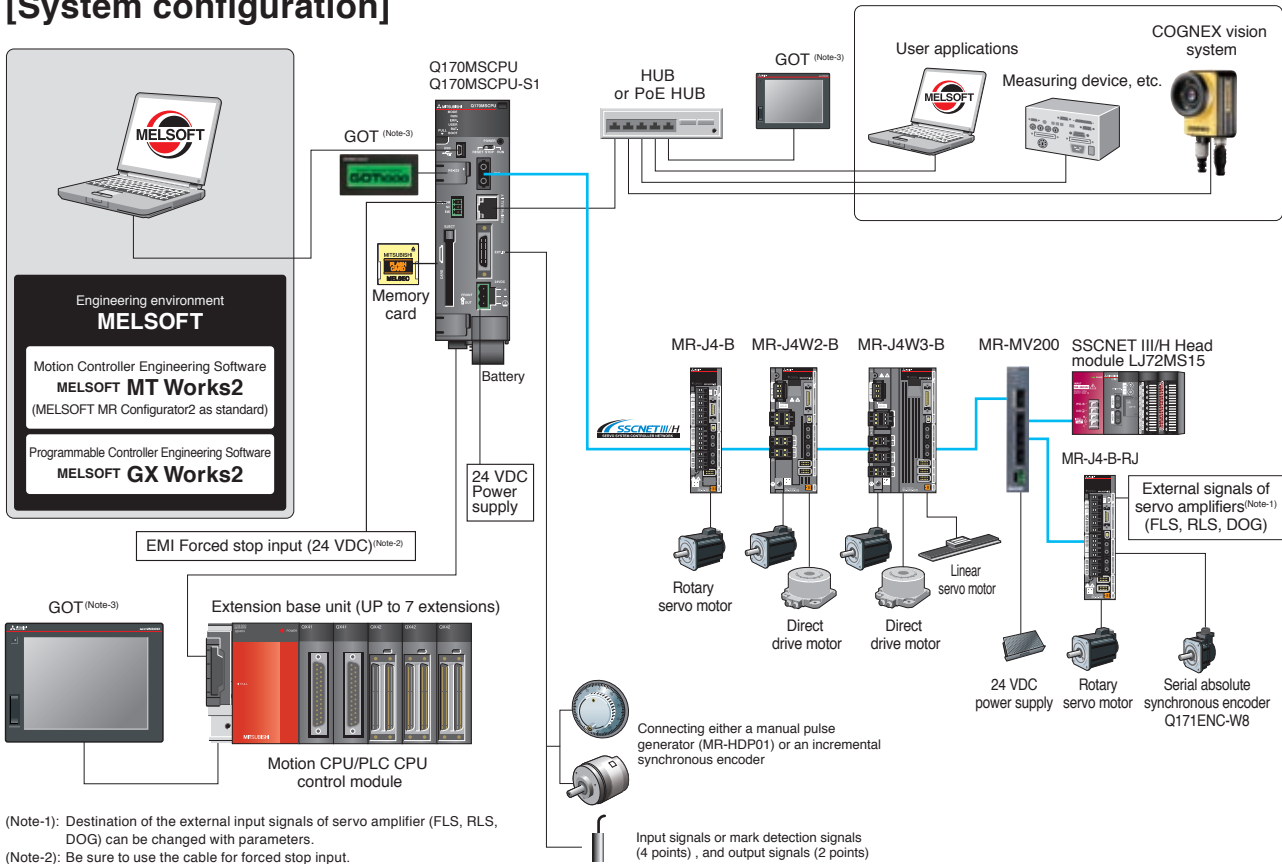
## Q170MPCPU/Q170MPCPU-S1

## Power Supply, PLC, and Motion Controller All in One



- Up to 16 axes can be controlled.
- Position/speed/torque/advanced synchronous controls, etc. are available.
- Incremental synchronous encoder interface and Mark detection interface are integrated.
- PLC capacity is increased to 60k steps (Q170MPCPU-S1), and up to 7 extension base units can be used.
- STO (Safe torque off) is achieved by combining the servo amplifier
- The COGNEX vision system can be connected directly with Ethernet connection.
- The MELSEC-L series I/O modules, analog I/O module, and high-speed counter module can be used when the SSCNET III/H Head module LJ72MS15 is connected in the system.

### [System configuration]



(Note-1): Destination of the external input signals of servo amplifier (FLS, RLS, DOG) can be changed with parameters.  
 (Note-2): Be sure to use the cable for forced stop input.  
 (Note-3): Use the Graphic Operation Terminal (GOT) compatible with Q170MPCPU(-S1).  
 When you use GOT2000, refer to the "GOT2000 Series Connection Manual (Mitsubishi Electric Products)".  
 When you use GOT1000, refer to the "GOT1000 Series Connection Manual (Mitsubishi Electric Products)".

Outline

Motion Controller

Simple Motion Module

Network

Servo Amplifier

Engineering Environment

## Features

Reduced wiring, basic performance, Multiple CPU control for all customer needs

## Multiple CPU Control by PLC CPU and Motion CPU

Q17nDSCPU

Q170MSCPU

CPU loads are distributed by sharing tasks between the Motion controller and the Programmable controller. Complex servo controls are executed by the Motion controllers, while machine and information control is managed by the Programmable controllers.

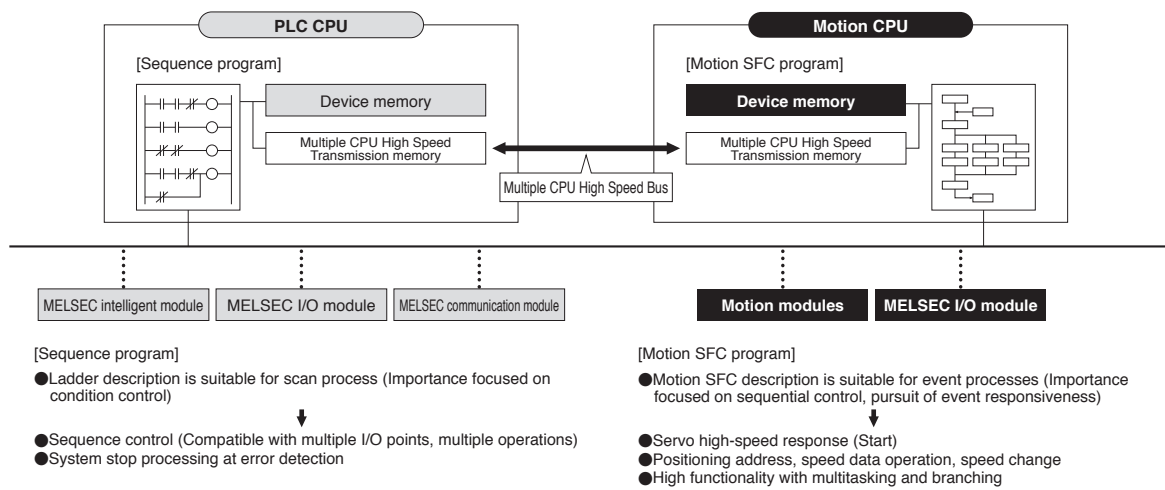
By selecting the Motion CPU and PLC CPU according to the application, a flexible system is configured.

The program of Motion CPU is described with the Motion SFC program.

### [Multiple CPU High Speed Bus]

Maximum of 14k words are transferred every 0.88ms through the dedicated multiple CPU high speed bus.

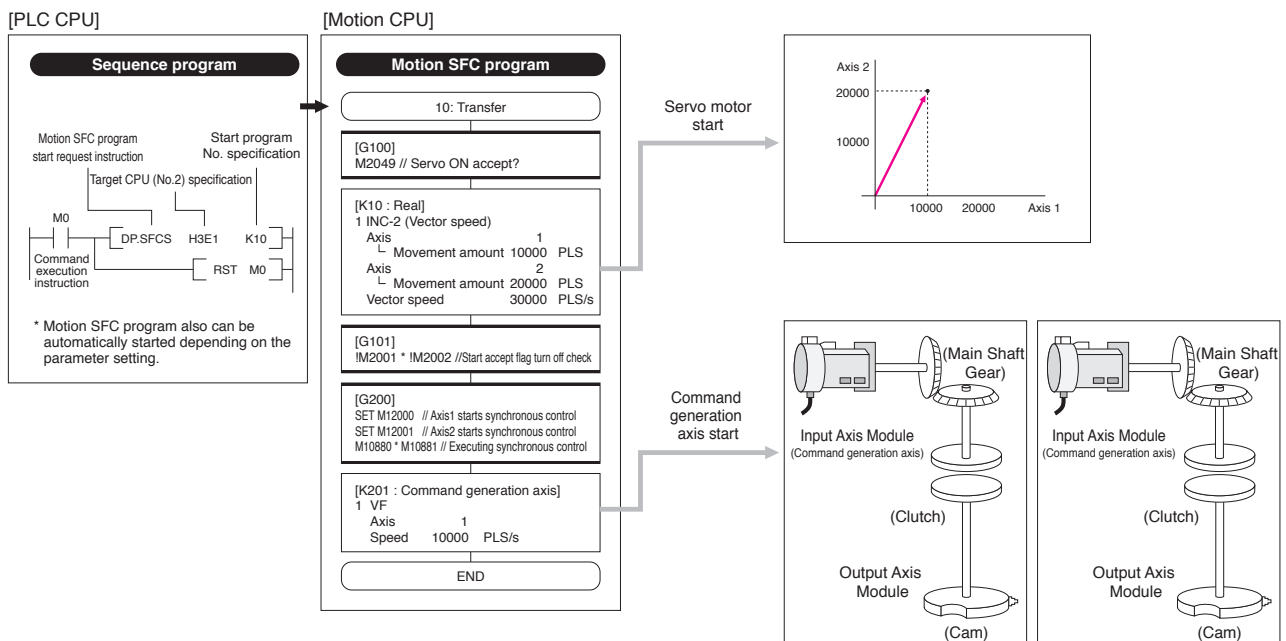
The Multiple CPU high speed transmission cycle is synchronized to the Motion control cycle thus optimizing the control system is achieved.



## Control Flow

Q17nDSCPU

Q170MSCPU





Faster response time enabling shorter cycle time

Q17nDSCPU  
Q170MPCPU

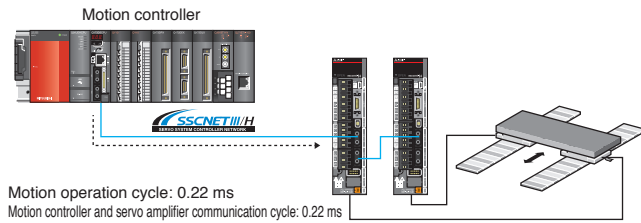
## Operation Cycle of 0.22 ms/4 axes

The Motion operation cycle of 0.22 ms/4 axes is achieved to meet customer needs for a shorter cycle time. Even at an operation cycle of 0.44 ms, up to 10 axes are controlled without losing high response.

[Perfect for smooth curve control]

The command data from the Motion controller is transmitted to the servo amplifier every 0.22 ms. Motion Controller with Servo amplifier (MR-J4-B) and servo motor (HG-KR motor: 4,194,304pulse/rev) achieves the shorter operation cycle and smooth motion.

|           | Operation cycle |         |
|-----------|-----------------|---------|
|           | 0.22 ms         | 0.44 ms |
| Q173DSCPU | 4 axes          | 10 axes |
| Q173DCPU  | —               | 6 axes  |



SSCNET III/H Head module greatly contributing to wire reduction

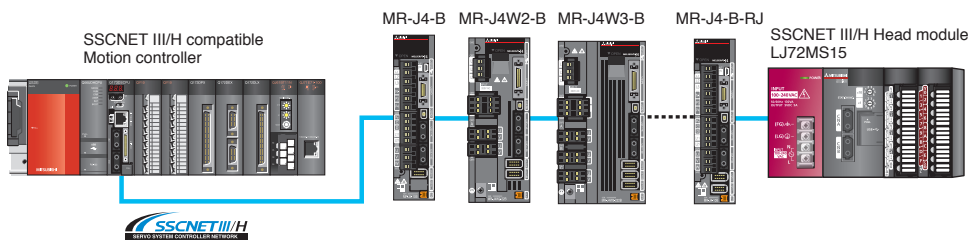
Q17nDSCPU  
Q170MPCPU

## Reduced Wiring, Space Saving

The SSCNET III/H Head module is used to connect the MELSEC-L series I/O module and intelligent function module to the SSCNET III/H.

Functioning as the Motion controller's remote station, a system can be configured flexibly with the I/O modules and intelligent function modules, the system wiring can be reduced, and space can be saved.

In addition, modules mounted on the SSCNET III/H Head module can be used as a Motion controller input/output using cyclic transmission.



Specifications

- Maximum number of stations: 4 stations
- Maximum I/O points per system
  - Input points 256 bytes
  - Output points 256 bytes
- Maximum I/O points per station
  - Input points 64 bytes
  - Output points 64 bytes

Connectable to various modules such as I/O, analog, and high-speed counter.

## Features

Event processing and programming environment have been significantly improved.

## Task Operation Examples of Motion SFC Program (SV13/SV22)

Q17nDSCPU  
Q170MSCPU

The Motion control program is described in flowchart form using the Motion SFC (Sequential Function Chart) format.

- Motion SFC format program is suitable for the event process and controlling sequential machine operation.
- The entire system operation is easily programmed by using the icons such as **F** (Arithmetic Operation, I/O Control), **G** (Transition Conditional judgment) and **K** (Motion Control) where they are arranged in a sequential process.

### Motion SFC description

#### Flowchart description are easy to read and understand

- The machine operation procedure is visualized in the program by using the flowchart descriptions.
- A process control program can be created easily, and control details can be visualized.

#### A logical layered structure program

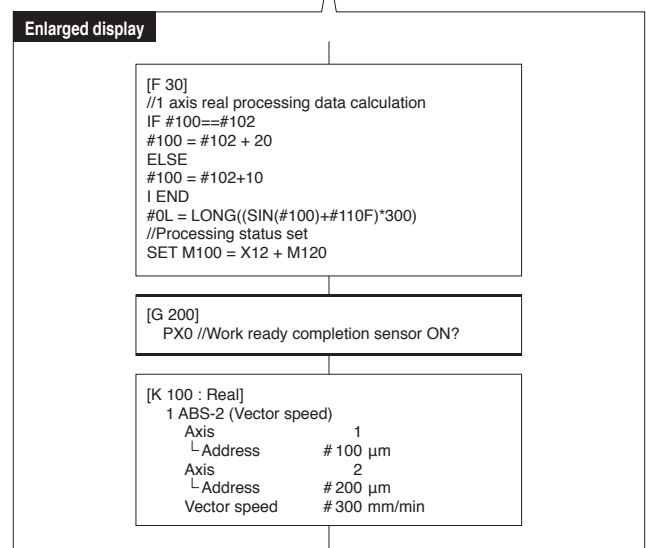
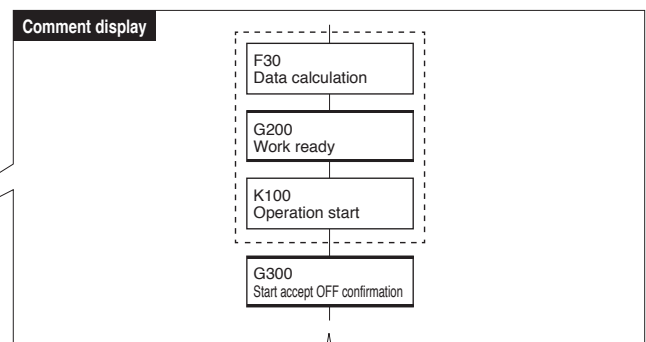
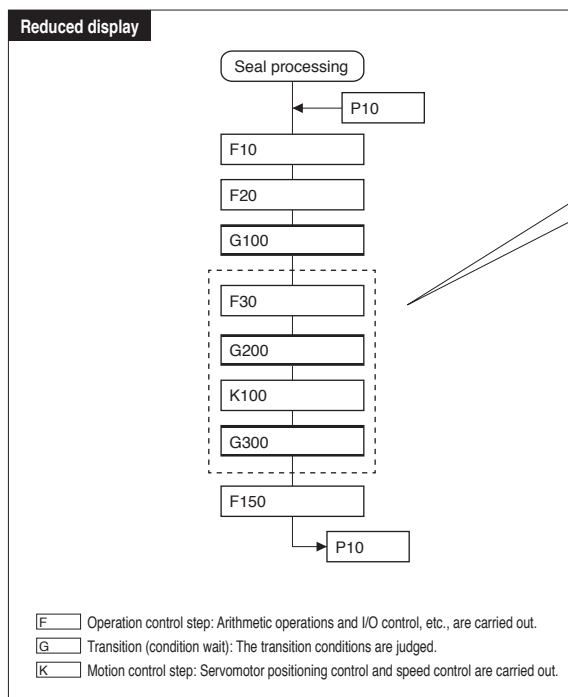
- Operation commands are easily described by creating comments.
- Operation commands are detailed in a step by step format in a layered structure program.

#### Controlling sequential machine operation using the Motion CPU

- Servo control, I/O control, and operation commands can be combined in the Motion SFC program.
- Motion SFC program can execute servo control by itself, eliminating the need of creating the sequence program for servo control.

#### Enhanced operation functions

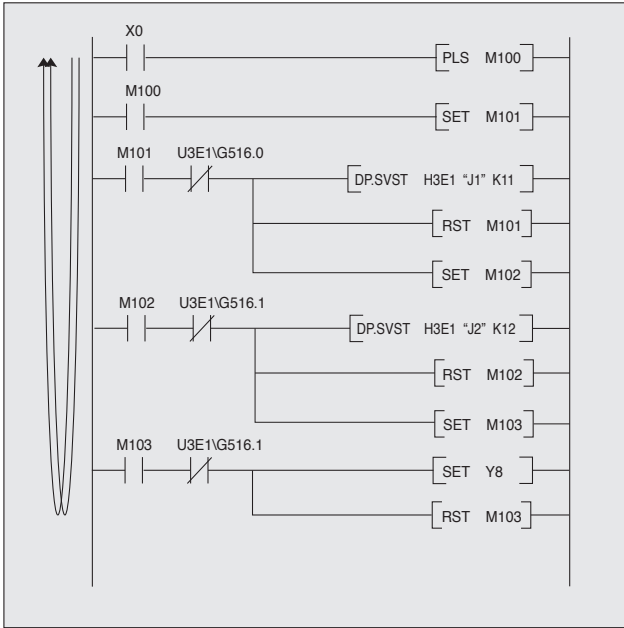
- Commands are able to be described with arithmetic and logic operation expressions.
- Compatible with 64-bit floating-point operations.
- Arithmetic functions include trigonometric functions, square root, natural logarithm, etc.
- The conditional branch (IF ELSE IEND), selective branch (SELECT CASE SEND) and repetition instruction (FOR NEXT) can be described.



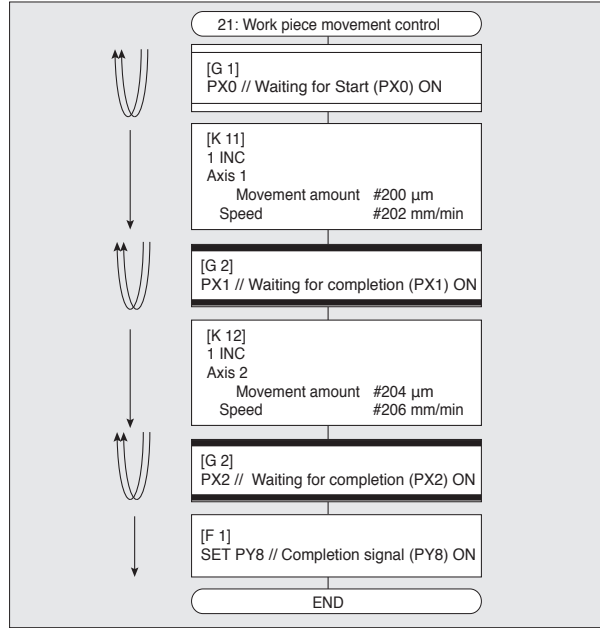
## Motion SFC scanning method

While the sequence program runs using “Scan execution method” where all of the steps are scanned at all times, the Motion SFC program runs using “STEP execution method” where the steps are scanned following the “SHIFT” instruction, which enables to reduce operation process for high-speed processing and high-response control.

### Scanning all the steps in the sequence programs



### Scanning only active steps following the transition conditions in Motion SFC program.



Outline

Motion Controller

Simple Motion Module

Network

Servo Amplifier

Engineering Environment

## Operating System Software (SV22 is pre-installed before shipment.)

Q17nDSCPU

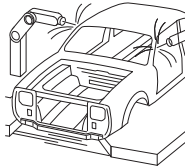
Q170MSCPU

“SV13” for conveyor assembly and “SV22” where the synchronous control is available are provided as the operating system software of Motion controllers. For the synchronous control, you can choose from either “Advanced synchronous control” or the one that uses the mechanical system program. SV22 is pre-installed before shipment.

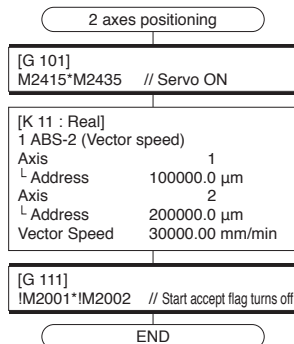
[Automatic machinery use SV22]

### [Conveyor assembly use SV13]

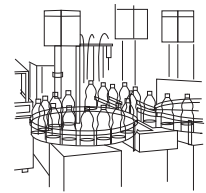
- Electronic component assembly
- Inserter
- Feeder
- Molder
- Conveying equipment
- Loader and Unloader
- Paint applicator
- Bonding machine
- Chip mounting
- X-Y table
- Wafer slicer
- Circular interpolation
- Constant-speed control
- Fixed-pitch feed
- Speed control with fixed position stop
- Speed switching (1 to 4 axes)
- Speed control
- Speed/position switching control (1 to 4 axes)
- Linear interpolation control
- Teaching
- Speed-torque control



### Motion SFC Program



- Press feeder
- Food processing
- Food packaging
- Winding machine
- Spinning machine
- Textile machine
- Knitter
- Printing machine
- Book binder
- Tire molder
- Paper-making machine
- Synchronous control
- Electronic shaft
- Electronic clutch
- Electronic cam
- Draw control
- Speed-torque control



### Advanced Synchronous Control

Synchronous control can be easily executed just by setting the parameters.



### Mechanical System Program

Synchronous control can be achieved just by drag&drop the mechanical modules on screen.

## Features

### Advanced Synchronous Control

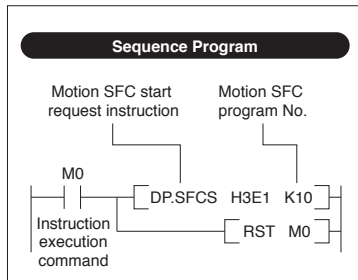
Q17nDSCPU

Q170MSCPU

Started/Stopped on axis-by-axis basis, "Synchronous control" can be executed easily using software instead of controlling mechanically with physical gears, shafts, speed change gears or cam, etc. Additionally, a cam is easily created with the cam auto-generation function. Axes in synchronous control and positioning control can be used together in the program. There are two types of synchronous control, "Advanced synchronous control" and the one using the mechanical system program, and you can select either of them.

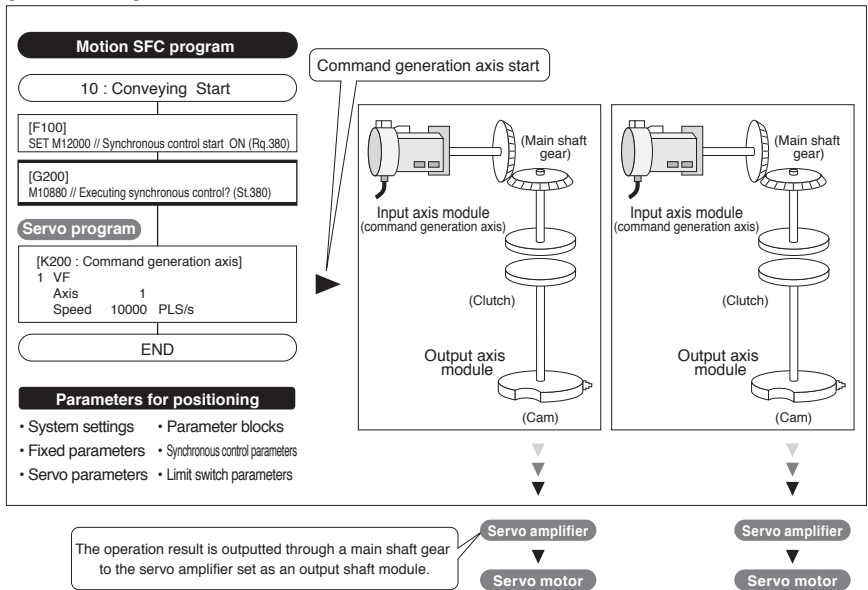
#### Control flow

[PLC CPU]



(Note) Motion SFC program can be also automatically started depending on parameter settings.

[Motion CPU]



The operation result is outputted through a main shaft gear to the servo amplifier set as an output shaft module.

#### Synchronous control parameters

- The synchronous control is easily executed just by setting parameters.
- The movement amount of the main shaft can be transmitted to output axes via the clutch.
- "Command generation axis" is not considered as a control axis; therefore the output axes can be set using all of the available control axes.

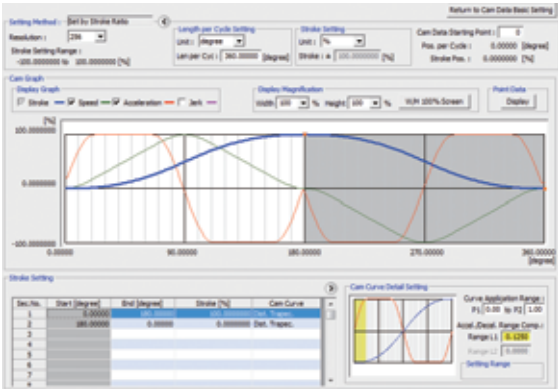
Double-clicking

| Item  | Setting Value                                   |
|---|---|
| <b>Synchronous Control Module Setting</b>   |   |
| Set each module parameter.                  |   |
| <b>Main Shaft</b>                           |   |
| <b>Main Input Axis</b>                      |   |
| Type  | 201:Command Generation Axis                     |
| Axis No.                                    | 0:Invalid                                       |
| <b>Sub Input Axis</b>                       |   |
| Type  | 1:Servo Input Axis                              |
| Axis No.                                    | 201:Command Generation Axis                     |
| Axis No.                                    | 001:Synchronous Encoder Axis                    |
| <b>Main Shaft Composite Gear</b>            |   |
| Main  | 1:Input+  |
| Sub   | 0:No Input                                      |
| <b>Main Shaft Gear</b>                      |   |
| Numerator                                   | 1   |
| Denominator                                 | 1   |
| <b>Main Shaft Clutch</b>                    |   |
| <b>Main Shaft Clutch Control Setting</b>    |   |
| ON Control Mode                             | 1:Clutch Command ON/OFF                         |
| OFF Control Mode                            | 0:OFF Control Invalid                           |
| High-speed Input Request Signal             | 0   |
| Main Shaft Clutch Reference Address Setting | 0:Current Value after Main Shaft Composite Gear |
| Main Shaft Clutch ON Address                | 0 PLS   |
| Travel Value before Main Shaft Clutch ON    | 0 PLS   |
| Main Shaft Clutch OFF Address               | 0 PLS   |
| Travel Value before Main Shaft Clutch OFF   | 0 PLS   |
| Main Shaft Clutch Smoothing System          | 0:Direct  |
| Main Shaft Clutch Smoothing Time Constant   | 0 ms  |
| Slippage at Main Shaft Clutch ON            | 0 PLS   |
| Slippage at Main Shaft Clutch OFF           | 0 PLS   |

**Electronic cam**

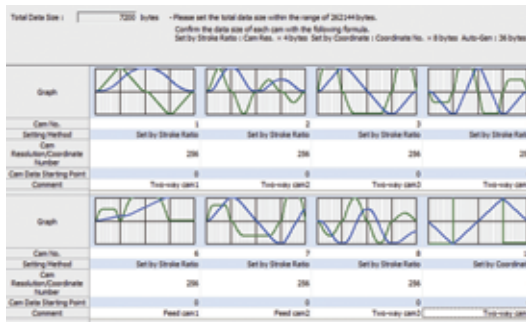
A wide variety of cam patterns can be easily created.

[Cam Data Creation Screen]



- Cam data has been created more freely and flexibly.
- To change the waveform, simply drag and drop it. The graph automatically change according to the pointer's movement.
- Stroke, speed, acceleration, and jump of speed can be set while checking the change of the graph.
- Cam data can be imported and exported in CSV format.

[Cam Data List]

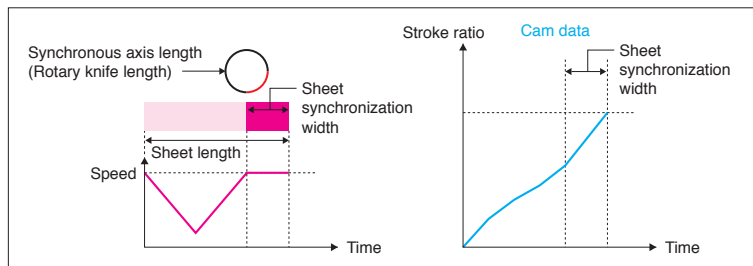
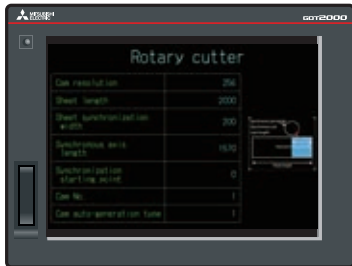


- The created cam data are easily viewed as thumbnails.
- The screen for cam data creation will open by double-clicking the cam data to be edited.

**Cam auto-generation**

The cam auto-generation function can automatically create cam data which is synchronized to the conveyor speed when the rotary knife cuts the material. The function is executed just by setting a sheet length, cam resolution, etc.

[User-created GOT screen example]



**Mechanical System Program**

Q17nDCPU  
Q170MSCPU

The synchronous control using the conventional mechanical system program is also possible.

**Refined synchronous control with simple settings**

[Easy programming with a mouse]

Synchronous control can be easily achieved with a graphical program where the mechanical modules such as a virtual main shafts, gears, clutches and cam are programmed on screen.

- Select and arrange the virtual modules on screen using a mouse, and set the parameters to be used.
- You can easily understand the outline of the synchronous control just by looking at the mechanical system program.
- Synchronous control monitoring is available on the mechanical system program.



Programming screen using mechanical system program

## Features

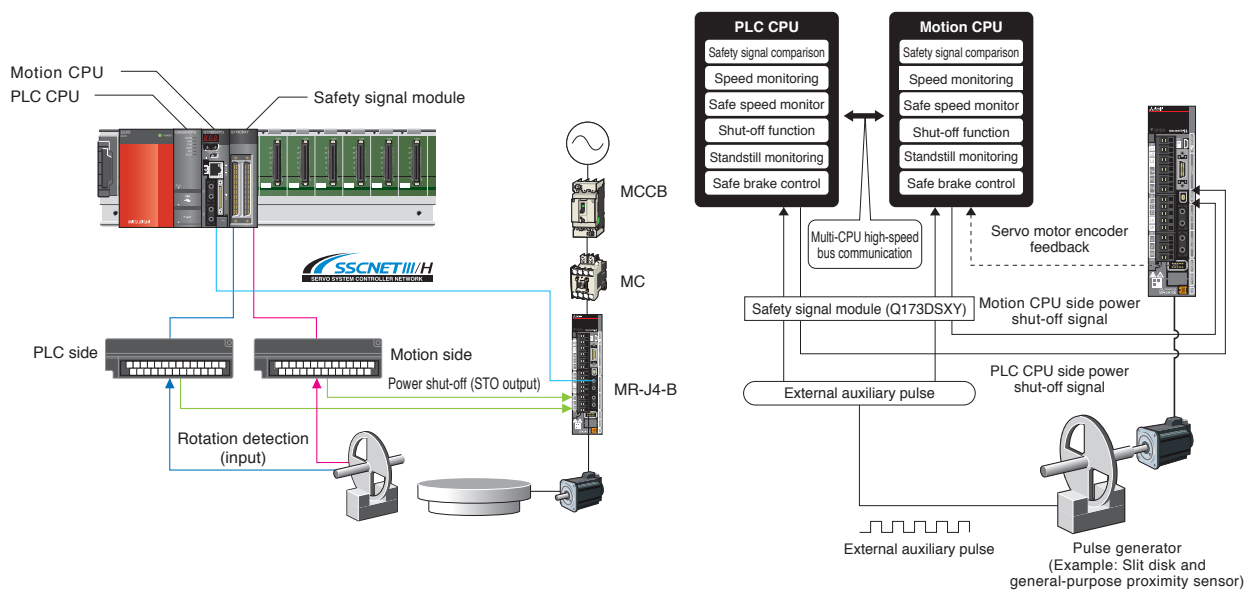
### Safety System

Q17nDSCPU

The safety system is compliant with “EN ISO13849-1:2008 Category 3 PL d” and “EN62061 SIL CL 2” (these standards are harmonized with European Machine Directives). Functional safety (STO, SS1, SS2, SOS, SSM, SBC, SLS) according to IEC61800-5-2 are available as standard, as well as the safety signal comparison function, which confirms the status of the input/output signals by the Motion CPU and the PLC CPU. The operating conditions for these functions are freely programmed by using the PLC CPU and Motion CPU ladder circuits.

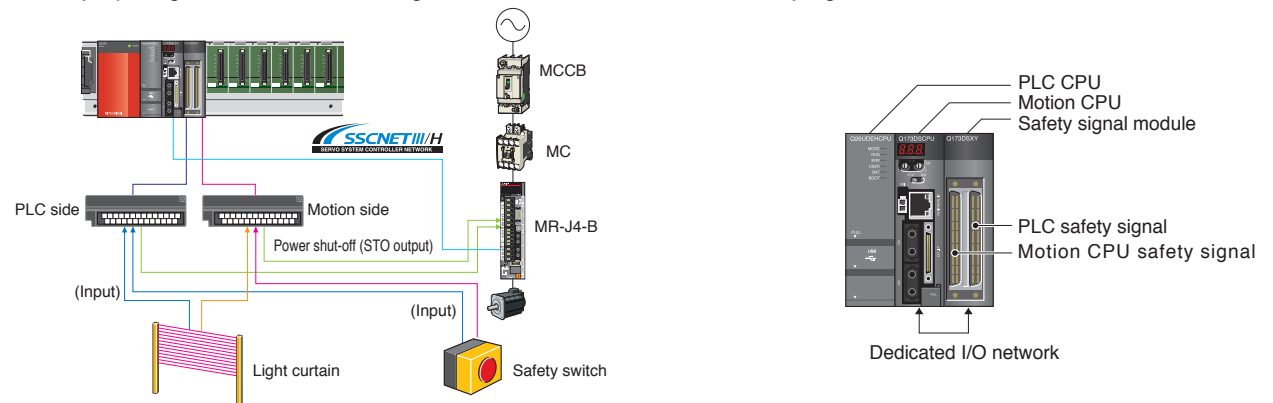
### Speed monitoring function

The motor speed is monitored not to exceed the "Safety Speed" by the Motion CPU and the PLC CPU.



### Safety signal comparison function

The safety input signals are monitored using the Motion CPU, PLC CPU and safety signal module.



|                         |  |
|-------------------------|--|
| PLC CPU                 | QnUD(E)(H)CPU (Note-1)                               |
| Motion CPU              | Q173DSCPU/Q172DSCPU                                  |
| Safety signal module    | Q173DSXY (up to 3 modules can be installed) (Note-2) |
| Number of input points  | Up to 60 points × 2 systems                          |
| Number of output points | Up to 36 points × 2 systems                          |

(Note-1): The safety system is certified by Certification Body only for the combination of Q173DSXY and "QnUD(E)(H)CPU"

(Note-2): All output signal points at the 2nd and 3rd modules can be used as user safety signals.

|        | No. of points | Signal description             |
|--------|---------------|--------------------------------|
| Input  | 20            | User safety signals            |
| Output | 1             | Power shut-off signal (Note-3) |
|        | 11            | User safety signals            |

(Note-3): Power shut-off signal turns: ON when safety signal comparison function status is normal. OFF when error is detected.

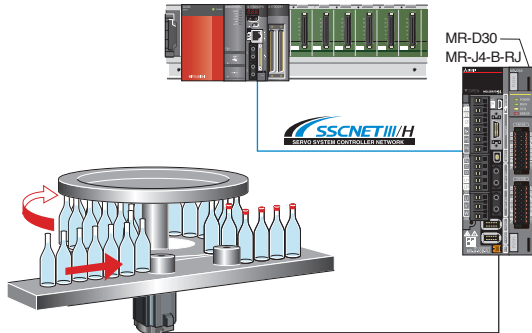
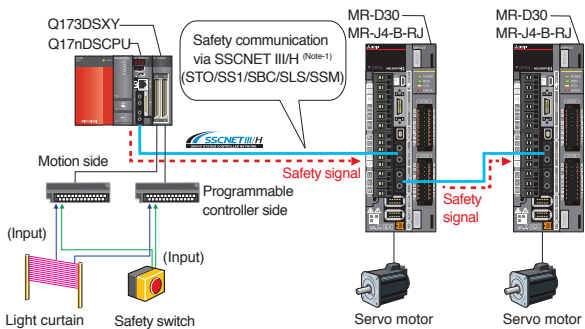
### Safety Communication via SSCNET III/H

Functional safety (STO, SS1, SSM, SBC, SLS) according to IEC 61800-5-2 can be achieved with a combination of MR-J4-B-RJ servo amplifier and MR-D30 functional safety unit. The safety observation function can be easily started up by setting parameters for MR-D30.

The sequence program for the functional safety, created by the Motion controller, is not required when using MR-D30 functional safety unit.

The servo amplifier with software version B3 or later supports the safety observation function.

[The safety signal comparison executed by MR-J4-B-RJ with MR-D30]



The wiring for power shutoff (STO) between the outputs on controller side and the servo amplifier is no longer needed.

Safely-limited speed (SLS) is available without an external pulse generator.

(Note-1): The safety communication via SSCNET III/H complies with IEC 61784-3:2010.

- Outline
- Motion Controller
- Simple Motion Module
- Network
- Servo Amplifier
- Engineering Environment

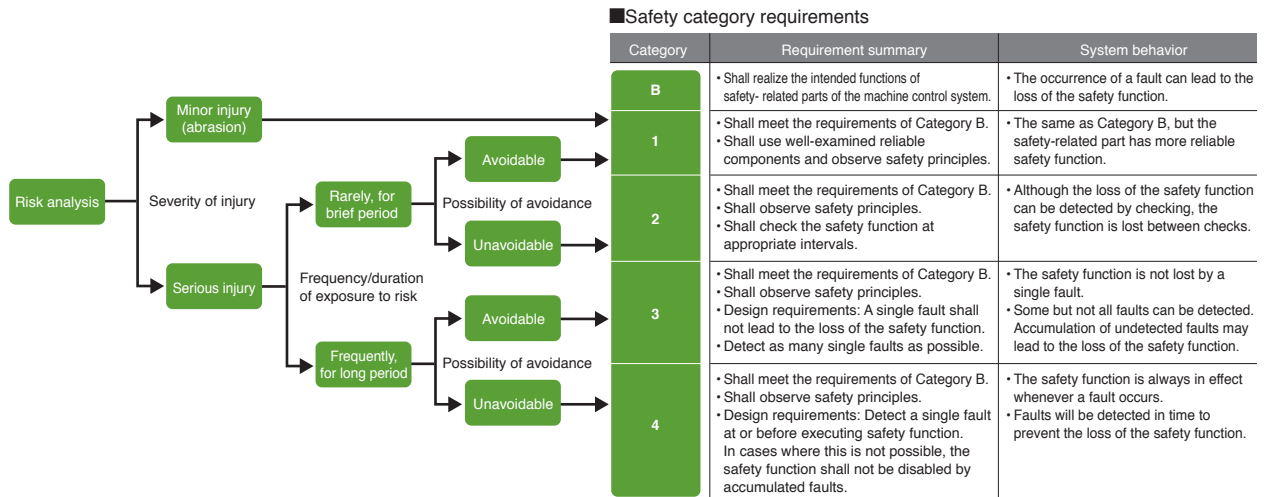
## Features

### Safety Category

Q17nDSCPU

#### ISO13849-1 Safety categories

“Safety categories” are indicators used to determine specific safety measures based on risk assessment results.



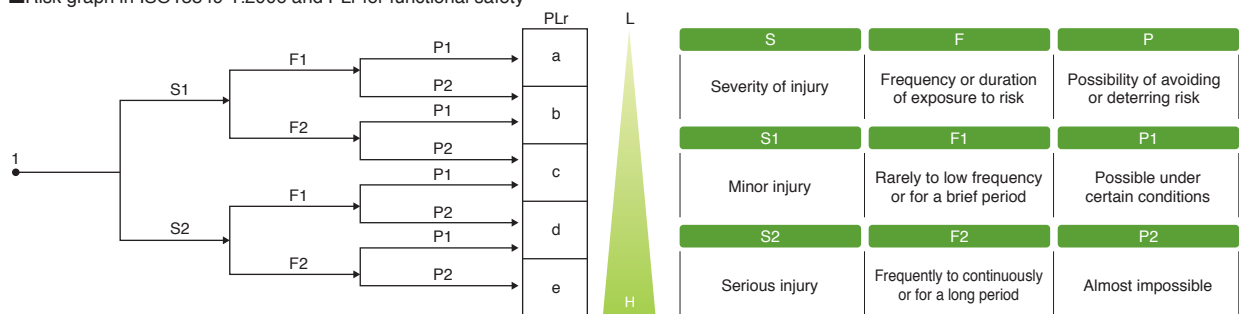
#### ISO13849-1:2006 Performance level

Performance levels for safety-related parts of control systems have been revised in ISO13849-1:2006.

Based on the original safety categories, frequency of a dangerous failure occurrence (the safety function does not work when needed), rate of a failure detection by diagnostics, etc. were added to evaluate comprehensively. The evaluation result is classified into five levels from “a” to “e” by the performance level (PL).

● Like the safety categories, the risk is evaluated from a perspective of “S: Severity of injury,” “F: Frequency or duration of exposure to risk,” and “P: Possibility of avoidance.”

■ Risk graph in ISO13849-1:2006 and PLr for functional safety



#### Safety Category IEC/EN 61800-5-2

These functions are defined as “power drive system electric safety function” in IEC/EN61800-5-2. The functions supported by the Motion controller are listed on the right.

| Item (IEC/EN 61800-5-2:2007) | Description          |
|------------------------------|----------------------|
| STO                          | Safe torque off      |
| SS1                          | Safe stop 1          |
| SS2                          | Safe stop 2          |
| SOS                          | Safe operating stop  |
| SLS                          | Safely-limited speed |
| SBC                          | Safe break control   |
| SSM                          | Safe speed monitor   |



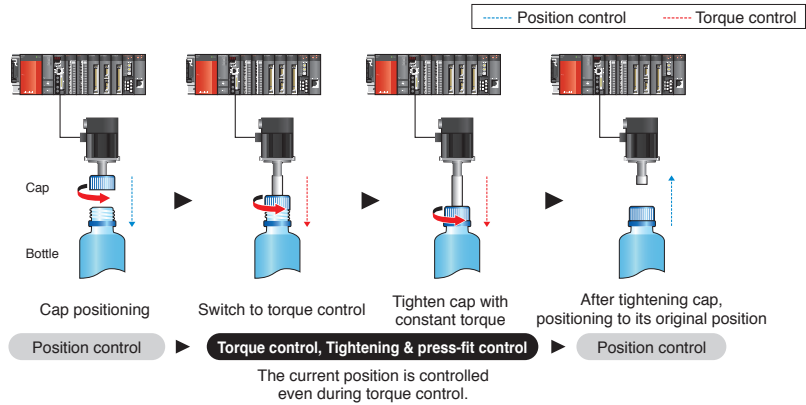
## Speed-Torque Control (Tightening & Press-Fit Control)

Tightening & Press-fit control **Patented**

Q17nDSCPU

Q170MSCPU

Torque control and tightening & press-fit control are available in addition to position control and speed control. Switching the control mode (position control→torque control→position control, as shown on the right) is also possible with the Motion dedicated device. The torque control has two modes: "Torque control" which starts after stopping the movement once to ensure safety, and "Tightening & press-fit control" which starts during the movement. The current position is controlled during both torque control and speed control. Therefore positioning based on the absolute position coordinates is possible even after switching back to position control.



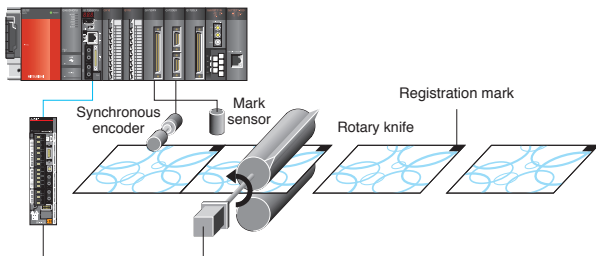
## Mark Detection Function

Q17nDSCPU

Q170MSCPU

The actual position of the servo motor can be obtained based on the inputs from the sensor that detects the registration marks printed on the high-speed moving film. By compensating the rotary knife axis position errors based on those inputs from the sensor, the film can be cut at the set position.

[Position compensation during registration mark detection]

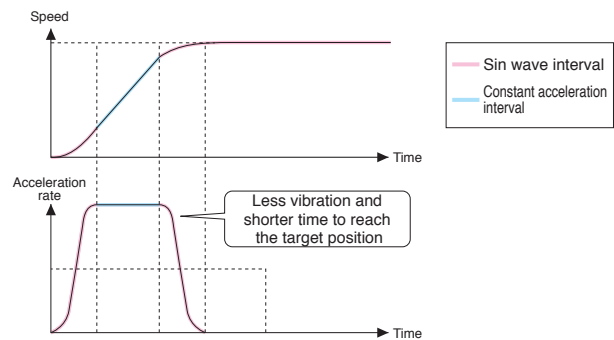


## Advanced S-Curve Acceleration/Deceleration

Q17nDSCPU

Q170MSCPU

The interval ratio between the following two is adjustable: the interval where acceleration rate changes smoothly (Sin wave interval), and the interval where the maximum acceleration rate is maintained (constant acceleration interval). The total acceleration time can be reduced without losing smoothness and high response.

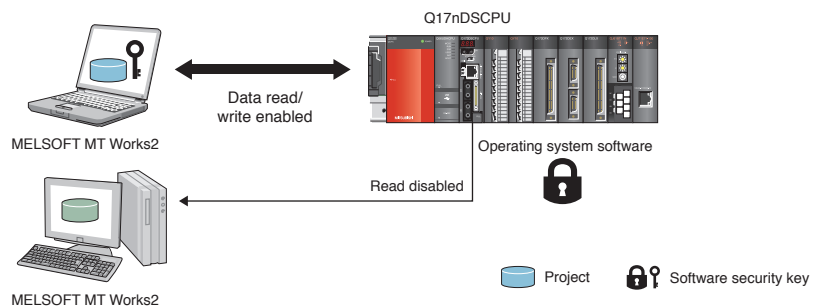


## Software Security Key Function

Q17nDSCPU

Q170MSCPU

User data is protected by setting a software security key to the project and the operating system software "MELSOFT MT Works2". Access of the personal computers and Motion CPU modules to the projects is limited.



## Features

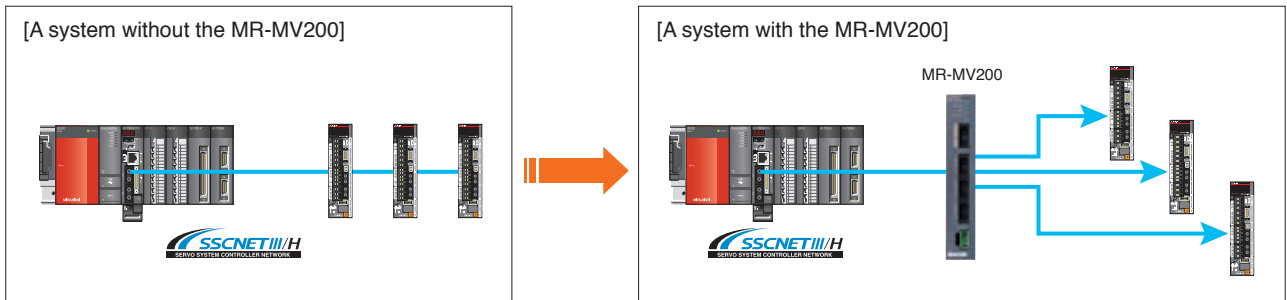
### Optical Hub Unit

Q17nDSCPU

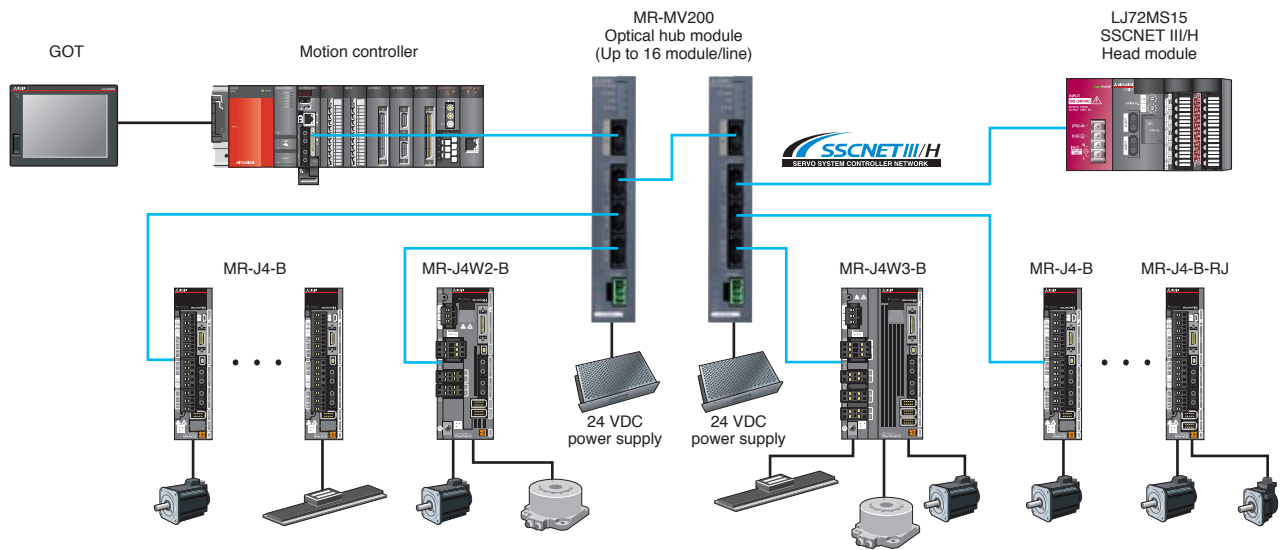
Q170MSCPU

The MR-MV200 can branch a single SSCNET III/H network line in three separate directions. This enables distribution of the high-performance MELSERVO-J4 series servo amplifiers with flexible wiring arrangement.

- The SSCNET connect/disconnect function of the Motion controller allows you to power off only the desired servo amplifiers.
- This unit is introduced just by making some changes in wiring without making any new settings.
- Longer-distance wiring becomes available by using this optical hub unit.



#### [System configuration example]



Note): MELSOFT MT Works2 supports a system using the optical hub unit without any restriction.  
 Note): Be sure to confirm that "SSCNET III/H" is selected in the system setting when introducing the optical hub unit.  
 Note): The MR-MV200 cannot be connected to a "J3 compatible mode" system. Make sure to use it in a "J4 mode" system.

## Various Basic Functions

Q17nDSCPU

Q170MSCPU

### Servo external input signals

The servo external input signals (FLS, RLS, DOG) can be controlled via the bit device or general-purpose input signal in addition to via the servo external signals interface module (Q172DLX) and via the servo amplifier. The logic and the validity of these signals are set individually, which makes these signals more flexible to use.

### Internal input signal (4-point)

The Motion CPU has the internal input signal I/F (max. 4 points) which can be used for the general-purpose input signal or mark detection input signal, etc.

### ROM operation function

Systems can be operated with the programs and parameters stored in the built-in FLASH ROM of the Motion CPU. If the system does not require an absolute position system or latch device, operation can be carried out without a battery.

### Home position return methods

A wide variety of functions, including thirteen home position return methods, the retry function and the shift function etc. are available to establish the home position used as the machine reference point. Select a home position return method according to the machine type.

### Target position change function

The target position can be changed during positioning operation. When compensating the position fluctuation using the data from the vision sensor, etc., the positioning operation to the final compensated position is completed without restarting the positioning.

### Optional data monitor function

Various servo amplifier control data can be monitored by setting the data type or monitor data storage device to the MELSOFT MT Works2 system settings. For the Motion controller with the MR-J4-B, up to six types of data, including power consumption and total power consumption, can be monitored.

### Servo parameter change function

Servo parameters can be individually changed during control operation through the Motion SFC program and etc., without connecting to a personal computer.

### Phase compensation

In synchronous control with a synchronous encoder, the phase compensation function is used to make up the delay time caused by a communication delay in the synchronous encoder data, etc.

### Operation control program

Binary operation, bit operation, type conversion and trigonometric in the Motion SFC comes as standard functions. In addition, more functions are available such as the command for the scaling function that is suitable for calculating coordinate conversions, the cam data reading/writing, and the synchronous control dedicated instruction for cam auto generation. Conditional branching at an operation control step is also available.

### PERIPHERAL I/F (Ethernet)

The Motion CPU has a built-in PERIPHERAL I/F which is designed to be connected to various devices such as the graphic operation terminal, COGNEX vision system with Ethernet etc.

### 4 million pulse synchronous encoder

The "Q171ENC-W8" 4 million (22-bit) pulse synchronous encoder, compatible as standard, greatly improves the synchronous operation accuracy. (16 times higher resolution than conventional model.) High-accuracy control is achieved when used with MR-J4-B (adapting 4 million (22-bit) pulses resolution motors as standard).

### Limit switch output function

Signals can be set to turn ON/OFF within the setting range of the watch data such as the real current value, motor rotation speed or motor current during operation.

### Speed control with fixed position stop

The servo motor is set to rotate at the specified speed and then stops at the specified position when turning ON the command of Speed control with fixed position stop. Both the speed and the duration of acceleration/deceleration can be changed to any value during operation, which is suitable for a spinner, etc.

### Digital oscilloscope function

With the digital oscilloscope function of MELSOFT MT Works2, data collection which is synchronized to the operation cycle and waveform display are available just by following the assistant function. Data of up to 16CH words or bits can be sampled, and of which 8CH words or bits can be displayed in real time.

### Torque limit value change

The torque limit value during positioning or JOG operation is changed easily with the Motion dedicated instruction CHGT. By using the individual change request of torque limit value "CHGT2", the torque limit of driving direction and regeneration direction is possible to set individually.

### Servo amplifier control mode switching function

Control mode switch commands of the gain switching function, PI-PID control and control loop (fully closed, semi-closed) can be executed to the servo amplifier.

### Electronic cam control

The electronic cam control is available with cam data created on MELSOFT MT Works2. Cam control for a degree axis and indirect designation of the number of pulses per cam axis rotation are possible with the Motion CPU.

### Multiple CPU synchronous control

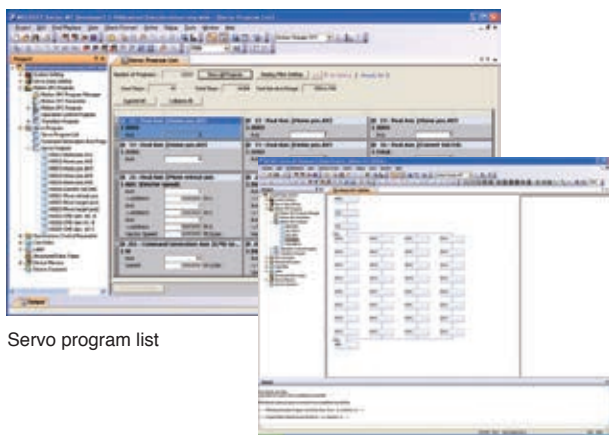
Up to 96 axes can be synchronized by use of three Motion controllers. (available only with Q173DSCPU/Q172DSCPU)

## Comprehensively supporting Motion controller design and maintenance

### Programming

#### User-friendly functions for program development

- Graphical Motion SFC program, mechanical system program
- Label, device comment, cross reference
- Programming with axis label (name)
- Instruction wizard and instruction help eliminate need to refer to manuals.

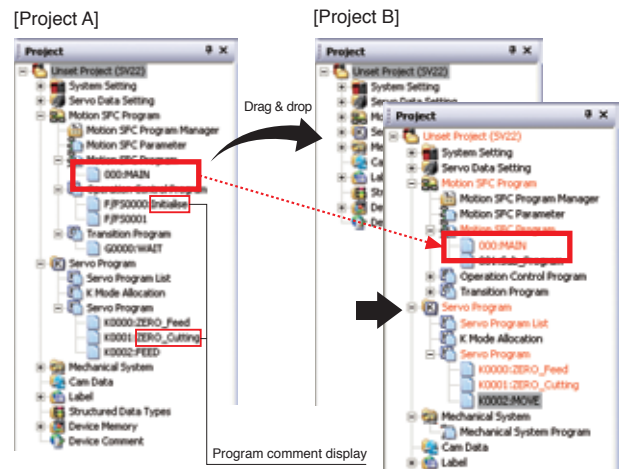


Servo program list

Motion SFC program

#### Easily diverting the existing program

- Easily divert the existing SFC program from the original project to the new project just by drag&drop.
- You can add the program comments to the project tree for easy identification of programs.



### System Design

- You can easily set servo amplifiers and various modules with a graphical system setting screen.
- The one-point help is available to set parameters without manuals.
- The complicated electric gear settings can be completed just by specifying the mechanical configuration (reduction ratio, ball screw pitch, etc.).



SSCNET structure



Servo data



Electronic gear setting

## Setup and Adjustment

### Monitor function

Easy confirmation of the Motion controller operation status with the various monitoring functions.

- Motion SFC program monitor
- Mechanical program monitor
- Current value monitor, positioning monitor, scroll monitor, error history monitor
- Device monitor

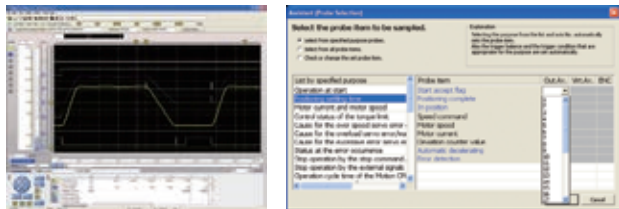


Monitor

### Digital oscilloscope function

Operation check and troubleshooting are powerfully supported with data collection and wave displays which are synchronized to the Motion operation cycle.

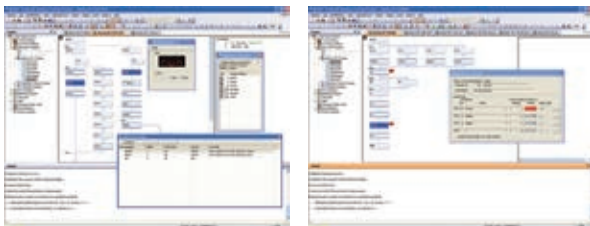
- The assistant function explains all work steps.
- Set often-viewed data easily with the purpose-based probe setting.
- Sample 16CH word and 16CH bit data. Of which, 8CH words and 8CH bits can be displayed in real time.



Digital oscilloscope

### Various test operation functions

- Basic startup can be confirmed without programming with the test mode.
- Simulator function executes the debugging of the Motion SFC program and the advanced synchronous control on desktop without using an actual machine.
- Step execution and brake point setting are possible with the Motion SFC program debug function.

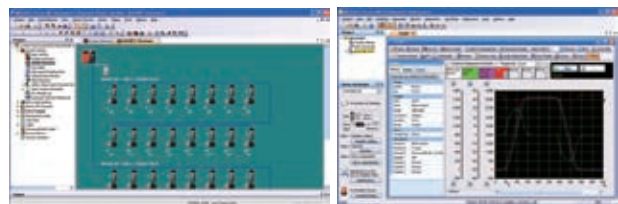


Simulator

Test

### Coordinated with MELSOFT MR Configurator2

- Adjust servo parameters with MELSOFT MR Configurator2, the software created with Mitsubishi Electric servo expertise.
- Adjust multiple axes with a personal computer connected to the controller.
- MELSOFT MR Configurator2 is included in MELSOFT MT Works2.



Graph

## A Variety of Security Options

### Controlling access to project data

- Specify the users who can access to the project to ensure the security.
- Prevent inadvertent editing of the created project data by setting access limits to each registered user.

### Protecting Motion SFC programs

- Display/Not display of program contents can be set for each Motion SFC program by password. This can prevent a program data in project from stealing.

### Controlling access to Motion CPU

- A software security key set to the Motion CPU and personal computer prevents the Motion CPU from unauthorized access.

## Specifications

### Control specification

| Item   | Specifications  |  |   |  |
|--|---|--|---|--|
|  | Q173DSCPU   | Q172DSCPU  | Q170MSCPU-S1  | Q170MSCPU                                    |
| Number of control axes                             | Up to 32 axes (16 axes/system)  |  | Up to 16 axes   |  |
| Operation cycle (Operation cycle setting)          | 0.22 ms, 0.44 ms, 0.88 ms, 1.77 ms, 3.55 ms, 7.11 ms  |  |   |  |
| Interpolation function                             | Linear interpolation (Up to 4 axes), Circular interpolation (2 axes), Helical interpolation (3 axes)  |  |   |  |
| Control modes                                      | PTP (Point to Point) control, Speed control, Speed-position switching control, Fixed-pitch feed control, Constant speed control, Position follow-up control, Speed control with fixed position stop, Speed switching control, High-speed oscillation control, Cam control (SV22), Speed-torque control, Synchronous control (SV22(Advanced synchronous control method/Virtual mode switching method)) |  |   |  |
| Acceleration/deceleration control                  | Trapezoidal acceleration/deceleration, S-curve acceleration/deceleration, Advanced S-curve acceleration/deceleration  |  |   |  |
| Compensation function                              | Backlash compensation, Electronic gear, Phase compensation (SV22)   |  |   |  |
| Programming language                               | Motion SFC, Dedicated instruction, Mechanical support language (SV22)   |  |   |  |
| Servo program capacity                             | 16k steps   |  |   |  |
| Number of positioning points                       | 3200 points (Positioning data can be set indirectly)  |  |   |  |
| Peripheral interface                               | Motion CPU (area)   | PERIPHERAL I/F   |   |  |
|  | PLC CPU (area)  | USB, RS-232, Ethernet  |   | USB, RS-232                                  |
| Home position return function                      | Proximity dog type (2 types), Count type (3 types), Data set type (2 types), Dog cradle type, Stopper type (2 types), Limit switch combined type, Scale home position signal detection type, Dogless home position signal reference type (Home position return re-try function provided, home position shift function provided)   |  |   |  |
| JOG operation function                             | Provided  |  |   |  |
| Manual pulse generator operation function          | Possible to connect 3 modules (Q173DPX use)<br>Possible to connect 1 module (Internal I/F use) <sup>(Note-5)</sup>  |  |   |  |
| Speed-torque control                               | Speed control without positioning loops, Torque control, Tightening & press-fit control   |  |   |  |
| Multiple CPU synchronous control                   | Up to 96 axes (by use of three modules of Q173DSCPU)  |  | -   |  |
| Synchronous encoder operation function             | 12 modules connectable (SV22)<br>(via Q173DPX+Q172DEX+ internal I/F+ device <sup>(Note-6)</sup> + servo amplifier <sup>(Note-6)</sup> )   |  | 12 modules connectable (SV22)<br>(via Q173DPX+ internal I/F+ device <sup>(Note-6)</sup> + servo amplifier <sup>(Note-6)</sup> ) |  |
| M-code function                                    | M-code output function provided, M-code completion wait function provided   |  |   |  |
| Limit switch output function                       | Number of output points: 64 points (Advanced synchronous control method),<br>32 points (Virtual mode switching method (SV13) )<br>Watch data: Motion control data, Word device  |  |   |  |
| ROM operation function                             | Provided  |  |   |  |
| External input signal                              | Q172DLX (FLS, RLS, STOP, DOG) ,<br>External input signals (FLS, RLS, DOG) of servo amplifier, Internal I/F(DI), Bit device  |  |   |  |
| High-speed reading function <sup>(Note-6)</sup>    | Available<br>(Via built-in interface in Motion CPU, input module, tracking of Q172DEX/Q173DPX)  |  | Available<br>(Via built-in interface in Motion CPU, input module, tracking of Q173DPX)  |  |
| Mark detection function                            | Mark detection signal   | Continuous Detection mode, Specified Number of Detections mode, Ring Buffer mode |   |  |
|  | Mark detection setting  | 4 points (Via Internal I/F), Bit device, Q172DLX (DOG)                           |   |  |
| Torque limit value change function                 | 32  |  |   |  |
| Torque limit value change function                 | Positive direction torque limit value, Negative direction torque limit value  |  |   |  |
| Target position change function                    | Provided  |  |   |  |
| Servo parameter change function                    | Provided  |  |   |  |
| Servo amplifier control mode switching function    | Gain switching function, PI-PID control, Control loop changing (semi closed loop control, fully closed loop control)  |  |   |  |
| Optional data monitor function                     | Up to 6 data/axis (MR-J4-B with SSCNET III/H use)   |  |   |  |
| Forced stop  | Motion controller forced stop (EMI terminal, System setting), Forced stop terminal of servo amplifier   |  |   |  |
| Number of input/output points                      | Total of 256 points (Internal I/F (4 input points) + I/O module+ Intelligent function module)   |  | Total of 256 points (Internal I/F (4 input points + 2 output points) + I/O module+ Intelligent function module)                 |  |
| Clock function                                     | Provided  |  |   |  |
| Security function                                  | Password registration, Password for every Motion SFC program, Software security key function  |  |   |  |
| All clear function                                 | Delete all user data in Motion CPU  |  |   |  |
| Remote operation                                   | Remote RUN/STOP, Remote latch clear   |  |   |  |
| Digital oscilloscope function                      | Bit data: 16 channels, Word data: 16 channels <sup>(Note-4)</sup>   |  |   |  |
| Driver communication function                      | Provided  |  |   |  |
| Amplifier-less operation function                  | Provided  |  |   |  |
| Absolute position system                           | Made compatible by setting battery to servo amplifier.<br>(Possible to select the absolute data method or incremental method for each axis)   |  |   |  |
| Number of SSCNET III/H systems <sup>(Note-1)</sup> | 2 systems   |  | 1 system  | 1 system                                     |
| Number of Motion modules                           | Q172DLX 4 modules usable  |  | Q172DLX 2 modules usable  | Q172DLX 2 modules usable                     |
|  | Q172DEX 6 modules usable <sup>(Note-2)</sup>  |  | Q172DEX 6 modules usable <sup>(Note-2)</sup>  | Q173DPX 4 modules usable <sup>(Note-3)</sup> |
|  | Q173DPX 4 modules usable <sup>(Note-3)</sup>  |  | Q173DPX 4 modules usable <sup>(Note-3)</sup>  |  |

(Note-1): The SSCNET III compatible servo amplifier can be used, but the SSCNET compatible servo amplifier cannot be used.

(Note-2): Q172DEX cannot be used in SV13.

(Note-3): This is the case of using an incremental synchronous encoder (SV22 used). When using a manual pulse generator, only one module are allowed to use.

(Note-4): 8CH word data and 8CH bit data can be displayed in real time.

(Note-5): The Q173DPX and internal interface cannot be used simultaneously.

(Note-6): Advanced synchronous control only.

■ Motion SFC performance specification

| Item  |  | Specifications  |  |   |           |
|---|--|---|--|---|-----------|
|   |  | Q173DSCPU   | Q172DSCPU  | Q170MSCPU-S1  | Q170MSCPU |
| Motion SFC program capacity                                     | Code total (Motion SFC chart + Operation control + Transition)                   | 652k bytes  |  |   |           |
|   | Text total (Operation control + Transition)                                      | 668k bytes  |  |   |           |
| Motion SFC program  | Number of Motion SFC programs  | 256 (No.0 to 255)   |  |   |           |
|   | Motion SFC chart size/program  | Up to 64k bytes (Included Motion SFC chart comments)  |  |   |           |
|   | Number of Motion SFC steps/program   | Up to 4094 steps  |  |   |           |
|   | Number of selective branches/branch  | 255   |  |   |           |
|   | Number of parallel branches/branch   | 255   |  |   |           |
|   | Parallel branch nesting  | Up to 4 levels  |  |   |           |
| Operation control program (F/FS)<br>/<br>Transition program (G) | Number of operation control programs   | 4096 with F (Once execution type) and FS (Scan execution type) combined (F/FS0 to F/FS4095)                       |  |   |           |
|   | Number of transition programs  | 4096 (G0 to G4095)  |  |   |           |
|   | Code size/program  | Up to approx. 64k bytes (32766 steps)   |  |   |           |
|   | Number of blocks(line)/program   | Up to 8192 blocks (In the case of 4 steps (min)/block)  |  |   |           |
|   | Number of characters/block   | Up to 128 (Comment included)  |  |   |           |
|   | Number of operand/block  | Up to 64 (Operand: Constants, Word devices, Bit devices)  |  |   |           |
|   | ( ) nesting/block  | Up to 32 levels   |  |   |           |
|   | Descriptive expression   | Operation control program   | Calculation expression, Bit conditional expression and branches, Repetition process IF ~ ELSE ~ IEND, SELECT ~ CASE ~ SEND, FOR ~ NEXT |   |           |
| Transition program  |  | Calculation expression, bit conditional expression, comparison conditional expression                             |  |   |           |
| Execute specification   | Number of multi executed programs  | Up to 256   |  |   |           |
|   | Number of multi active steps   | Up to 256 steps per all programs<br>Executed in Motion main cycle   |  |   |           |
|   | Executed task  | Normal task   |  |   |           |
|   |  | Event task<br>(Execution can be masked.)  | Fixed cycle  | Executed in fixed cycle (0.22 ms, 0.44 ms, 0.88 ms, 1.77 ms, 3.55 ms, 7.11 ms, 14.2 ms) |           |
|   |  |   | External interrupt   | Executed when input ON is set among the input 16 points of interrupt module QI60        |           |
|   |  |   | PLC interrupt  | Executed with interrupt instruction (D (P).GINT) from PLC CPU                           |           |
| NMI task  | Executed when input ON is set among the input 16 points of interrupt module QI60 |   |  |   |           |
| Number of I/O points (X/Y)                                      |  | 8192 points   |  |   |           |
| Number of real I/O points (PX/PY)                               |  | 256 points  |  |   |           |
| Number of devices   | Internal relays (M)  | 12288 points  |  |   |           |
|   | Link relays (B)  | 8192 points   |  |   |           |
|   | Annunciators (F)   | 2048 points   |  |   |           |
|   | Special relays (SM)  | 2256 points   |  |   |           |
|   | Data registers (D)   | 19824 points (advanced synchronous control method),<br>8192 points (Virtual mode switching control method (SV13)) |  |   |           |
|   | Link registers (W)   | 8192 points   |  |   |           |
|   | Special registers (SD)   | 2256 points   |  |   |           |
|   | Motion registers (#)   | 12288 points  |  |   |           |
|   | Coasting timers (FT)   | 1 point (888μs)   |  |   |           |
|   | Multiple CPU shared device (U□\G)  | Up to 14336 points <sup>(Note-1)</sup>  |  |   |           |

(Note-1): The number of usable points will differ depending on the system settings.

## Specifications

### Advanced synchronous control specifications

#### Synchronous control

| Item                           |                          | Number of settable axes |                |              |           |
|--------------------------------|--------------------------|-------------------------|----------------|--------------|-----------|
|                                |                          | Q173DSCPU               | Q172DSCPU      | Q170MSCPU-S1 | Q170MSCPU |
| Input axis                     | Servo input axis         | 32 axes/module          | 16 axes/module |              |           |
|                                | Command generation axis  | 32 axes/module          | 16 axes/module |              |           |
|                                | Synchronous encoder axis | 12 axes/module          |                |              |           |
| Composite main shaft gear      |                          | 1/output axis           |                |              |           |
| Main shaft main input axis     |                          | 1/output axis           |                |              |           |
| Main shaft sub input axis      |                          | 1/output axis           |                |              |           |
| Main shaft gear                |                          | 1/output axis           |                |              |           |
| Main shaft clutch              |                          | 1/output axis           |                |              |           |
| Auxiliary shaft                |                          | 1/output axis           |                |              |           |
| Auxiliary shaft gear           |                          | 1/output axis           |                |              |           |
| Auxiliary shaft clutch         |                          | 1/output axis           |                |              |           |
| Composite auxiliary shaft gear |                          | 1/output axis           |                |              |           |
| Speed change gear              |                          | 2/output axis           |                |              |           |
| Output axis (Cam axis)         |                          | 32 axes/module          | 16 axes/module |              |           |

#### Cam control

| Item                   |                           |                   | Specifications   |           |              |           |
|------------------------|---------------------------|-------------------|--|-----------|--------------|-----------|
|                        |                           |                   | Q173DSCPU  | Q172DSCPU | Q170MSCPU-S1 | Q170MSCPU |
| Memory capacity        | Storage area for cam data |                   | 256k bytes   |           |              |           |
|                        | Working area for cam data |                   | 1024k bytes  |           |              |           |
| Number of registration |                           |                   | Up to 256 program items (depending on memory capacity, cam resolution and number of coordinates) |           |              |           |
| Comment                |                           |                   | Up to 32 characters for each cam data  |           |              |           |
| Cam data               | Stroke ratio data type    | Cam resolution    | 256, 512, 1024, 2048, 4096, 8192, 16384, 32768   |           |              |           |
|                        |                           | Stroke ratio      | -214.7483648 to 214.7483647 [%]  |           |              |           |
|                        | Coordinate data type      | Coordinate number | 2 to 16384   |           |              |           |
|                        |                           | Coordinate data   | Input value : 0 to 2147483647<br>Output value : -2147483648 to 2147483647                        |           |              |           |
| Cam auto-generation    |                           |                   | Cam for rotary knife, Easy stroke ratio cam  |           |              |           |

### Mechanical system program (SV22)

| Item                      |                      |   | Specifications          |           |              |           |           |           |           |           |
|---------------------------|----------------------|---|-------------------------|-----------|--------------|-----------|-----------|-----------|-----------|-----------|
|                           |                      |   | Q173DSCPU               | Q172DSCPU | Q170MSCPU-S1 | Q170MSCPU | Q170MSCPU | Q170MSCPU | Q170MSCPU | Q170MSCPU |
| Control unit              | Drive module         | Virtual servo motor   | pulse                   |           |              |           |           |           |           |           |
|                           |                      | Synchronous encoder   | pulse                   |           |              |           |           |           |           |           |
|                           | Output module        | Roller  | mm, inch                |           |              |           |           |           |           |           |
|                           |                      | Ball screw  | mm, inch                |           |              |           |           |           |           |           |
|                           |                      | Rotary table  | Fixed as "degree"       |           |              |           |           |           |           |           |
|                           |                      |   | mm, inch, degree, pulse |           |              |           |           |           |           |           |
| Mechanical system program | Drive module         | Virtual servo motor   | 32                      | Total 44  | 16           | Total 28  | 16        | Total 28  | 16        | Total 28  |
|                           |                      | Synchronous encoder   | 12                      |           | 12           |           | 12        |           | 12        |           |
|                           | Virtual axis         | Virtual main shaft  | 32                      | Total 64  | 16           | Total 32  | 16        | Total 32  | 16        | Total 32  |
|                           |                      | Virtual auxiliary input axis  | 32                      |           | 16           |           | 16        |           | 16        |           |
|                           | Transmission module  | Gear <sup>(Note-1)</sup>  | 64                      |           | 32           |           |           |           |           |           |
|                           |                      | Clutch <sup>(Note-1)</sup>  | 64                      |           | 32           |           |           |           |           |           |
|                           |                      | Speed change gear <sup>(Note-1)</sup>                                     | 64                      |           | 32           |           |           |           |           |           |
|                           |                      | Differential gear <sup>(Note-1)</sup>                                     | 32                      |           | 16           |           |           |           |           |           |
|                           |                      | Differential gear (Connect to the virtual main shaft) <sup>(Note-2)</sup> | 32                      |           | 16           |           |           |           |           |           |
|                           | Output module        | Roller  | 32                      | Total 32  | 16           | Total 16  | 16        | Total 16  | 16        | Total 16  |
|                           |                      | Ball screw  | 32                      |           | 16           |           | 16        |           | 16        |           |
|                           |                      | Rotary table  | 32                      |           | 16           |           | 16        |           | 16        |           |
|                           |                      | Cam   | 32                      |           | 16           |           | 16        |           | 16        |           |
| Cam                       | Types                |   | Up to 256               |           |              |           |           |           |           |           |
|                           | Resolution per cycle |   | 256, 512, 1024, 2048    |           |              |           |           |           |           |           |
|                           | Memory capacity      |   | 132k bytes              |           |              |           |           |           |           |           |
|                           | Stroke resolution    |   | 32767                   |           |              |           |           |           |           |           |
|                           | Control mode         |   | Two-way cam, Feed cam   |           |              |           |           |           |           |           |

(Note-1): Use only one module for one output module. (one gear, clutch, speed change gear or differential gear module for one output module).

(Note-2): The differential gears connected to the virtual main shaft can be used only one module per one main shaft.



## ■ Performance specification of PLC CPU control area (Q170MSCPU(-S1))

| Item   |  | Specifications   |                        |
|--|--|--|------------------------|
|  |  | Q170MSCPU-S1   | Q170MSCPU              |
| PLC CPU area   |  | Q06UDHCPU or equivalent  | Q03UDCPU or equivalent |
| Control method   |  | Stored program repeat operation  |                        |
| I/O control mode   |  | Refresh mode   |                        |
| Sequence control language  |  | Relay symbol language (ladder), Logic symbolic language (list),<br>MELSP3 (SFC), MELSP-L, Structured text (ST) |                        |
| Processing speed<br>(Sequence instruction)   | LD instruction   | 9.5ns  | 20ns                   |
|  | MOV instruction  | 19ns   | 40ns                   |
|  | PC MIX value (instruction/μs)  | 60   | 28                     |
|  | Floating point addition  | 0.057μs  | 0.12μs                 |
| Total number of instructions   |  | 858  |                        |
| Operation (floating point operation) instruction   |  | Yes  |                        |
| Character string processing instruction  |  | Yes  |                        |
| PID instruction  |  | Yes  |                        |
| Special function instruction<br>(Trigonometric function, square root, exponential operation, etc.) |  | Yes  |                        |
| Constant scan  |  | 0.5 to 2000ms (setting available in units of 0.5ms)  |                        |
| Program capacity   |  | 60k steps (240 kbytes)   | 30k steps (120 kbytes) |
| CPU shared memory  | QCPU standard memory   | 8k bytes   |                        |
|  | Multiple CPU high speed transmission area                                    | 32k bytes  |                        |
| Number of I/O device points [X/Y]  |  | 8192 points  |                        |
| Number of I/O points [X/Y]   |  | 4096 points  |                        |
| Internal relay [M]   | Points by default<br>(Changeable by parameter)                               | 8192 points  |                        |
| Latch relay [L]  |  | 8192 points  |                        |
| Link relay [B]   |  | 8192 points  |                        |
| Timer [T]  |  | 2048 points  |                        |
| Retentive timer [ST]   |  | 0 points   |                        |
| Counter [C]  |  | 1024 points  |                        |
| Data register [D]  |  | 12288 points   |                        |
| Link register [W]  |  | 8192 points  |                        |
| Annunciator [F]  |  | 2048 points  |                        |
| Edge relay [V]   |  | 2048 points  |                        |
| Link special relay [SB]  |  | 2048 points  |                        |
| Link special register [SW]   |  | 2048 points  |                        |
| File register [R, ZR]  |  | 393216 points  | 98304 points           |
| Step relay [S]   |  | 8192 points  |                        |
| Index register/Standard device register [Z]  | 20 points  |  |                        |
| Index register [Z]<br>(32-bit modification specification of ZR indexing)                           | Up to 10 points (Z0 to Z18)<br>(Index register [Z] is used in double words.) |  |                        |
| Pointer [P]  | 4096 points  |  |                        |
| Interrupt pointer [I]  | 256 points   |  |                        |
| Special relay [SM]   | 2048 points  |  |                        |
| Special register [SD]  | 2048 points  |  |                        |
| Function input [FX]  | 16 points  |  |                        |
| Function output [FY]   | 16 points  |  |                        |
| Function register [FD]   | 5 points   |  |                        |
| Local device   | Yes  |  |                        |
| Device initial values  | Yes  |  |                        |
| Extension base unit  | Up to 7 (up to 64 slots)   |  |                        |
| PC type when program is made by GX Works2  |  | Q06UDHCPU  | Q03UDCPU               |

## Specifications

### Module specification

#### Motion CPU module Q173DSCPU / Q172DSCPU



| Item  |  | Specifications  |                         |
|---|--|---|-------------------------|
|   |  | Q173DSCPU   | Q172DSCPU               |
| Number of control axes  |  | Up to 32 axes   | Up to 16 axes           |
| Servo amplifier connection system                             |  | SSCNET III/H (2 systems)  | SSCNET III/H (1 system) |
| Maximum overall cable distance [m(ft.)]                       |  | SSCNET III/H : 1600 (5249.34), SSCNET III : 800 (2624.67)   |                         |
| Maximum distance between stations [m(ft.)]                    |  | SSCNET III/H : 100 (328.08), SSCNET III : 50 (164.04)   |                         |
| Peripheral I/F  |  | PERIPHERAL I/F (Motion CPU), USB/RS-232/Ethernet (Via PLC CPU)  |                         |
| Manual pulse generator operation function                     |  | Possible to connect 3 modules   |                         |
| Synchronous encoder operation function                        |  | Possible to connect 12 modules <sup>(Note-1)</sup> (SV22 use)   |                         |
| Controllable modules  | Q172DLX  | Up to 4 modules per CPU   | Up to 2 modules per CPU |
|   | Q172DEX  | Up to 6 modules per CPU (SV22 use)  |                         |
|   | Q173DPX  | Up to 4 modules per CPU (Incremental synchronous encoder use in SV22)   |                         |
|   | Q173DSXY   | Up to 1 module per CPU (Only manual pulse generator use)  |                         |
|   | Input/output module                                      | Up to 3 modules   |                         |
|   | Analogue module  | Total : Up to 256 points per CPU  |                         |
| QI60  |  | Up to 1 module per CPU  |                         |
| Input signal  | Number of input points                                   | 4 points  |                         |
|   | Input method   | Positive Common/ Negative Common Shared Type (Photocoupler isolation)   |                         |
|   | Rated input voltage/current                              | 24VDC/Approx. 5 mA  |                         |
|   | Operating voltage range                                  | 21.6 to 26.4VDC (24VDC $\pm$ 10%, ripple ratio 5% or less)  |                         |
|   | ON voltage/current                                       | 17.5VDC or more/3.5mA or more   |                         |
|   | OFF voltage/current                                      | 5VDC or less/0.9mA or less  |                         |
|   | Input resistance   | Approx. 5.6k $\Omega$   |                         |
|   | Response time  | 1ms or less (OFF $\rightarrow$ ON, ON $\rightarrow$ OFF)  |                         |
| Recommended wire size   |  | AWG18 to AWG22  |                         |
| Forced stop input signal                                      | Number of input points                                   | 1 point   |                         |
|   | Input method   | Sink/ Source (Photocoupler isolation)   |                         |
|   | Rated input voltage/current                              | 24VDC/Approx. 2.4 mA  |                         |
|   | Operating voltage range                                  | 20.4 to 26.4 VDC (+10/-15 %, ripple ratio 5 % or less)  |                         |
|   | ON voltage/current                                       | 17.5 VDC or more/ 2.0 m A or more   |                         |
|   | OFF voltage/current                                      | 1.8 VDC or less/ 0.18m A or less  |                         |
|   | Input resistance   | Approximately 10k $\Omega$  |                         |
| Response time   | 1ms or less (OFF $\rightarrow$ ON, ON $\rightarrow$ OFF) |   |                         |
| Recommended wire size   |  | AWG22   |                         |
| Manual pulse generator/incremental synchronous encoder signal | Signal input form  | Phase A/ Phase B (magnification by 4)   |                         |
|   | Input frequency  | Up to 1Mpps (After magnification by 4, up to 4Mpps) (Differential-output type)<br>Up to 200kpps (After magnification by 4, up to 800kpps) (Voltage-output/Open-collector type ) |                         |
| Extension base unit   |  | Up to 7   |                         |
| 5VDC internal current consumption [A]                         |  | 1.75  | 1.44                    |
| Mass [kg]   |  | 0.38  |                         |
| Exterior dimensions [mm(inch)]                                |  | 120.5 (4.74)(H) $\times$ 27.4 (1.08)(W) $\times$ 120.3 (4.74)(D)  |                         |

(Note-1): Up to 12 of manual pulse generators and synchronous encoders can be used in total.

## Stand-alone Motion controller Q170MSCPU / Q170MSCPU-S1



| Item  | Specifications  |   |
|---|---|---|
|   | Q170MSCPU-S1  | Q170MSCPU   |
| Number of control axes  | Up to 16 axes   |   |
| Servo amplifier connection system                             | SSCNET III/H (1 system)   |   |
| Maximum overall cable distance [m(ft.)]                       | SSCNET III/H : 1600 (5249.34), SSCNET III : 800 (2624.67)                   |   |
| Maximum distance between stations [m(ft.)]                    | SSCNET III/H : 100 (328.08), SSCNET III : 50 (164.04)                       |   |
| Peripheral I/F  | PERIPHERAL I/F (Motion CPU control area), USB/RS-232 (PLC CPU control area) |   |
| Manual pulse generator operation function                     | Possible to connect 3 modules   |   |
| Synchronous encoder operation function                        | Possible to connect 12 modules <sup>(Note-1)</sup> (SV22 use)               |   |
| Controllable modules  | Q172DLX   | Up to 2 modules per CPU   |
|   | Q173DPX   | Up to 4 modules per CPU (Incremental synchronous encoder use in SV22)   |
|   |   | Up to 1 module per CPU (Only manual pulse generator use)  |
|   | Input/output module   | Total : Up to 256 points per CPU  |
|   | Analogue module   |   |
| QI60  | Up to 1 module per CPU  |   |
| Input signal  | Number of input points  | 4 points  |
|   | Input method  | Positive Common/ Negative Common Shared Type (Photocoupler isolation)   |
|   | Rated input voltage/current   | 24VDC/ Approx. 5mA  |
|   | Operating voltage range   | 21.6 to 26.4VDC (24VDC $\pm$ 10%, ripple ratio 5% or less)  |
|   | ON voltage/current  | 17.5VDC or more/3.5mA or more   |
|   | OFF voltage/current   | 5VDC or less/0.9mA or less  |
|   | Input resistance  | Approx. 5.6k $\Omega$   |
|   | Response time   | 1ms or less (OFF $\rightarrow$ ON, ON $\rightarrow$ OFF)  |
| Recommended wire size   | AWG18 to AWG22  |   |
| Forced stop input signal                                      | Number of input points  | 1 point   |
|   | Input method  | Sink/ Source (Photocoupler isolation)   |
|   | Rated input voltage/current   | 24VDC/Approx. 2.4mA   |
|   | Operating voltage range   | 20.4 to 26.4 VDC (+10/-15 %, ripple ratio 5 % or less)  |
|   | ON voltage/current  | 17.5 VDC or more/ 2.0 mA or more  |
|   | OFF voltage/current   | 1.8 VDC or less/ 0.18m A or less  |
|   | Input resistance  | Approximately 10k $\Omega$  |
| Response time   | 1ms or less (OFF $\rightarrow$ ON, ON $\rightarrow$ OFF)                    |   |
| Recommended wire size   | AWG16 to AWG22  |   |
| Manual pulse generator/incremental synchronous encoder signal | Signal input form   | Phase A/ Phase B (magnification by 4)   |
|   | Input frequency   | Up to 1Mpps (After magnification by 4, up to 4Mpps) (Differential-output type)<br>Up to 200kpps (After magnification by 4, up to 800kpps) (Voltage-output/Open-collector type ) |
| Memory card interface   | Internal interface  |   |
| Extension base unit   | Up to 7   |   |
| 24VDC power supply, Max. input current [A]                    | 1.4   |   |
| Mass [kg]   | 0.8   |   |
| Exterior dimensions [mm(inch)]                                | 186(7.32)(H) $\times$ 52(2.05)(W) $\times$ 135(5.31)(D)                     |   |

(Note-1): Up to 12 of manual pulse generators and synchronous encoders can be used in total.

## Specifications

### Servo external signals interface module Q172DLX



| Item  |                             | Specifications   |
|---|-----------------------------|--|
| External input signal<br>(FLS, RLS, STOP,<br>DOG) | Number of input points      | Servo external control signals : 32 points, 8 axes                               |
|   | Input method                | Positive Common/ Negative Common Shared Type (Photocoupler isolation)            |
|   | Rated input voltage/current | 12VDC/2mA, 24VDC/4mA   |
|   | Operating voltage range     | 10.2 to 26.4 VDC (Ripple ratio 5% or less)                                       |
|   | ON voltage/current          | 10VDC or more/2.0mA or more  |
|   | OFF voltage/current         | 1.8VDC or less/0.18mA or less  |
|   | Response time               | FLS, RLS, STOP   |
| DOG   |                             | 0.4ms, 0.6ms, 1ms (OFF to ON, ON to OFF)<br>CPU parameter setting, default 0.4ms |
| Number of I/O occupying points                    |                             | 32 points (I/O allocation: Intelligent function module, 32 points)               |
| 5VDC internal current consumption [A]             |                             | 0.06   |
| Mass [kg]   |                             | 0.15   |
| Exterior dimensions [mm (inch)]                   |                             | 98 (3.86)(H) × 27.4 (1.08)(W) × 90 (3.54)(D)                                     |

Note) Motion modules (Q172DLX) cannot be installed in CPU slot and I/O slot 0 to 2 of the main base unit.

### Synchronous encoder interface module Q172DEX



| Item  |                               | Specifications   |
|---|-------------------------------|--|
| Serial absolute<br>synchronous encoder<br>input | Number of modules             | 2 per module   |
|   | Applicable encoder            | Q171ENC-W8   |
|   | Position detection method     | Absolute (ABS) data method   |
|   | Transmission method           | Serial communications (2.5Mbps)  |
|   | Back up battery               | A6BAT/MR-BAT   |
|   | Maximum cable length [m(ft.)] | 50(164.04)   |
| Tracking enable input                           | Number of input points        | 2 points   |
|   | Input method                  | Positive Common/Negative Common Shared Type (Photocoupler isolation)             |
|   | Rated input voltage/current   | 12VDC/2mA, 24VDC/4mA   |
|   | Operating voltage range       | 10.2 to 26.4 VDC (Ripple ratio 5% or less)                                       |
|   | ON voltage/current            | 10VDC or more/2.0mA or more  |
|   | OFF voltage/current           | 1.8VDC or less/0.18mA or less  |
|   | Response time                 | 0.4ms, 0.6ms, 1ms (OFF to ON, ON to OFF)<br>CPU parameter setting, default 0.4ms |
| Number of I/O occupying points                  |                               | 32 points ( I/O allocation: Intelligent function module, 32 points)              |
| 5VDC internal current consumption [A]           |                               | 0.19   |
| Mass [kg]                                       |                               | 0.15   |
| Exterior dimensions [mm (inch)]                 |                               | 98 (3.86)(H) × 27.4 (1.08)(W) × 90 (3.54)(D)                                     |

(Note-1) Motion modules (Q172DEX) cannot be installed in CPU slot and I/O slot 0 to 2 of the main base unit.

(Note-2) Install Q172DEX to the main base unit. Do not install to the extension base unit.

### Manual pulse generator interface module Q173DPX



| Item  |  | Specifications  |                 |
|---|--|---|-----------------|
| Manual pulse<br>generator/<br>incremental<br>synchronous<br>encoder input | Number of modules  | 3 per module  |                 |
|   | Voltage-output/<br>Open-collector type   | High-voltage  | 3.0 to 5.25 VDC |
|   |  | Low-voltage   | 0 to 1.0 VDC    |
|   | Differential-output type   | High-voltage  | 2.0 to 5.25 VDC |
|   |  | Low-voltage   | 0 to 0.8 VDC    |
|   | Input frequency  | 50kpps (Up to 200kpps after magnification by 4)   |                 |
|   | Applicable types   | Voltage-output/Open-collector type (5VDC),<br>(Recommended product: MR-HDP01)<br>Differential-output type (26C31 or equivalent) |                 |
|   | Maximum cable length [m(ft.)]  | Voltage-output type: 10(32.79)<br>Differential-output type: 30(98.36)   |                 |
| Tracking enable<br>input  | Number of input points   | 3 points  |                 |
|   | Input method   | Positive Common/Negative Common Shared Type (Photocoupler isolation)  |                 |
|   | Rated input voltage/current  | 12VDC/2mA, 24VDC/4mA  |                 |
|   | Operating voltage range  | 10.2 to 26.4 VDC (Ripple ratio 5% or less)  |                 |
|   | ON voltage/current   | 10VDC or more/2.0mA or more   |                 |
|   | OFF voltage/current  | 1.8VDC or less/0.18mA or less   |                 |
| Response time   | 0.4ms, 0.6ms, 1ms (OFF to ON, ON to OFF)<br>CPU parameter setting, default 0.4ms |   |                 |
| Number of I/O occupying points  |  | 32 points (I/O allocation: Intelligent function module, 32 points)  |                 |
| 5VDC internal current consumption [A]                                     |  | 0.38  |                 |
| Mass [kg]   |  | 0.15  |                 |
| Exterior dimensions [mm (inch)]   |  | 98(3.86)(H) × 27.4(1.08)(W) × 90(3.54)(D)   |                 |

Note) Motion modules (Q173DPX) cannot be installed in CPU slot and I/O slot 0 to 2 of the main base unit.

Safety signal module Q173DSXY



| Item   |  | Specifications  |
|--|--|---|
|  |  | Q173DSXY  |
| Input signals                                    | Number of input points   | 32 points × 2 systems (PLC CPU control 32 points + Motion CPU control 32 points, Safety input 20 points × 2 systems, Feedback inputs for outputs 12 points × 2 systems) |
|  | Input isolation method   | Photocoupler  |
|  | Rated input voltage  | 24VDC (+10/-10%), Negative Common Type  |
|  | Max. input current   | Approx. 4mA   |
|  | Input resistance   | Approx. 8.2kΩ   |
|  | Input ON voltage/current   | 20VDC or more/3mA or more   |
|  | Input OFF voltage/current  | 5VDC or less/1.7mA or less  |
|  | Input response time  | PLC CPU control I/O: 10ms (digital filter's default value)<br>Motion CPU control I/O: 15ms (CR filter)  |
|  | Input common method  | 32 points/common (separate commons for the PLC CPU control I/O and the Motion CPU control I/O)  |
| Input operation indicator LED                    | 32 points (indication for PLC CPU control)   |   |
| Output signals                                   | Number of output points  | 12 points × 2 systems (PLC CPU control 12 points + Motion CPU control 12 points)  |
|  | Output isolation method  | Photocoupler  |
|  | Rated output voltage   | 24VDC (+10/-10%), Source type   |
|  | Max. load current  | (0.1A × 8 points, 0.2A × 4 points) × 2 systems, common current: each connector 1.6A or less   |
|  | Max. inrush current  | 0.7A 10ms or less (1.4A, 10ms or less for 0.2A output pin)  |
|  | Response time  | 1ms or less   |
|  | Output common method   | 12 points/common (separate commons for the PLC CPU control I/O and the Motion CPU control I/O)  |
| Output operation indicator LED                   | Shared with inputs   |   |
| Safety specifications<br><small>(Note-1)</small> | Functions according to IEC61800-5-2  | STO, SS1, SS2, SOS, SLS, SBC, SSM (IEC61800-5-2 : 2007) and Safety I/Os   |
|  | Safety performance   | EN ISO 13849-1 Category 3 PL d, EN 61800-5-2/IEC 61508 Part 1-7 : 1998/2000, EN 62061 SIL CL 2  |
|  | Mean time to dangerous failure (MTTFd)   | 169 years or more (theoretical value)   |
|  | Diagnostic coverage (DCavg)  | Low   |
|  | Probability of dangerous Failure per Hour (PFH)  | 2.17E-8 (1/h)   |
| Number of I/O occupying points                   | 32 points  |   |
| Communication between PLC CPUs                   | Parallel bus communication (via main base unit)  |   |
| Communication between Motion CPUs                | Serial communication (RS-485), RIO cable   |   |
| Number of installed modules                      | Up to 3 modules<br>(Max. number of input points: 60 points × 2 systems; Max. number of output points: 36 points × 2 systems) |   |
| 5VDC internal current consumption                | 0.20A (TYP. all points ON)   |   |
| Mass [kg]  | 0.15   |   |
| Exterior dimensions [mm(inch)]                   | 98 (3.86)(H) × 27.4 (1.08)(W) × 90 (3.54)(D)   |   |

Note) Install Q173DSXY to the main base unit. Do not install to the extension base unit.  
 (Note-1): These functions are certified by Certification Body only for the combination of Q173DSXY and "QnUD(E)(H)CPU", the following PLC CPU modules.  
 QnUD (E)(H) CPU : Q03UDCPU, Q03UDECPU, Q04UDHCPU, Q04UDEHCPU, Q06UDHCPU, Q06UDEHCPU, Q10UDHCPU, Q10UDEHCPU, Q13UDHCPU, Q13UDEHCPU, Q20UDHCPU, Q20UDEHCPU, Q26UDHCPU, Q26UDEHCPU, Q50UDEHCPU, Q100UDEHCPU

Optical hub unit MR-MV200



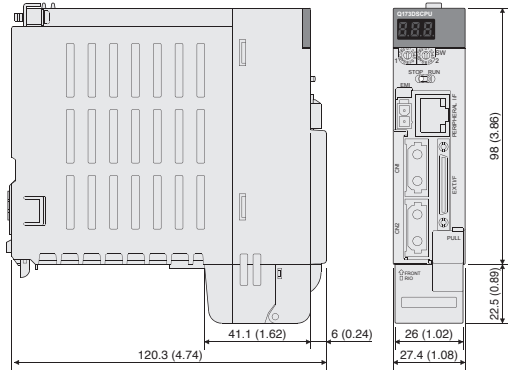
| Item  |                   | Specifications   |
|---|-------------------|--|
|   |                   | MR-MV200   |
| Number of optical hub module                      |                   | Up to 16 modules /line                                 |
| Number of servo amplifier <small>(Note-1)</small> |                   | Up to 16 axes /line                                    |
| Input power supply                                | Input voltage [V] | 21.6 to 26.4 VDC (24 VDC±10%)                          |
|   | Input current [A] | 0.2  |
| Mounting method                                   |                   | Directly mounted to the control panel or with DIN rail |
| Cable length [m(ft.)]                             |                   | Up to 100 (328.08)                                     |
| Consumption power [W]                             |                   | 4.8  |
| Mass [kg]   |                   | 0.2  |
| Exterior dimensions [mm(inch)]                    |                   | 168 (6.61)(H) × 30 (1.18)(W) × 100 (3.94)(D)           |

(Note-1): MR-J4-B, MR-J4W2-B, and MR-J4W3-B are 1-axis, 2-axis, 3-axis amplifiers respectively.

## Specifications

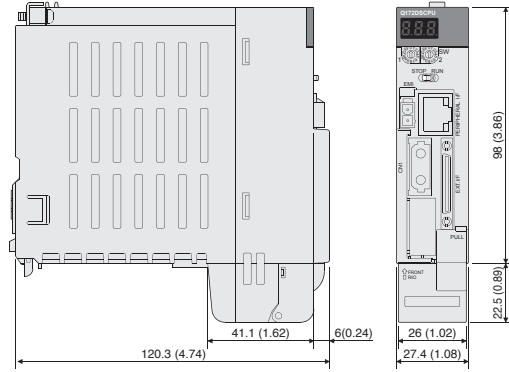
### Exterior Dimensions

**Motion CPU module Q173DSCPU**



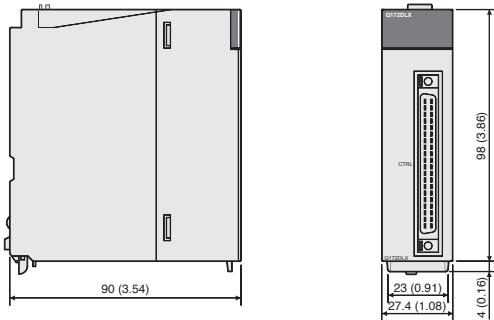
[Unit : mm (inch)]

**Motion CPU module Q172DSCPU**



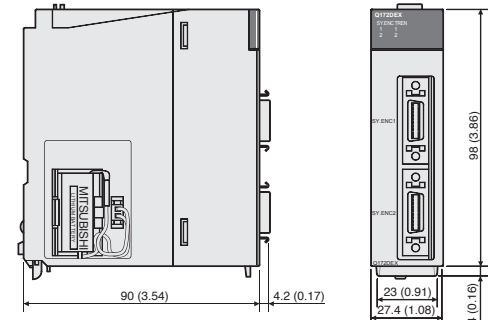
[Unit : mm (inch)]

**Servo external signals interface module Q172DLX**



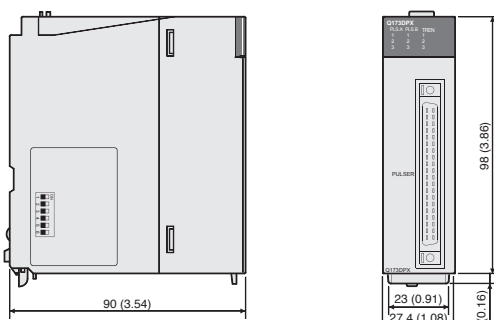
[Unit : mm (inch)]

**Synchronous encoder interface module Q172DEX**



[Unit : mm (inch)]

**Manual pulse generator interface module Q173DPX**



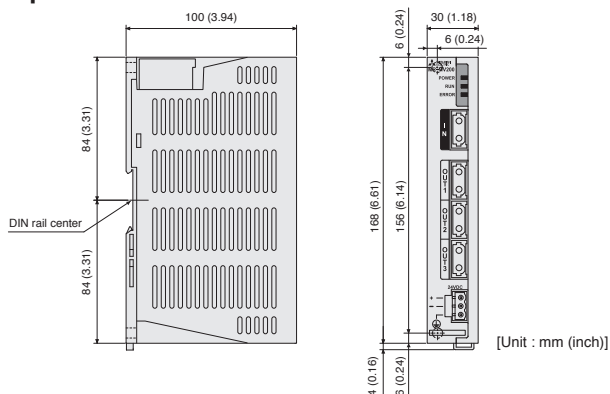
[Unit : mm (inch)]

**Safety signal module Q173DSXY**



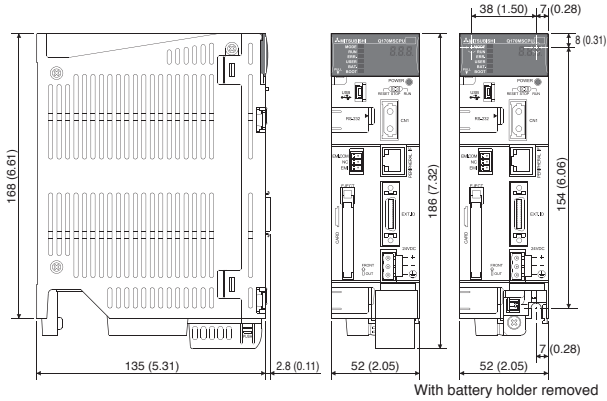
[Unit : mm (inch)]

**Optical hub unit MR-MV200**



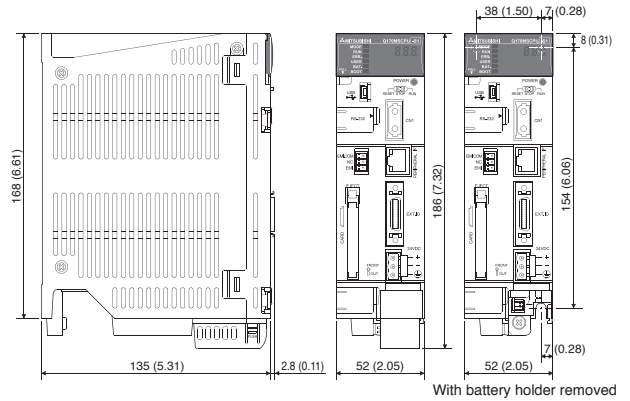
[Unit : mm (inch)]

## Motion controller Q170MSCPU



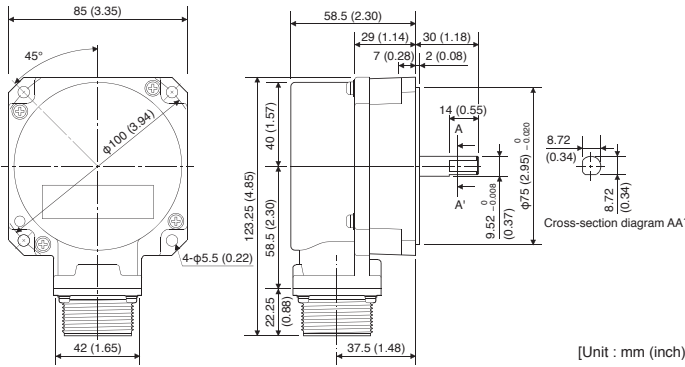
[Unit: mm (inch)]

## Motion controller Q170MSCPU-S1



[Unit: mm (inch)]

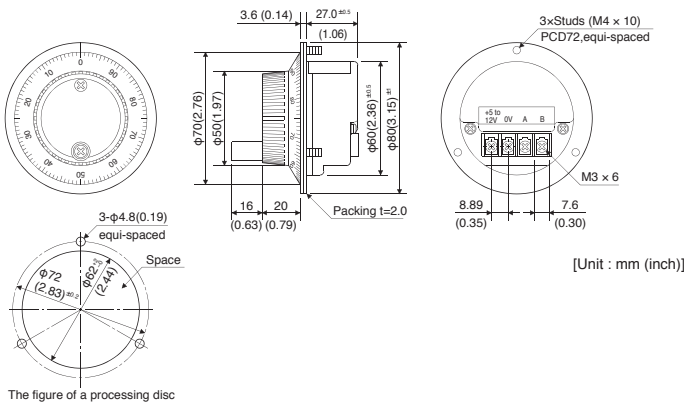
## Serial absolute synchronous encoder Q171ENC-W8



[Unit: mm (inch)]

| Item                              | Specifications   |
|-----------------------------------|--|
| Resolution                        | 4,194,304pulse/rev   |
| Direction of increasing addresses | CCW (viewed from end of shaft)                                       |
| Protective construction           | Dustproof/Waterproof<br>(IP67: Except for the shaft-through portion) |
| Permitted axial loads             | Radial load: Up to 19.6N<br>Thrust load: Up to 9.8N                  |
| Permitted speed                   | 3600r/min  |
| Permitted angular acceleration    | 4000rad/s <sup>2</sup>   |
| Ambient temperature               | -5 to 55°C (23 to 131°F)   |
| 5VDC consumption current          | 0.25A  |
| Mass                              | 0.6kg  |

## Manual pulse generator MR-HDP01



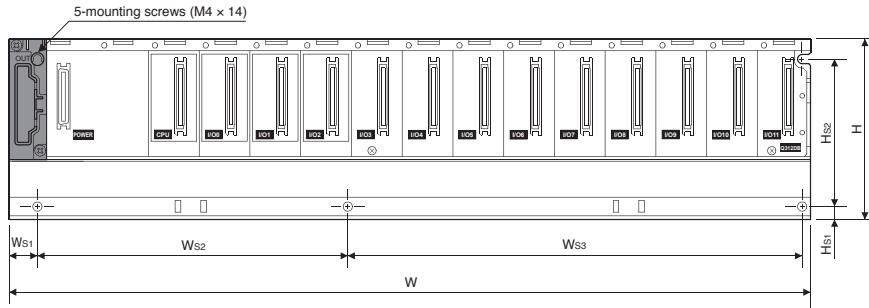
[Unit: mm (inch)]

| Item                           | Specifications   |
|--------------------------------|--|
| Pulse resolution               | 25pulse/rev (100pulse/rev after magnification by 4)          |
| Phase A/Phase B Output voltage | Input voltage : -1V or more (Note)                           |
| Output method                  | Voltage output   |
| Output current                 | Up to 20mA   |
| Life time                      | 1,000,000 revolutions or more (at 200r/min)                  |
| Permitted axial loads          | Radial load: Up to 19.6N<br>Thrust load: Up to 9.8N          |
| Maximum rotation speed         | 600r/min (Instantaneous maximum), 200r/min (Normal rotation) |
| Ambient temperature            | -10 to 60°C (14 to 140°F)                                    |
| 5VDC consumption current       | 0.06A  |
| Mass                           | 0.4kg  |

(Note) When using an external power supply, use 5VDC power supply.

## Specifications

### Main base unit

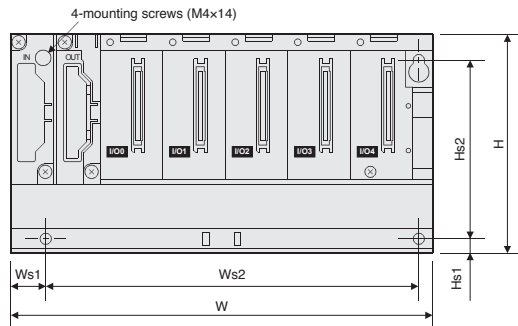


|     | Q35DB                    | Q38DB                  | Q312DB                 | Q63B                   | Q65B                     | Q68B                   | Q612B                  |
|-----|--------------------------|------------------------|------------------------|------------------------|--------------------------|------------------------|------------------------|
| W   | 245<br>(9.65)            | 328<br>(12.92)         | 439<br>(17.30)         | 189<br>(7.44)          | 245<br>(9.65)            | 328<br>(12.92)         | 439<br>(17.30)         |
| Ws1 | 15.5 (0.61)              |                        |                        |                        |                          |                        |                        |
| Ws2 | 224.5±0.3<br>(8.84±0.01) | 170±0.3<br>(6.69±0.01) | 170±0.3<br>(6.69±0.01) | 167±0.3<br>(6.57±0.01) | 222.5±0.3<br>(8.76±0.01) | 190±0.3<br>(7.48±0.01) | 190±0.3<br>(7.48±0.01) |
| Ws3 | (Ws2+Ws3)<br>5.43±0.01   | 138±0.3<br>(5.43±0.01) | 249±0.3<br>(9.80±0.01) | (Ws2+Ws3)<br>6.57±0.01 | (Ws2+Ws3)<br>8.76±0.01   | 116±0.3<br>(4.57±0.01) | 227±0.3<br>(8.94±0.01) |
| H   | 98 (3.86)                |                        |                        |                        |                          |                        |                        |
| Hs1 | 7 (0.28)                 |                        |                        |                        |                          |                        |                        |
| Hs2 | 80±0.3 (3.15±0.01)       |                        |                        |                        |                          |                        |                        |

[Unit : mm (inch)]

### Extension base unit (Note-1)

The power supply unit is not required to use.



|     | Q52B                    | Q55B                   |
|-----|-------------------------|------------------------|
| W   | 106(4.17)               | 189(7.44)              |
| Ws1 | 15.5(0.61)              |                        |
| Ws2 | 83.5±0.3<br>(3.29±0.01) | 167±0.3<br>(6.57±0.01) |
| H   | 98(3.86)                |                        |
| Hs1 | 7(0.28)                 |                        |
| Hs2 | 80±0.3(3.15±0.01)       |                        |

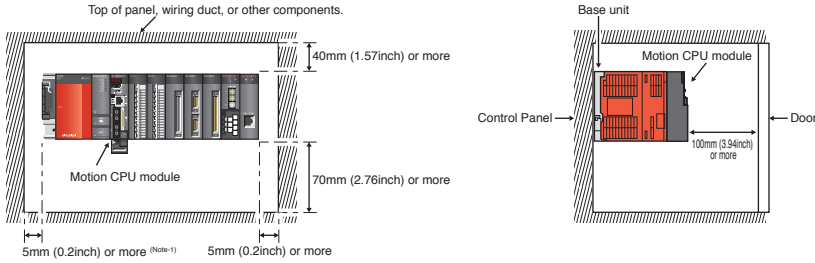
[Unit: mm (inch)]

(Note-1): Refer to the exterior dimensions of main base unit in this catalog for the main base unit with the power supply unit.



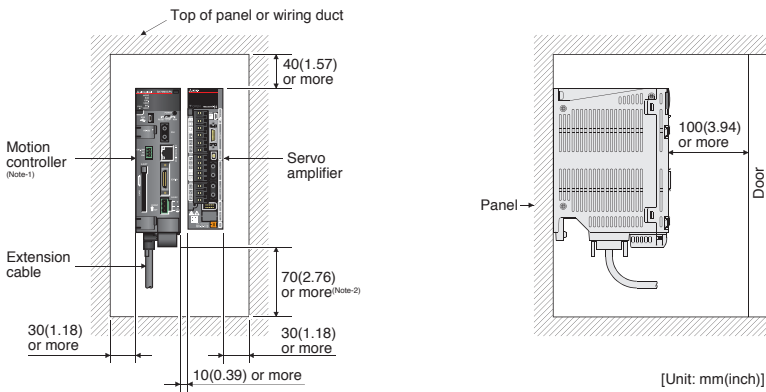
■ Mounting

Motion controller Q173DSCPU/Q172DSCPU



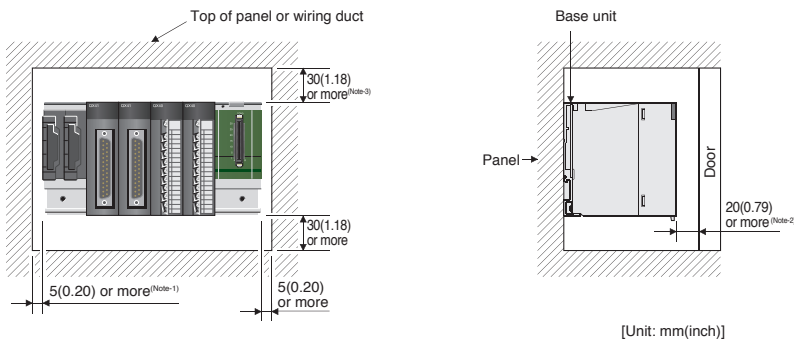
(Note-1): 20mm(0.79inch) or more when the adjacent module is not removed and the extension cable is connected.  
 Note) The main base unit cannot be mounted with the DIN rail when using the Motion CPU module.

Stand-alone Motion controller Q170MSCPU(-S1)



(Note-1): Install the Motion controller at the left side of the servo amplifier.  
 (Note-2): 15mm(0.59inch) or more when the extension cable is connected.

Base unit



(Note-1): 20mm(0.79inch) or more when the adjacent module is not removed and the extension cable is connected.  
 (Note-2): 80mm(3.15inch) or more for the connector type.  
 (Note-3): For wiring duct with 50mm(1.97inch) or less height. 40mm(1.57inch) or more for other cases.

- Outline
- Motion Controller
- Simple Motion Module
- Network
- Servo Amplifier
- Engineering Environment

## Specifications

### Components

Compliance with the indicated global standards and regulations is current as of the release date of this catalog.  
Contact your local sales office for the latest information.

### Motion controller Q173DSCPU/Q172DSCPU

#### [Motion dedicated equipment]

| Part  | Model  | Description  | Standards  |
|---|--|--|--|
| Motion CPU module                               | Q173DSCPU  | Up to 32 axes, Operation cycle 0.22 ms or more (Attachment: battery (Q6BAT))   | CE, UL, KC   |
|   | Q172DSCPU  | Up to 16 axes, Operation cycle 0.22 ms or more (Attachment: battery (Q6BAT))   | CE, UL, KC   |
| Cable for forced stop input <sup>(Note-1)</sup> | Q170DEMICBL05M   | Forced stop input<br>(Be sure to order with Motion CPU modules)  | 0.5m (1.64ft.)   |
|   | Q170DEMICBL1M  |  | 1m (3.28ft.)   |
|   | Q170DEMICBL2M  |  | 2m (6.56ft.)   |
|   | Q170DEMICBL3M  |  | 3m (9.84ft.)   |
|   | Q170DEMICBL5M  |  | 5m (16.40ft.)  |
|   | Q170DEMICBL10M   |  | 10m (32.81ft.)   |
|   | Q170DEMICBL15M   |  | 15m (49.21ft.)   |
|   | Q170DEMICBL20M   |  | 20m (65.62ft.)   |
|   | Q170DEMICBL25M   |  | 25m (82.02ft.)   |
| Connector for forced stop input cable           | Q170DEMICON  | Connector for forced stop input cable production<br>(Be sure to order when you make the forced stop input cable)   | —  |
|   | MR-J3BUS_M   | Q17nDSCPU⇔MR-J4-B<br>MR-J4-B⇔MR-J4-B   | Standard cord for inside panel<br>0.15m (0.49ft.), 0.3m (0.98ft.),<br>0.5m (1.64ft.), 1m (3.28ft.), 3m (9.84ft.) |
| MR-J3BUS_M-A                                    | Standard cable for outside panel<br>5m (16.40ft.), 10m (32.81ft.),<br>20m (65.62ft.) |  |  |
| MR-J3BUS_M-B <sup>(Note-2)</sup>                | Long distance cable<br>30m (98.43ft.), 40m (131.23ft.),<br>50m (164.04ft.)           |  |  |
| Servo external signals interface module         | Q172DLX  | Servo external signal inputs for 8 axes (FLS, RLS, STOP, DOG × 8)  | CE, UL, KC   |
| Synchronous encoder interface module            | Q172DEX  | Serial absolute synchronous encoder Q171ENC-W8 interface × 2, Tracking input 2 points, with A6BAT  | CE, UL, KC   |
| Manual pulse generator interface module         | Q173DPX  | Manual pulse generator MR-HDP01/Incremental synchronous encoder interface × 3,<br>Tracking input 3 points  | CE, UL, KC   |
| Safety signal module                            | Q173DSXY   | Input: 20 points (2 systems), Output: 12 points (2 systems), Attachment RIO cable (Q173DSXYCBL01M)   | CE, UL, KC   |
| Optical hub unit                                | MR-MV200   | Three branches/unit, DC power supply connector enclosed  | CE, UL, KC   |
| Serial absolute synchronous encoder             | Q171ENC-W8   | Resolution: 4,194,304pulse/rev, Permitted speed: 3600r/min   | CE, UL, KC   |
| Serial absolute synchronous encoder cable       | Q170ENCCBL2M   | Serial absolute synchronous encoder Q171ENC-W8⇔Q172DEX   | 2m (6.56ft.)   |
|   | Q170ENCCBL5M   |  | 5m (16.40ft.)  |
|   | Q170ENCCBL10M  |  | 10m (32.81ft.)   |
|   | Q170ENCCBL20M  |  | 20m (65.62ft.)   |
|   | Q170ENCCBL30M  |  | 30m (98.43ft.)   |
|   | Q170ENCCBL50M  | 50m (164.04ft.)  |  |
|   | Q170ENCCBL2M-A   | Serial absolute synchronous encoder Q171ENC-W8⇔MR-J4-RJ  | 2m (6.56ft.)   |
|   | Q170ENCCBL5M-A   |  | 5m (16.40ft.)  |
|   | Q170ENCCBL10M-A  |  | 10m (32.81ft.)   |
|   | Q170ENCCBL20M-A  |  | 20m (65.62ft.)   |
|   | Q170ENCCBL30M-A  |  | 30m (98.43ft.)   |
| Q170ENCCBL50M-A                                 | 50m (164.04ft.)  |  |  |
| Internal I/F connector set                      | Q170DSIOCON  | Manual pulse generator/incremental synchronous encoder interface, external command signal/interface for switching signals, With ferrite core<br>(This set is not included with the Motion CPU module.) | —  |
| RIO cable                                       | Q173DSXYCBL01M   | Q17nDSCPU⇔Q173DSXY   | 0.1m (0.44ft.)   |
|   | Q173DSXYCBL05M   | Q173DSXY⇔Q173DSXY  | 0.5m (1.64ft.)   |
| Battery   | Q6BAT  | For memory data backup of SRAM built-in Motion CPU<br>(program, parameter, absolute position data, latch data)   | —  |
|   | A6BAT  | For data backup of Q171ENC-W8  | —  |
| Manual pulse generator                          | MR-HDP01   | Number of pulses per revolution: 25pulse/rev (100pulse/rev after magnification by 4)<br>Permitted speed: 200r/min (Normal rotation)  | —  |

(Note-1): Be sure to use the cable for forced stop input. The forced stop cannot be released without using it.

(Note-2): For long distance cable up to 100m (328.08ft.) and ultra-long bending life cable, contact Mitsubishi Electric System & Service Co., Ltd.

[Sales office] FA PRODUCT DIVISION mail: osb.webmaster@melsc.jp

(Note-3): "-" indicates cable length (015: 0.15m (0.49ft.), 03: 0.3m (0.98ft.), 05: 0.5m (1.64ft.), 1: 1m (3.28ft.), 3: 3m (9.84ft.), 5: 5m (16.40ft.), 10: 10m (32.81ft.), 20: 20m (65.62ft.), 30: 30m (98.43ft.), 40: 40m (131.23ft.), 50: 50m (164.04ft.))

Stand-alone Motion controller Q170MSCPU(-S1)

[Motion dedicated equipment]

| Part                                      | Model                            | Description  | Standards  |  |   |
|---|----------------------------------|--|--|--|---|
| Stand-alone Motion controller             | Q170MSCPU                        | Integrated with power supply, PLC CPU, and Motion CPU  | CE, UL, KC   |  |   |
|   | Q170MSCPU-S1                     | Attachment: battery (Q6BAT), 24VDC power supply connector, emergency stop input cable connector <sup>(Note-1)</sup>  | CE, UL, KC   |  |   |
| SSCNET III cable <sup>(Note-3)</sup>      | MR-J3BUS_M                       | Q170MSCPU(-S1)⇔MR-J4-B<br>MR-J4-B⇔MR-J4-B  | Standard cord for inside panel<br>0.15m (0.49ft.), 0.3m (0.98ft.),<br>0.5m (1.64ft.), 1m (3.28ft.), 3m (9.84ft.) | —  |   |
|   | MR-J3BUS_M-A                     |  |  | Standard cable for outside panel<br>5m (16.40ft.), 10m (32.81ft.),<br>20m (65.62ft.) | — |
|   | MR-J3BUS_M-B <sup>(Note-2)</sup> |  |  | Long distance cable<br>30m (98.43ft.), 40m (131.23ft.),<br>50m (164.04ft.)           | — |
| Servo external signals interface module   | Q172DLX                          | Servo external signal inputs for 8 axes (FLS, RLS, STOP, DOG × 8)  | CE, UL, KC   |  |   |
| Manual pulse generator interface module   | Q173DPX                          | Manual pulse generator MR-HDP01/ Incremental synchronous encoder interface ×3, Tracking input 3 points   | CE, UL, KC   |  |   |
| Optical hub unit                          | MR-MV200                         | Three branches/unit, DC power supply connector enclosed  | CE, UL, KC   |  |   |
| Serial absolute synchronous encoder       | Q171ENC-W8                       | Resolution: 4,194,304pulse/rev, Permitted speed: 3600r/min   | CE, UL, KC   |  |   |
| Serial absolute synchronous encoder cable | Q170ENCCBL2M-A                   | Serial absolute synchronous encoder Q171ENC-W8⇔<br>Servo amplifier MR-J4-B-RJ  | 2m (6.56ft.)   | —  |   |
|   | Q170ENCCBL5M-A                   |  | 5m (16.40ft.)  | —  |   |
|   | Q170ENCCBL10M-A                  |  | 10m (32.81ft.)   | —  |   |
|   | Q170ENCCBL20M-A                  |  | 20m (65.62ft.)   | —  |   |
|   | Q170ENCCBL30M-A                  |  | 30m (98.43ft.)   | —  |   |
|   | Q170ENCCBL50M-A                  |  | 50m (164.04ft.)  | —  |   |
| Internal I/F connector set                | LD77MHIOCON                      | Manual pulse generator/Incremental synchronous encoder interface, external command signal/Switching signal interface (This set is not included with the Q170MSCPU(-S1).) | —  |  |   |
| Battery                                   | Q6BAT                            | For memory data backup of SRAM built-in Motion controller (program, parameter, absolute position data, latch data)   | —  |  |   |
| Large capacity battery                    | Q7BATN                           |  | —  |  |   |
| Battery holder                            | Q170MSBATN-SET                   | Battery holder for Q7BATN (included with the battery)  | —  |  |   |
| Manual pulse generator                    | MR-HDP01                         | Number of pulses per revolution: 25pulse/rev (100pulse/rev after magnification by 4)<br>Permitted speed: 200r/min (Normal rotation)                                      | —  |  |   |

(Note-1): Be sure to use the cable for forced stop input. The forced stop cannot be released without using it.  
 (Note-2): For long distance cable up to 100m (328.08ft.) and ultra-long bending life cable, contact Mitsubishi Electric System & Service Co., Ltd. [Sales office] FA PRODUCT DIVISION mail: osb.webmaster@melsc.jp  
 (Note-3): " " indicates cable length (015: 0.15m (0.49ft.), 03: 0.3m (0.98ft.), 05: 0.5m (1.64ft.), 1: 1m (3.28ft.), 3: 3m (9.84ft.), 5: 5m (16.40ft.), 10: 10m (32.81ft.), 20: 20m (65.62ft.), 30: 30m (98.43ft.), 40: 40m (131.23ft.), 50: 50m (164.04ft.)

[PLC common equipment]

| Part  | Model   |
|---|---|
| PLC CPU module <sup>(Note-1)</sup>          | Q03UDCPU, Q03UDECPU, Q04UDHCPU, Q04UDEHCPU, Q06UDHCPU, Q06UDEHCPU, Q10UDHCPU, Q10UDEHCPU, Q13UDHCPU, Q13UDEHCPU, Q20UDHCPU, Q20UDEHCPU, Q26UDHCPU, Q26UDEHCPU, Q50UDEHCPU, Q100UDEHCPU, Q03UDVCPU, Q04UDVCPU, Q06UDVCPU, Q13UDVCPU, Q26UDVCPU |
| C Controller CPU module <sup>(Note-1)</sup> | Q12DCCPU-V, Q24DHCCPU-V, Q24DHCPU-LS  |
| Main base unit <sup>(Note-1)</sup>          | Q35DB, Q38DB, Q312DB  |
| Extension base unit                         | Q63B, Q65B, Q68B, Q612B, Q52B, Q55B   |
| Extension cable                             | QC05B, QC06B, QC12B, QC30B, QC50B, QC100B   |
| Power supply module <sup>(Note-2)</sup>     | Q61P, Q62P, Q63P, Q64PN   |
| Input/output module                         | Input module, Output module, Input/output composite module  |
| Analog module                               | Q68ADV, Q62AD-DGH, Q66AD-DG, Q68ADI, Q64AD, Q64AD-GH, Q68AD-G, Q68DAVN, Q68DAIN, Q62DAN, Q62DA-FG, Q64DAN, Q66DA-G  |
| Interrupt module                            | QI60  |
| High-speed counter                          | QD62D, QD65PD2  |
| Positioning module                          | QD75P1, QD75P2, QD75P4, QD75D1, QD75D2, QD75D4, QD75MH1, QD75MH2, QD75MH4   |
| Simple Motion module                        | QD77MS2, QD77MS4, QD77MS16  |
| Control unit of displacement sensor         | UQ1-01, UQ1-02  |

(Note-1): Needed when the Q173DSCPU/Q172DSCPU is used.  
 (Note-2): Use the power supply module within its capacity.

Software for Motion controller

[Operating system software] <sup>(Note-1)</sup>

| Application                  | Model name    |               |               |           |
|------------------------------|---------------|---------------|---------------|-----------|
|                              | Q173DSCPU     | Q172DSCPU     | Q170MSCPU-S1  | Q170MSCPU |
| Conveyor assembly use SV13   | SW8DNC-SV13QJ | SW8DNC-SV13QL | SW8DNC-SV13QN |           |
| Automatic machinery use SV22 | SW8DNC-SV22QJ | SW8DNC-SV22QL | SW8DNC-SV22QN |           |

| Product   | Model name          | Description  |
|---|---------------------|--|
| Operating system software set for Q17nDSCPU/Q170MSCPU | SW8DNC-SV1322QJLSET | SW8DNC-SV13QJ, SW8DNC-SV13QL, SW8DNC-SV13QN, SW8DNC-SV22QJ, SW8DNC-SV22QL, SW8DNC-SV22QN |

(Note-1): Operating system software (SV22) is Pre-installed into Motion controller before shipment  
 SW8DNC-SV1322QJLSET [CD-ROM] that includes all operating system software in the table above is also available.



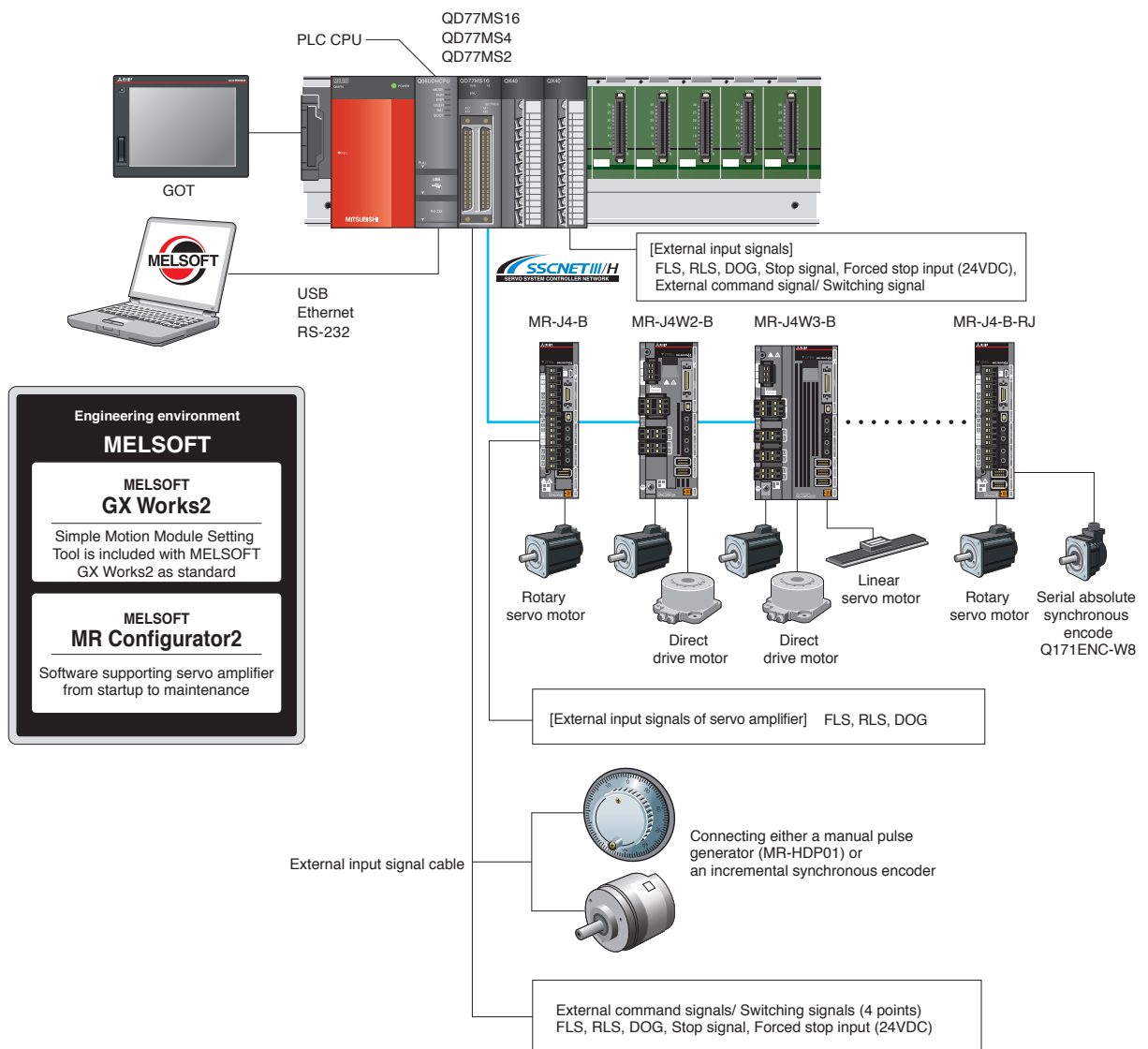
SSCNET III/H compatible  
MELSEC-Q series Simple Motion module  
**QD77MS16/QD77MS4/QD77MS2**



## Achieving Various Controls While Being Simple to Use Just Like Positioning Modules

- Advanced and wide-range Motion controls can be easily performed just with a sequence program, such as advanced synchronous control, cam control, and speed-torque control (tightening & press-fit control).
- Equipped with the synchronous encoder input and mark detection function as standard.
- Simple settings without programming are achieved with Mitsubishi Electric's MELSOFT series Engineering environment.
- QD75MH existing project assets can be diverted to QD77MS.

### [System configuration]



SSCNET III/H compatible  
 MELSEC-L series Simple Motion module  
**LD77MS16/LD77MS4/LD77MS2**

### Motion Control Made Simpler



- Advanced and wide-range Motion controls can be easily performed just with a sequence program, such as advanced synchronous control, cam control, and speed-torque control (tightening & press-fit control).
- Equipped with the synchronous encoder input and mark detection function as standard.
- Simple settings without programming are achieved with Mitsubishi Electric's MELSOFT series Engineering environment.
- LD77MH existing project assets can be diverted to LD77MS.

Outline

Motion Controller

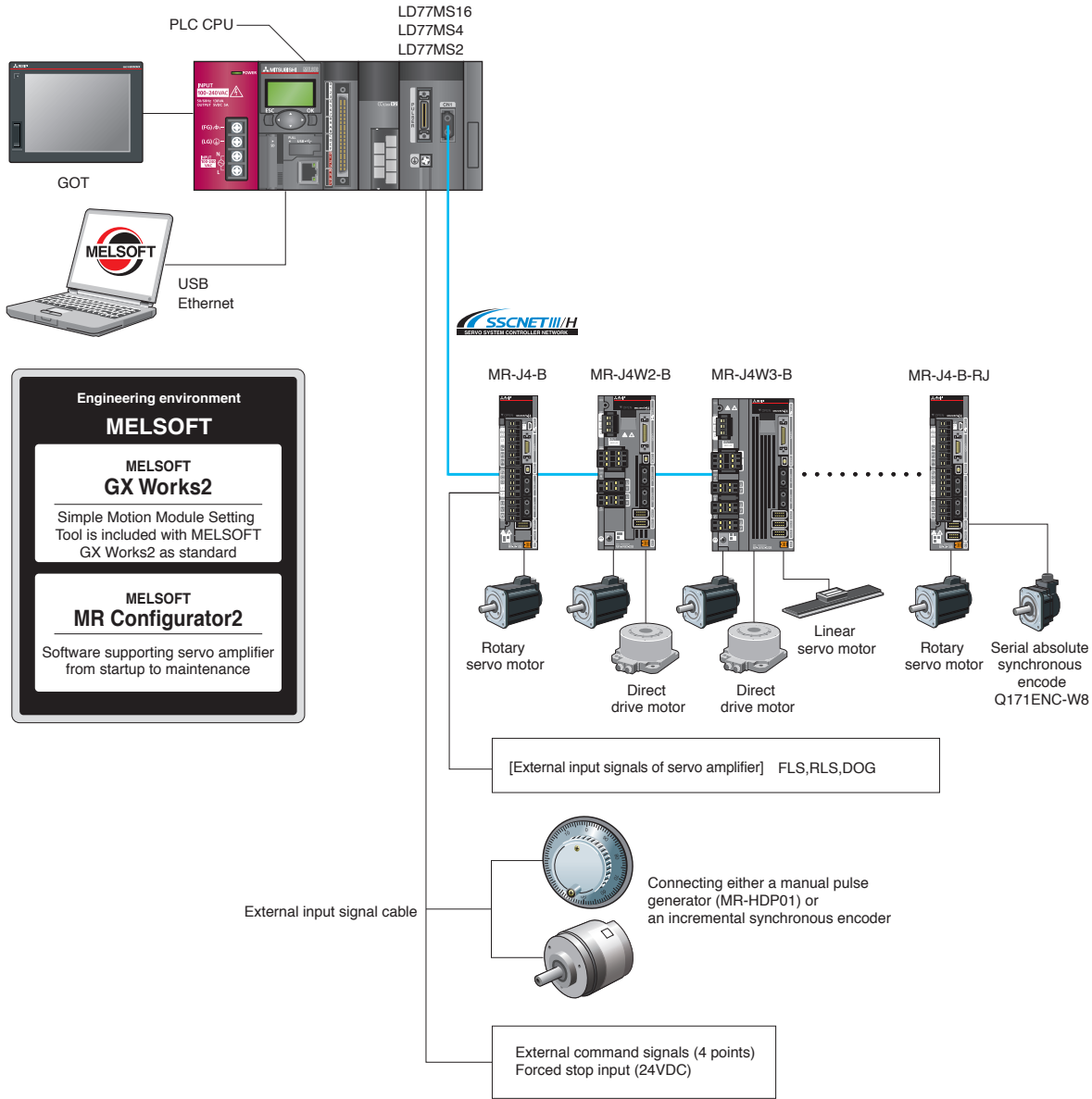
Simple Motion Module

Network

Servo Amplifier

Engineering Environment

### [System configuration]



CC-Link IE Field Network  
MELSEC-Q series Simple Motion module  
**QD77GF16**

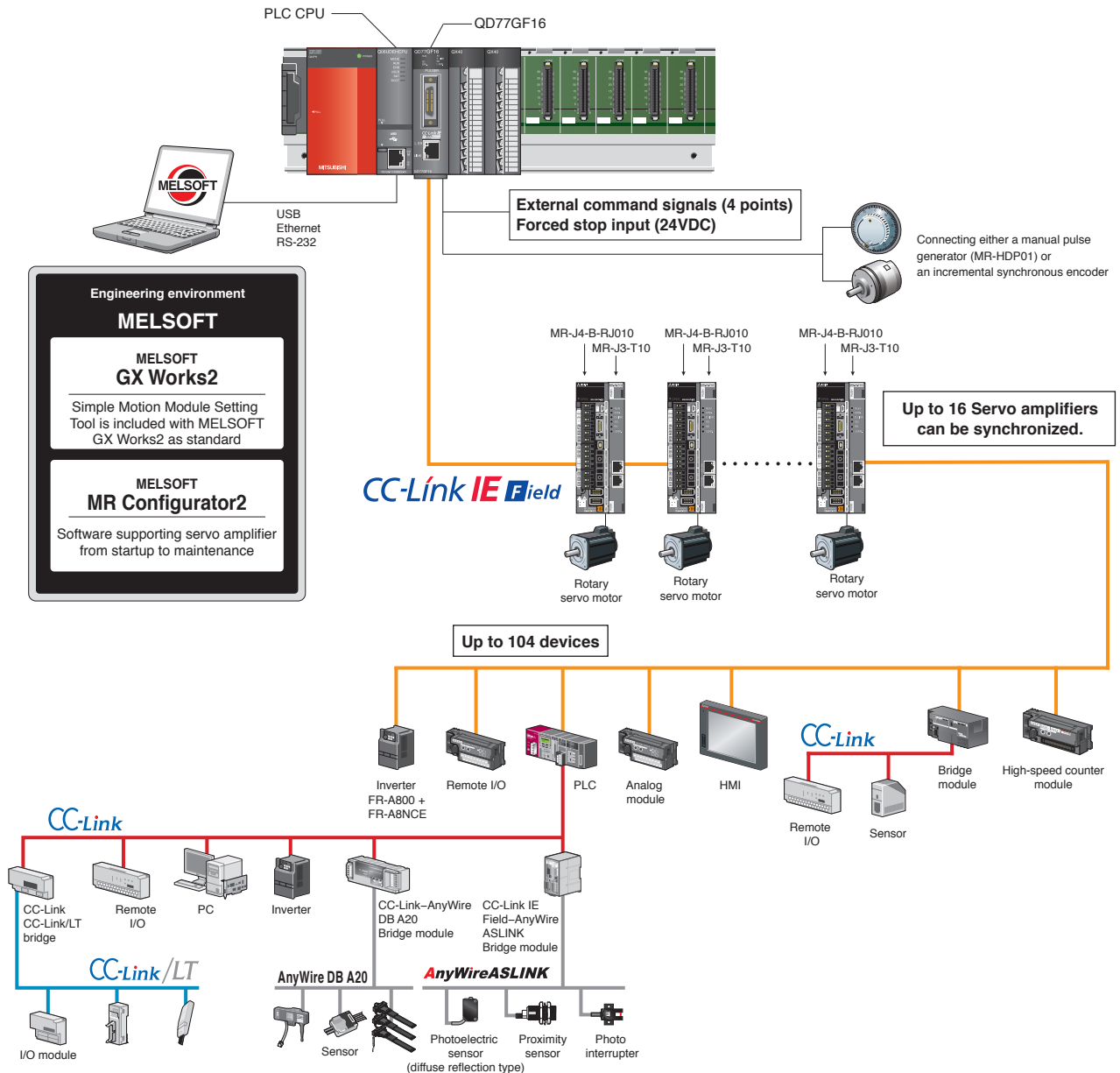


## Superior Motion Performance Now Available for CC-Link IE Field Network

- Positioning/advanced synchronous/cam controls are easily performed with simple parameter setting and a start from a sequence program.
- QD77GF16 can be used as the master station of CC-Link IE Field Network. (equivalent to QJ71GF11-T2) (Note-1)
- Within one network, QD77GF16 can communicate with servo amplifiers and field devices (Remote I/O, Sensor, etc.).

(Note-1): QD77GF can be used only as the master station. Line and star topologies are available. Up to 104 device stations can be connected in one network.

### [System configuration]

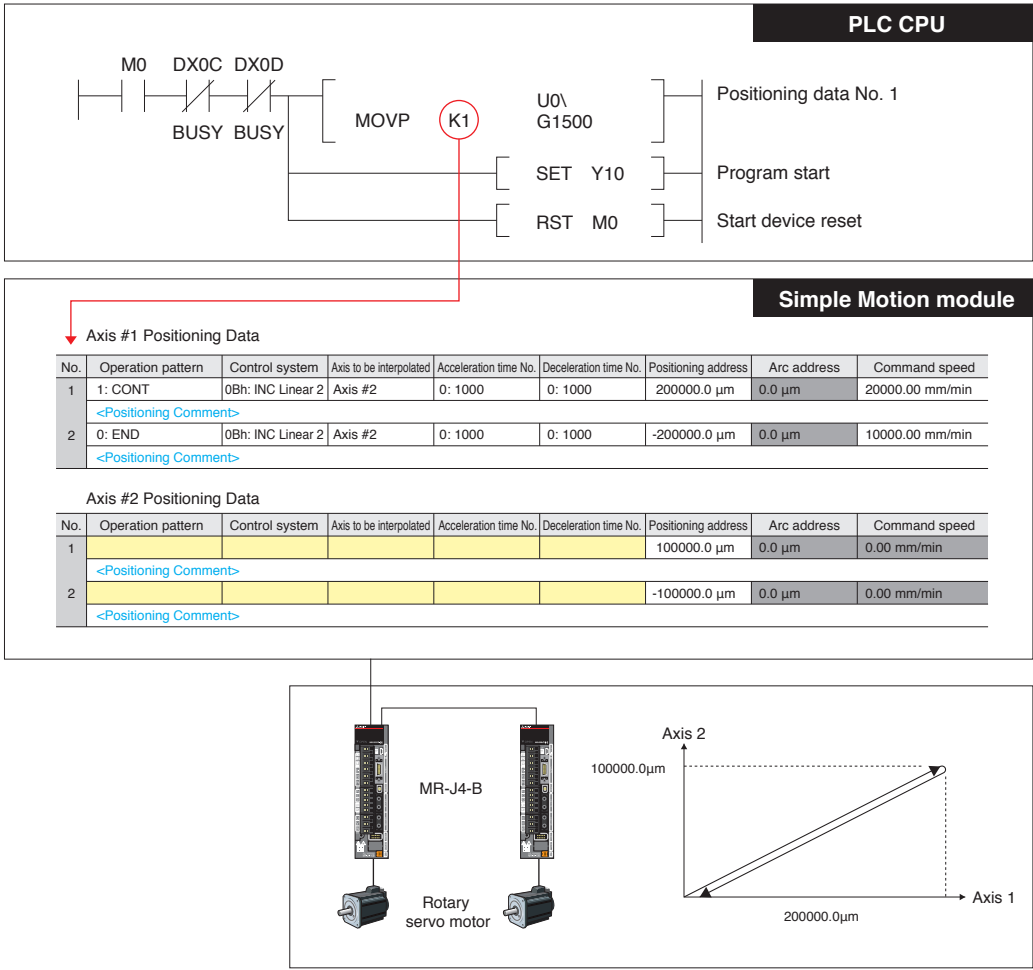


(Note): Star topology needs a HUB.

Features

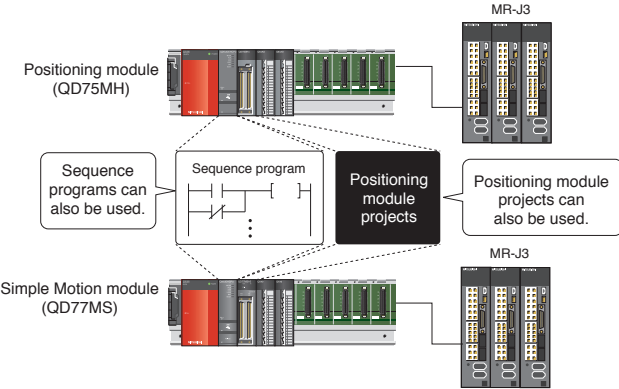
Control Flow QD77MS LD77MS  
QD77GF

The start of positioning operation by the Simple Motion module is programmed in PLC CPU.  
The Simple Motion module starts operation from the designated positioning data No. and continues operation until the operation pattern ends.



High Compatibility with the Previous Models QD77MS LD77MS

The Positioning module (QD75MH) projects and sequence programs are easily diverted to the Simple Motion module (QD77MS/LD77MS).  
The replacement to QD77MS/LD77MS is easily completed without replacing the prior model of servo amplifier MR-J3-B.



Outline

Motion Controller

Simple Motion Module

Network

Servo Amplifier

Engineering Environment

## Features

### Equipped with Various Functions in the Compact Modules

QD77MS

LD77MS

QD77GF

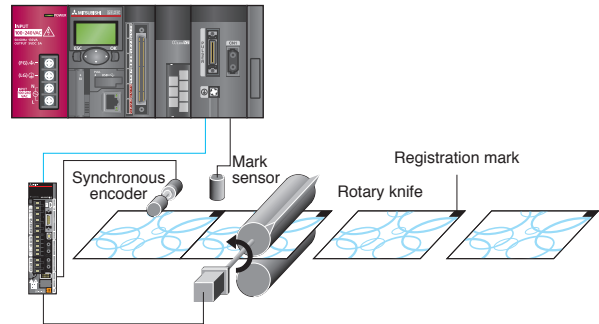
The incremental synchronous encoder interface and the mark detection signal interface are integrated in the Simple Motion modules. Therefore no option module is required.

- Synchronous control with synchronous encoder

Select the synchronous encoder to be used from either the incremental synchronous encoder using the LD77MS built-in interface, or the absolute synchronous encoder via servo amplifier. The synchronization accuracy is improved further with the phase compensation function, designed to compensate for synchronous encoder delays.

- Mark detection function

This function detects registration marks on the high-speed moving packing film by sensor and sets the current position to the buffer memory. Any fluctuation errors between the current sensed position and the reference position are compensated, and the packing material is cut at the set position.



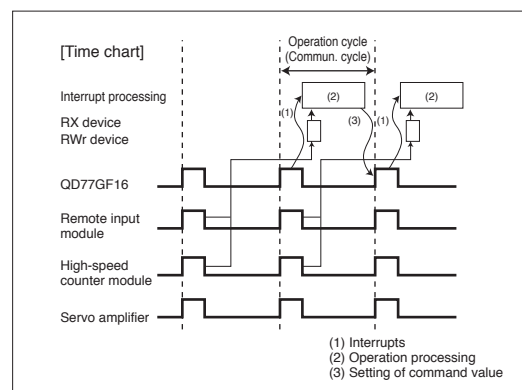
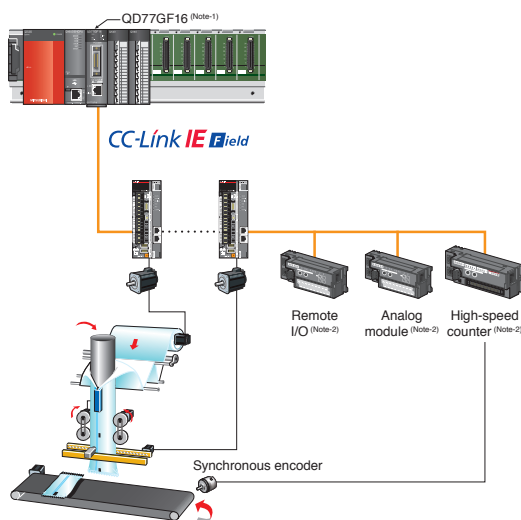
[Example of using an absolute synchronous encoder via a servo amplifier]

### Synchronous Communication Function

QD77GF

The operation timing between multiple device stations is aligned since the synchronous communication compatible device stations can operate while synchronizing to the operation cycle of the Simple Motion module. Synchronous control is achieved by calculating the data of each device station with the PLC CPU interrupt task and then setting the command value for the next amplifier. The device stations that are compatible with this synchronous communication function include DC inputs, transistor outputs, analog I/Os, and high-speed counter modules.

[In case that the high-speed counter module reads the data from the synchronous encoder for synchronous control.]



(Note-1): The units with serial number of 15092 or later (upper 5 digits) are compatible with this function.

(Note-2): The units with serial number of 15102 or later (upper 5 digits) are compatible with this function.



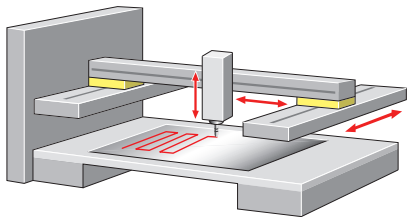
## Positioning Control

QD77MS LD77MS  
QD77GF

- To respond to various applications, a machine can be controlled by various control methods such as linear interpolation control, 2-axis circular interpolation control, fixed-pitch feed control, and continuous path control.
- Automatic operation can be executed by setting the positioning addresses and speeds, etc., to a sequence program.
- Powerful sub-functions are available such as M codes, skip function, speed change function, and target position change function.

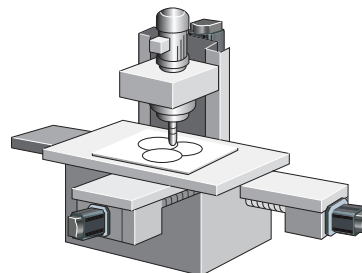
### Sealing

- Continuous path control
- Linear/circular interpolation
- Synchronous control
- High-speed, high-accuracy path calculation



### X-Y table

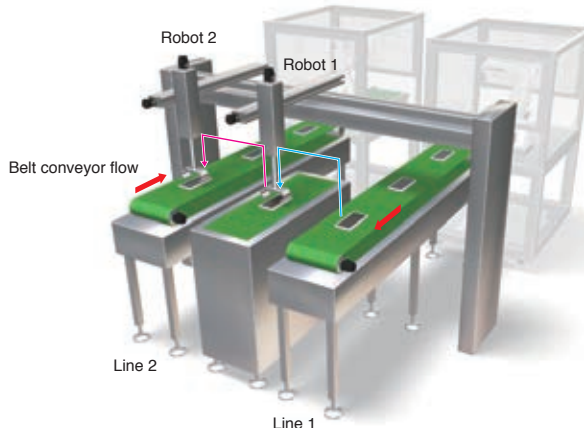
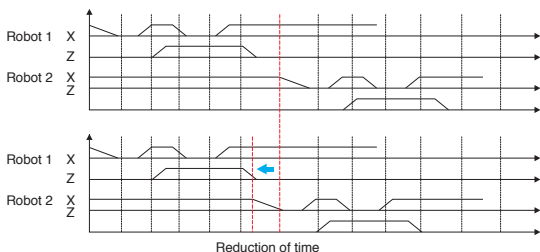
- 2-axis linear interpolation
- 2-axis circular interpolation
- 3-axis linear interpolation
- Continuous path control



## Advanced Synchronous/Cam Controls

QD77MS LD77MS  
QD77GF

The workpiece handled from line 1 is transferred to the relay point by robot 1. After robot 1 returns to its original position, the workpiece at the relay point is moved to line 2 by robot 2. Robot 1 and robot 2 need to check the position each other when handling the work pieces, which makes the cycle time longer. In cam control, the robot positions are determined by the cam pattern, so the robots can efficiently handle the work pieces.



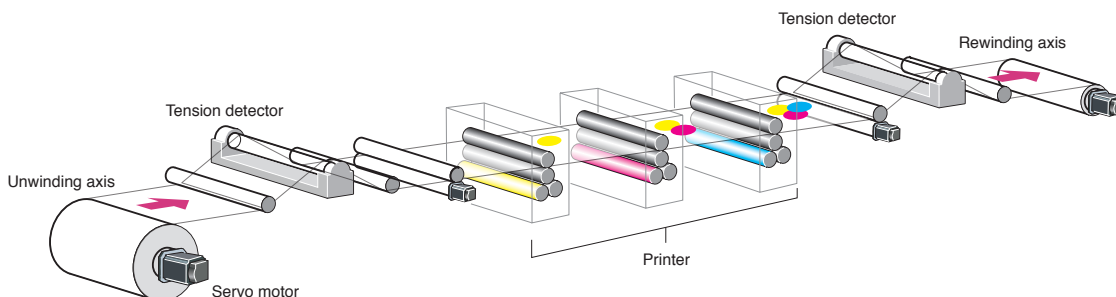
## Speed-Torque Control (Tightening & Press-Fit Control)

Tightening & Press-fit control Patented

QD77MS LD77MS  
QD77GF

Tension control application such as unwinding and rewinding are available with the Simple Motion module. Since the current position is controlled even during the speed-torque control, the positioning based on the absolute position coordinates is possible after switching from the speed-torque control back to the position control.

(Note): The tightening & press-fit control can be achieved with QD77MS/LD77MS.



Outline

Motion Controller

Simple Motion Module

Network

Servo Amplifier

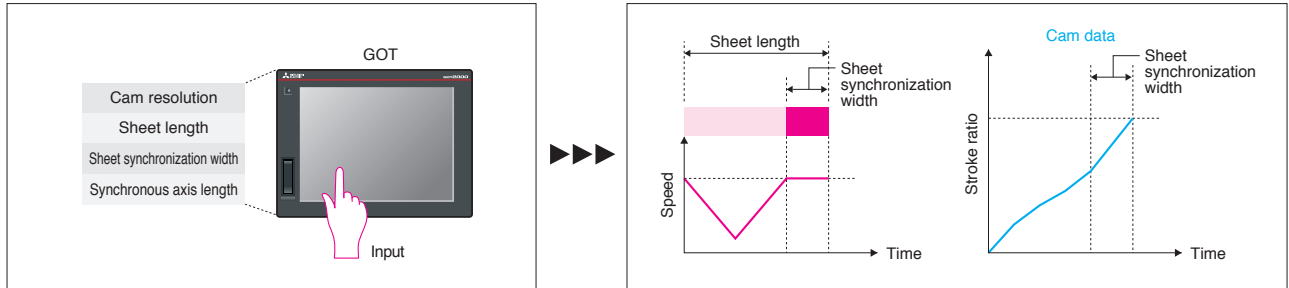
Engineering Environment

## Features

### Cam Auto-Generation Function

|        |        |
|--------|--------|
| QD77MS | LD77MS |
| QD77GF |        |

The cam data for the rotary knife is created easily just by entering the sheet length, synchronization width and cam resolution, etc., in the sequence program.



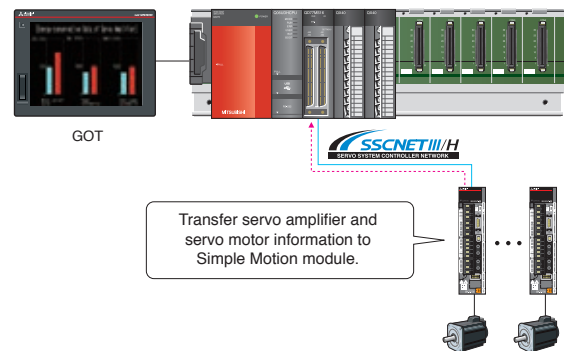
### Optional Data Monitor Function

|        |        |
|--------|--------|
| QD77MS | LD77MS |
|--------|--------|

The servo amplifier and servo motor information are monitored via the Simple Motion module. The information is also possible to be displayed on a user-created screen.

#### Setting data

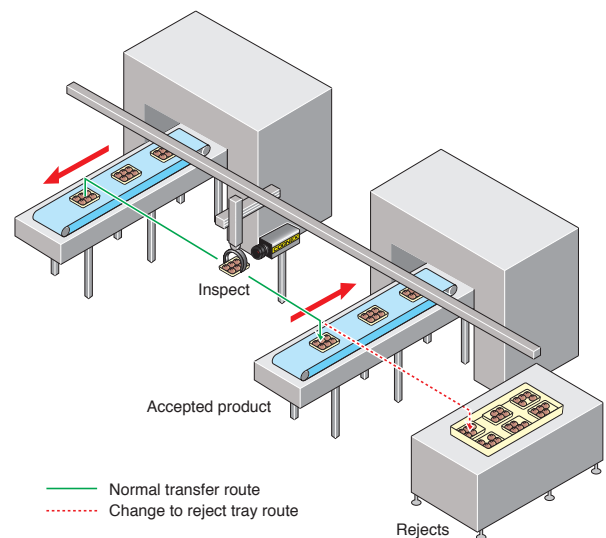
Effective load ratio, Regenerative load ratio, Peak torque ratio, Load inertia ratio, Position loop gain 1, Main circuit bus voltage, Position feedback, Servo motor speed, Absolute encoder single revolution position, Power consumption, Total power consumption, etc.



### Target Position Change Function

|        |        |
|--------|--------|
| QD77MS | LD77MS |
| QD77GF |        |

The target position can be changed at any time even when the products are being moved (1-axis linear control). The product is examined while being moved to the next line. If a faulty product is found, the target position is changed so that the faulty product is put in a separate tray for those rejects.



Safety System

QD77MS LD77MS

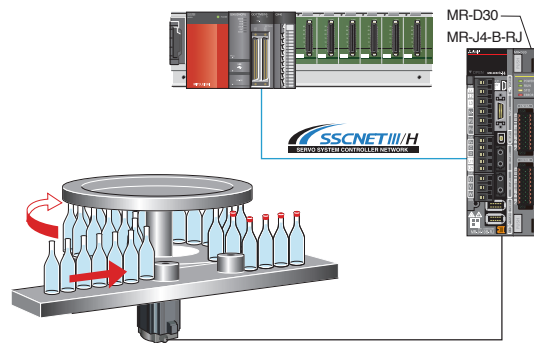
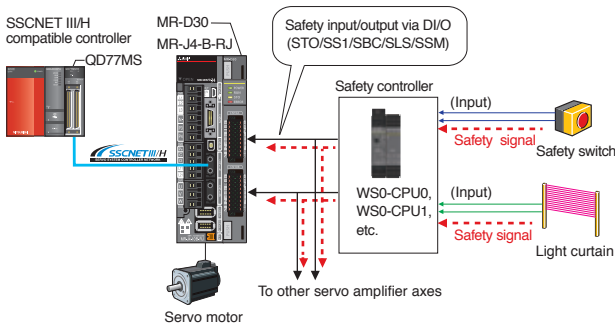
The safety system is compliant with "EN ISO13849-1:2008 Category 4 PL e" and "EN62061 SIL CL 3" (Note-1) (these standards are harmonized with European Machine Directives). Functional safety (STO, SS1, SSM, SBC, SLS) according to IEC 61800-5-2 can be achieved with a combination of MR-J4-B-RJ servo amplifier and MR-D30 functional safety unit. The safety observation function can be easily started up by setting parameters for MR-D30.

The servo amplifier with software version B3 or later supports the safety observation function.

(Note-1): STO, SS1, and SBC are compliant with the level.

| IEC/EN 61800-5-2:2007 function | Safety function/level by wiring to MR-D30 |
|--------------------------------|---|
| STO (Safe torque off)          | Category 4 PL e, SIL 3                    |
| SS1 (Safe stop 1)              |   |
| SBC (Safe brake control)       |   |
| SLS (Safely-limited speed)     | Category 3 PL d, SIL 2                    |
| SSM (Safe speed monitor)       |   |

[The safety signal comparison executed by MR-J4-B-RJ with MR-D30]



Safely-limited speed (SLS) is available without an external pulse generator.

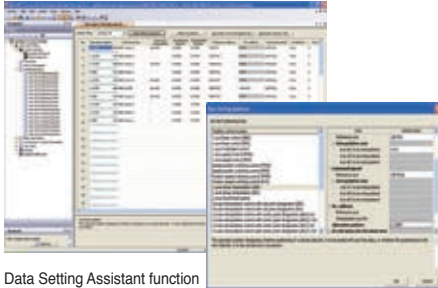
## Simple Operation for Ease of Use

### Positioning Control

QD77MS LD77MS  
QD77GF

Positioning control is executed with Point table method.

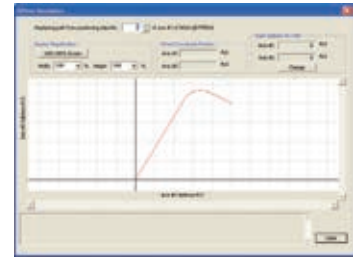
- The Data Setting Assistant function simplifies the setting input process of positioning data.
- Positioning data is set more simply by using functions such as Automatic Command Speed Calculation, Offline Simulation, and automatic calculation of auxiliary arc, etc.



Data Setting Assistant function



Automatic Command Speed Calculation



Offline Simulation

### Advanced Synchronous Control

QD77MS LD77MS  
QD77GF

Synchronous control can be easily achieved with software by placing mechanical modules on screen, such as the gear, shaft, speed change gear and cam.

- The Synchronous control is easily performed with parameter settings. There is no need to create complicated programs.
- Synchronous control is started/stopped on axis-by-axis basis. The synchronous control axis and positioning control axis can exist together in a program.
- The movement amount of main shaft is transmitted to the output axis via the clutch.



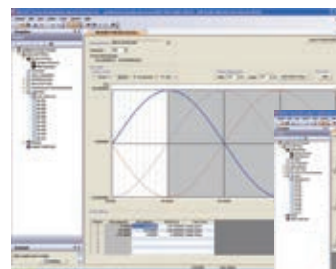
Synchronous Control Parameter Settings

### Cam Control

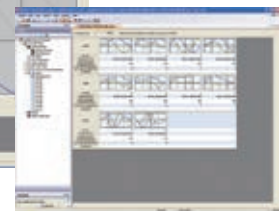
QD77MS LD77MS  
QD77GF

Various cam pattern can be easily created.

- Cam control has become more flexible. Various cam patterns are available.
- You can set the stroke, speed, acceleration and throb while simultaneously checking the profile on a graph.
- The created cam data are easily viewed as thumbnails.
- Cam data is imported and exported in CSV format.



Cam Data



Cam Data List

### Parameter Settings

QD77MS LD77MS  
QD77GF

- One-point help allows parameters to be set without a manual.
- The servo amplifiers can be set easily on a graphical screen.
- The complicated electronic gear settings can be completed just by specifying the mechanical configuration (reduction ratio, ball screw pitch, etc.).



Parameter Settings



System Structure Settings



Electronic Gear Settings

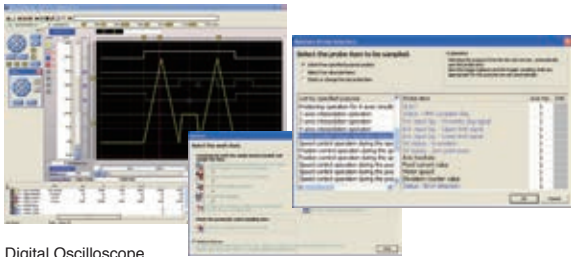
## Setup

QD77MS LD77MS

QD77GF

### Digital oscilloscope function

- Operation confirmation and troubleshooting are powerfully supported with data collection and wave displays which are synchronized to the Motion operation cycle.
- The assistant function explains all steps.
- 16CH word and 16CH bit data can be sampled. Of which, 8CH words and 8CH bits can be displayed in real time.



Digital Oscilloscope

### Monitor and test functions

- The items needed to be displayed can be selected from various monitored information.
- The test function enables you to check basic operations without a sequence program.



Axis Monitor



Positioning Test

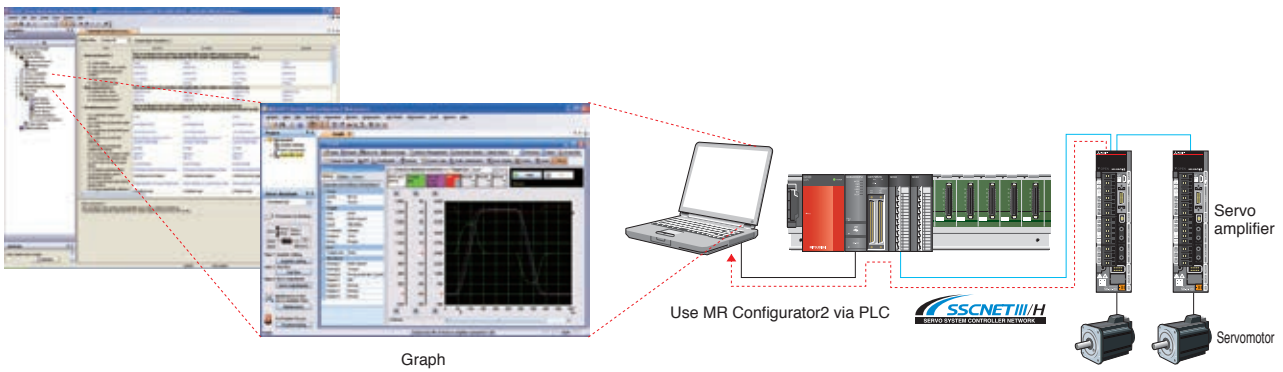
## Adjustment of Servo Amplifier Parameters

QD77MS LD77MS

QD77GF

Coordination with the MELSOFT MR Configurator2 increases the ease of servo installation.

You can set and adjust servo amplifier parameters with the MELSOFT MR Configurator2, the software created with Mitsubishi Electric servo know-how.



## Specifications

### Control specification

| Item  | Specifications   |  |                             |               |              |                             |               |
|---|--|--|-----------------------------|---------------|--------------|-----------------------------|---------------|
|   | QD77MS16   | QD77MS4  | QD77MS2 <sup>(Note-3)</sup> | LD77MS16      | LD77MS4      | LD77MS2 <sup>(Note-3)</sup> | QD77GF16      |
| Number of control axes<br>(Virtual servo amplifier axis included) | Up to 16 axes  | Up to 4 axes   | Up to 2 axes                | Up to 16 axes | Up to 4 axes | Up to 2 axes                | Up to 16 axes |
| Operation cycle (Operation cycle settings) <sup>(Note-1)</sup>    | 0.88ms, 1.77ms   |  |                             |               |              |                             | 1ms, 2ms, 4ms |
| Interpolation function  | Linear interpolation (Up to 4 axes), Circular interpolation (2 axes)   |  |                             |               |              |                             |               |
| Control modes   | PTP (Point To Point) control, Path control (both linear and arc can be set), Speed control, Speed-position switching control, Position-speed switching control, Speed-torque control |  |                             |               |              |                             |               |
| Acceleration/deceleration process                                 | Trapezoidal acceleration/deceleration, S-curve acceleration/deceleration   |  |                             |               |              |                             |               |
| Compensation function   | Backlash compensation, Electronic gear, Near pass function   |  |                             |               |              |                             |               |
| Synchronous control   | Synchronous encoder input, Cam, Phase Compensation, Cam auto-generation  |  |                             |               |              |                             |               |
| Control unit  | mm, inch, degree, pulse  |  |                             |               |              |                             |               |
| Positioning data  | 600 data (positioning data No. 1 to 600)/axis<br>(Can be set with MELSOFT GX Works2 or Sequence program.)  |  |                             |               |              |                             |               |
| Backup  | Parameters, positioning data, and block start data can be saved on flash ROM (battery-less backup)   |  |                             |               |              |                             |               |
| OPR control   | OPR method   | Near-point dog method, Count method 1, Count method 2, Data set method, Scale home position signal detection method  |                             |               |              |                             |               |
|   | Fast OPR control   | Provided   |                             |               |              |                             |               |
|   | Sub functions  | OPR retry, OP shift  |                             |               |              |                             |               |
| Positioning control   | Linear control   | 1-axis linear control, 2-axis linear interpolation control, 3-axis linear interpolation control, 4-axis linear interpolation control <sup>(Note-4)</sup> (Composite speed, Reference axis speed) |                             |               |              |                             |               |
|   | Fixed-pitch feed control   | 1-axis fixed-pitch feed, 2-axis fixed-pitch feed, 3-axis fixed-pitch feed, 4-axis fixed-pitch feed   |                             |               |              |                             |               |
|   | 2-axis circular interpolation  | Sub point designation, center point designation  |                             |               |              |                             |               |
|   | Speed control  | 1-axis speed control, 2-axis speed control, 3-axis speed control, 4-axis speed control   |                             |               |              |                             |               |
|   | Speed-position switching control   | INC mode, ABS mode   |                             |               |              |                             |               |
|   | Position-speed switching control   | INC mode   |                             |               |              |                             |               |
|   | Current value change   | Positioning data, Start No. for a current value changing   |                             |               |              |                             |               |
|   | NOP instruction  | Provided   |                             |               |              |                             |               |
|   | JUMP instruction   | Unconditional JUMP, Conditional JUMP   |                             |               |              |                             |               |
| Manual control  | LOOP, LEND   | Provided   |                             |               |              |                             |               |
|   | High-level positioning control   | Block start, Condition start, Wait start, Simultaneous start, Repeated start   |                             |               |              |                             |               |
| Expansion control   | JOG operation  | Provided   |                             |               |              |                             |               |
|   | Inching operation  | Provided   |                             |               |              |                             |               |
|   | Manual pulse generator operation   | Possible to connect 1 module (Incremental) Unit magnification (1 to 10000 times)   |                             |               |              |                             |               |
| Absolute position system  | Speed-torque control   |  |                             |               |              |                             |               |
| Synchronous encoder interface                                     | Speed control without positioning loops, Torque control, Tightening & press-fit control <sup>(Note-5)</sup>  |  |                             |               |              |                             |               |
| Functions that limit control                                      | Speed-torque control   | Made compatible by setting battery to servo amplifier  |                             |               |              |                             |               |
|   | Internal interface   | Up to 4 channels (Total of the internal interface, via PLC CPU interface, and servo amplifier interface <sup>(Note-5)</sup> )  |                             |               |              |                             |               |
|   | Speed limit function   | 1 channel (Incremental)  |                             |               |              |                             |               |
|   | Torque limit function  | Speed limit value, JOG speed limit value   |                             |               |              |                             |               |
|   | Forced stop  | Torque limit value_same setting, torque limit value_individual setting   |                             |               |              |                             |               |
|   | Software stroke limit function   | Valid/Invalid setting  |                             |               |              |                             |               |
| Functions that change control details                             | Hardware stroke limit function   | Movable range check with current feed value, movable range check with machine feed value   |                             |               |              |                             |               |
|   | Speed change function  | Provided   |                             |               |              |                             |               |
|   | Override function  | Provided   |                             |               |              |                             |               |
|   | Acceleration/deceleration time change function   | Provided   |                             |               |              |                             |               |
| Other functions   | Torque change function   | Provided   |                             |               |              |                             |               |
|   | Target position change function  | Target position address and speed to target position are changeable  |                             |               |              |                             |               |
|   | M code output function   | Provided   |                             |               |              |                             |               |
|   | Step function  | Deceleration unit step, Data No. unit step   |                             |               |              |                             |               |
| Mark detection function   | Skip function  | Via PLC CPU, Via external command signal   |                             |               |              |                             |               |
|   | Teaching function  | Provided   |                             |               |              |                             |               |
| Optional data monitor function                                    | Continuous Detection mode, Specified Number of Detections mode, Ring Buffer mode   |  |                             |               |              |                             |               |
|   | Mark detection signal  | 4 points   | 2 points                    | 4 points      | 2 points     | 4 points                    | 4 points      |
| Driver communication function                                     | Mark detection setting   | 16 settings  | 4 settings                  | 16 settings   | 4 settings   | 16 settings                 | 16 settings   |
|   | Amplifier-less operation function  | 4 points/axis  |                             |               |              |                             |               |
| Digital oscilloscope function <sup>(Note-2)</sup>                 | Provided   | —  |                             |               |              |                             |               |
| Digital oscilloscope function <sup>(Note-2)</sup>                 | Provided   | —  |                             |               |              |                             |               |
|   | Bit data   | 16ch   | 8ch                         | 16ch          | 8ch          | 16ch                        | 16ch          |
|   | Word data  | 16ch   | 4ch                         | 16ch          | 4ch          | 16ch                        | 16ch          |

(Note-1): Default value is 1.77 ms. If necessary, check the operation time and change to 0.88 ms.

(Note-2): 8CH word data and 8CH bit data can be displayed in real time.

(Note-3): The maximum number of control axes for QD77MS2 and LD77MS2 is two axes. Use QD77MS4, QD77MS16, LD77MS4, or LD77MS16 to control three or more axes.

(Note-4): 4-axis linear interpolation control is enabled only at the reference axis speed.

(Note-5): QD77MS and LD77MS only.

## ■ Synchronous control specification

### Synchronous control

| Item                           |                          | Number of settable axes |               |               |                |               |               |                |
|--------------------------------|--------------------------|-------------------------|---------------|---------------|----------------|---------------|---------------|----------------|
|                                |                          | QD77MS16                | QD77MS4       | QD77MS2       | LD77MS16       | LD77MS4       | LD77MS2       | QD77GF16       |
| Input axis                     | Servo input axis         | 16 axes/module          | 4 axes/module | 2 axes/module | 16 axes/module | 4 axes/module | 2 axes/module | 16 axes/module |
|                                | Synchronous encoder axis | 4 axes/module           |               |               |                |               |               |                |
| Composite main shaft gear      |                          | 1/output axis           |               |               |                |               |               |                |
| Main shaft main input axis     |                          | 1/output axis           |               |               |                |               |               |                |
| Main shaft sub input axis      |                          | 1/output axis           |               |               |                |               |               |                |
| Main shaft gear                |                          | 1/output axis           |               |               |                |               |               |                |
| Main shaft clutch              |                          | 1/output axis           |               |               |                |               |               |                |
| Auxiliary shaft                |                          | 1/output axis           |               |               |                |               |               |                |
| Auxiliary shaft gear           |                          | 1/output axis           |               |               |                |               |               |                |
| Auxiliary shaft clutch         |                          | 1/output axis           |               |               |                |               |               |                |
| Composite auxiliary shaft gear |                          | 1/output axis           |               |               |                |               |               |                |
| Speed change gear              |                          | 1/output axis           |               |               |                |               |               |                |
| Output axis (Cam axis)         |                          | 16 axes/module          | 4 axes/module | 2 axes/module | 16 axes/module | 4 axes/module | 2 axes/module | 16 axes/module |

### Cam control

| Item                   |                           |                   | Specifications  |         |         |          |         |         |          |
|------------------------|---------------------------|-------------------|---|---------|---------|----------|---------|---------|----------|
|                        |                           |                   | QD77MS16  | QD77MS4 | QD77MS2 | LD77MS16 | LD77MS4 | LD77MS2 | QD77GF16 |
| Memory capacity        | Storage area for cam data |                   | 256k bytes  |         |         |          |         |         |          |
|                        | Working area for cam data |                   | 1024k bytes   |         |         |          |         |         |          |
| Number of registration |                           |                   | Max. 256 (depending on memory capacity, cam resolution and number of coordinates) |         |         |          |         |         |          |
| Comment                |                           |                   | Up to 32 characters for each cam data   |         |         |          |         |         |          |
| Cam data               | Stroke ratio data type    | Cam resolution    | 256, 512, 1024, 2048, 4096, 8192, 16384, 32768                                    |         |         |          |         |         |          |
|                        |                           | Stroke ratio      | -214.7483648 to 214.7483647 [%]   |         |         |          |         |         |          |
|                        | Coordinate data type      | Coordinate number | 2 to 16384  |         |         |          |         |         |          |
|                        |                           | Coordinate data   | Input value: 0 to 2147483647 Output value: -2147483648 to 2147483647              |         |         |          |         |         |          |
| Cam auto-generation    |                           |                   | Cam auto-generation for rotary knife  |         |         |          |         |         |          |

## Specifications

### Module specification

#### Simple Motion module QD77MS16/QD77MS4/QD77MS2



| Item   |  | Specifications  |              |                         |
|--|--|---|--------------|-------------------------|
|  |  | QD77MS16  | QD77MS4      | QD77MS2                 |
| Number of control axes<br>(Virtual servo amplifier axis included)  |  | Up to 16 axes   | Up to 4 axes | Up to 2 axes            |
| Servo amplifier connection system  |  | SSCNET III/H  |              |                         |
| Maximum overall cable distance [m(ft.)]  |  | SSCNET III/H: 1600 (5249.34), SSCNET III: 800 (2624.67)   |              |                         |
| Maximum distance between stations [m(ft.)]   |  | SSCNET III/H: 100 (328.08), SSCNET III: 50 (164.04)   |              |                         |
| Peripheral I/F   |  | Via CPU module (USB, RS-232, Ethernet)  |              |                         |
| Manual pulse generator operation function  |  | Possible to connect 1 module  |              |                         |
| Synchronous encoder operation function   |  | Possible to connect 4 modules<br>(Total of the internal interface, via PLC CPU interface, and servo amplifier interface)  |              |                         |
| Near-point dog signal (DOG)<br>External command signal/<br>Switching signal (CHG)                            | Number of input points   | 4 points  |              | 2 points                |
|  | Input method   | Positive common/ Negative common shared (Photocoupler isolation)  |              |                         |
|  | Rated input voltage/current  | 24 VDC/ Approx. 5 mA  |              |                         |
|  | Operating voltage range  | 19.2 to 26.4 VDC (24 VDC +10%/-20%, ripple ratio 5% or less)  |              |                         |
|  | ON voltage/current   | 17.5 VDC or more/ 3.5 mA or more  |              |                         |
|  | OFF voltage/current  | 7 VDC or less/ 1.0 mA or less   |              |                         |
|  | Input resistance   | Approx 6.8 kΩ   |              |                         |
| Forced stop input signal (EMI)<br>Upper limit signal (FLS)<br>Lower limit signal (RLS)<br>Stop signal (STOP) | Response time  | 1 ms or less (OFF→ON, ON→OFF)   |              |                         |
|  | Recommended wire size  | AWG24 (0.2 mm <sup>2</sup> )  |              |                         |
|  | Number of input points   | 4 points, 1 point (EMI)   |              | 2 points, 1 point (EMI) |
|  | Input method   | Positive common/ Negative common shared (Photocoupler isolation)  |              |                         |
|  | Rated input voltage/current  | 24 VDC/ Approx. 5 mA  |              |                         |
|  | Operating voltage range  | 19.2 to 26.4VDC (24VDC +10%/-20%, ripple ratio 5% or less)  |              |                         |
|  | ON voltage/current   | 17.5 VDC or more/ 3.5 mA or more  |              |                         |
| Manual pulse generator/<br>Incremental synchronous encoder signal  | OFF voltage/current  | 7 VDC or less/ 1.0 mA or less   |              |                         |
|  | Input resistance   | Approx 6.8 kΩ   |              |                         |
|  | Response time  | 4 ms or less (OFF→ON, ON→OFF)   |              |                         |
|  | Recommended wire size  | AWG24 (0.2 mm <sup>2</sup> )  |              |                         |
|  | Signal input form  | Phase A/Phase B (magnification by 4/magnification by 2/magnification by 1), PULSE/SIGN  |              |                         |
|  | Input frequency  | 1Mpps (After magnification by 4, up to 4 Mpps) (Differential-output type)<br>200 kpps (After magnification by 4, up to 800 kpps) (Voltage-output/Open-collector type) |              |                         |
|  | Cable length   | Up to 30 m (98.43ft.) (Differential-output type)<br>Up to 10 m (32.81ft.) (Voltage-output/Open-collector type)  |              |                         |
| Number of I/O occupying points   | 32 points (I/O allocation: Intelligent function module, 32 points) |   |              |                         |
| Number of module occupied slots  | 1  |   |              |                         |
| 5VDC internal current consumption [A]  | 0.75   | 0.6   |              |                         |
| Mass [kg]  | 0.16   |   | 0.15         |                         |
| Exterior dimensions [mm(inch)]   | 98.0 (3.86) (H) × 27.4 (1.08) (W) × 90.0 (3.54) (D)                |   |              |                         |

### Applicable system

|                                 |  |
|---------------------------------|--|
| Basic Model QCPU                | Q00JCPU, Q00CPU, Q01CPU  |
| High performance model QCPU     | Q02CPU, Q02HCPU, Q06HCPU, Q12HCPU, Q25HCPU   |
| Universal model QCPU            | Q00UJCPU, Q00UCPU, Q01UCPU, Q02UCPU, Q03UDHCPU, Q04UDHCPU, Q06UDHCPU, Q10UDHCPU, Q13UDHCPU, Q20UDHCPU, Q26UDHCPU, Q03UDECPU, Q04UDEHCPU, Q06UDEHCPU, Q10UDEHCPU, Q13UDEHCPU, Q20UDEHCPU, Q26UDEHCPU, Q50UDEHCPU, Q100UDEHCPU |
| High-speed universal model QCPU | Q03UDVCPU, Q04UDVCPU, Q06UDVCPU, Q13UDVCPU, Q26UDVCPU  |
| C Controller                    | Q12DCCPU-V, Q24DHCCPU-V, Q24DHCPU-LS   |



## Simple Motion module LD77MS16/LD77MS4/LD77MS2



| Item  |                             | Specifications  |              |              |
|---|-----------------------------|---|--------------|--------------|
|   |                             | LD77MS16  | LD77MS4      | LD77MS2      |
| Number of control axes<br>(Virtual servo amplifier axis included) |                             | Up to 16 axes   | Up to 4 axes | Up to 2 axes |
| Servo amplifier connection system                                 |                             | SSCNET III/H (1 system)   |              |              |
| Maximum distance between stations [m(ft.)]                        |                             | SSCNET III/H: 1600 (5249.34), SSCNET III: 800 (2624.67)   |              |              |
| Maximum distance between stations [m(ft.)]                        |                             | SSCNET III/H: 100 (328.08), SSCNET III: 50 (164.04)   |              |              |
| Peripheral I/F  |                             | Via CPU module (USB, Ethernet)  |              |              |
| External command signal/<br>Switching signal (CHG)                | Number of input points      | 4 points  |              | 2 points     |
|   | Input method                | Positive common/Negative common shared (Photocoupler isolation)   |              |              |
|   | Rated input voltage/current | 24 VDC/Approx. 5 mA   |              |              |
|   | Operating voltage range     | 21.6 to 26.4 VDC (24 VDC $\pm$ 10 %, ripple ratio 5 % or less)  |              |              |
|   | ON voltage/current          | 17.5 VDC or more/3.5 mA or more   |              |              |
|   | OFF voltage/current         | 5 VDC or less/0.9 mA or less  |              |              |
|   | Input resistance            | Approx. 5.6 k $\Omega$  |              |              |
|   | Response time               | 1 ms or less (OFF $\rightarrow$ ON, ON $\rightarrow$ OFF)   |              |              |
| Forced stop input signal (EMI)                                    | Recommended wire size       | AWG24 (0.2 mm <sup>2</sup> )  |              |              |
|   | Number of input points      | 1 point (EMI)   |              |              |
|   | Input method                | Positive common/Negative common shared (Photocoupler isolation)   |              |              |
|   | Rated input voltage/current | 24 VDC/Approx. 2.4 mA   |              |              |
|   | Operating voltage range     | 20.4 to 26.4 VDC (24 VDC +10 %/-15 %, ripple ratio 5 % or less)   |              |              |
|   | ON voltage/current          | 17.5 VDC or more/2.0 mA or more   |              |              |
|   | OFF voltage/current         | 1.8 VDC or less/0.18 mA or less   |              |              |
|   | Input resistance            | Approx. 10 k $\Omega$   |              |              |
| Manual pulse generator/<br>Incremental synchronous encoder signal | Response time               | 1 ms or less (OFF $\rightarrow$ ON, ON $\rightarrow$ OFF)   |              |              |
|   | Recommended wire size       | AWG24 (0.2mm <sup>2</sup> )   |              |              |
|   | Signal input form           | Phase A/Phase B (magnification by 4/magnification by 2/magnification by 1), PULSE/SIGN  |              |              |
|   | Input frequency             | 1Mpps (After magnification by 4, up to 4 Mpps) (Differential-output type)<br>200 kpps (After magnification by 4, up to 800 kpps) (Voltage-output/Open-collector type) |              |              |
|   | Cable length                | Up to 30 m (98.43ft.) (Differential-output type)<br>Up to 10 m (32.81ft.) (Voltage-output/Open-collector type)  |              |              |
| Number of I/O occupying points                                    |                             | 32 points (I/O allocation: Intelligent function module, 32 points)  |              |              |
| Number of module occupied slots                                   |                             | 2   |              |              |
| 5VDC internal current consumption [A]                             |                             | 0.7   | 0.55         |              |
| Mass [kg]   |                             | 0.22  |              |              |
| Exterior dimensions [mm(inch)]                                    |                             | 90.0 (3.54) (H) $\times$ 45.0 (1.77) (W) $\times$ 95.0 (3.74) (D)   |              |              |

### Applicable system

|                     |  |
|---------------------|--|
| MELSEC-L series CPU | LO25CPU, LO2CPU, LO2CPU-P, LO6CPU, L26CPU, L26CPU-BT, L26CPU-PBT |
|---------------------|--|

## Specifications

### Simple Motion module QD77GF16



| Item   |                             | Specifications  |
|--|-----------------------------|---|
|  |                             | QD77GF16  |
| Number of control axes (Virtual servo amplifier axis included) |                             | Up to 16 axes   |
| Servo amplifier connection system                              |                             | CC-Link IE Field Network  |
| Maximum distance between stations [m(ft.)]                     |                             | 100 (328.08)  |
| Peripheral I/F   |                             | Via CPU module (USB, RS-232, Ethernet)  |
| Manual pulse generator operation function                      |                             | Possible to connect 1 module  |
| External command signal  | Number of input points      | 4 points  |
|  | Input method                | Positive common/ Negative common shared (Photocoupler isolation)  |
|  | Rated input voltage/current | 24 VDC/ Approx. 5 mA  |
|  | Operating voltage range     | 21.6 to 26.4 VDC (24 VDC $\pm$ 10%, ripple ratio 5% or less)  |
|  | ON voltage/current          | 17.5 VDC or more/ 3.5 mA or more  |
|  | OFF voltage/current         | 5 VDC or less/ 0.9 mA or less   |
|  | Input resistance            | Approx 5.6 k $\Omega$   |
|  | Response time               | 1 ms or less (OFF $\rightarrow$ ON, ON $\rightarrow$ OFF)   |
| Recommended wire size  |                             | AWG24 (0.2 mm <sup>2</sup> )  |
| Forced stop input signal (EMI)                                 | Number of input points      | 1 point   |
|  | Input method                | Positive common/ Negative common shared (Photocoupler isolation)  |
|  | Rated input voltage/current | 24 VDC/ Approx. 2.4 mA  |
|  | Operating voltage range     | 20.4 to 26.4VDC (24VDC +10%/-15%, ripple ratio 5% or less)  |
|  | ON voltage/current          | 17.5 VDC or more/ 2 mA or more  |
|  | OFF voltage/current         | 1.8 VDC or less/ 0.18 mA or less  |
|  | Input resistance            | Approx. 10 k $\Omega$   |
|  | Response time               | 1 ms or less (OFF $\rightarrow$ ON, ON $\rightarrow$ OFF)   |
| Recommended wire size  |                             | AWG24 (0.2 mm <sup>2</sup> )  |
| Manual pulse generator/Incremental synchronous encoder signal  | Signal input form           | Phase A/Phase B (magnification by 4/magnification by 2/magnification by 1), PULSE/SIGN  |
|  | Input frequency             | 1Mpps (After magnification by 4, up to 4 Mpps) (Differential output type)<br>200 kpps (After magnification by 4, up to 800 kpps) (Voltage-output/Open-collector type) |
|  | Cable length                | Up to 30 m (98.43ft.) (Differential output type)<br>Up to 10 m (32.81ft.) (Voltage-output/Open-collector type)  |
| Number of I/O occupying points                                 |                             | 32 points (I/O allocation: Intelligent function module, 32 points)  |
| Number of module occupied slots                                |                             | 1   |
| 5VDC internal current consumption [A]                          |                             | 0.8   |
| Mass [kg]  |                             | 0.26  |
| Exterior dimensions [mm(inch)]                                 |                             | 98.0 (3.86) (H) $\times$ 27.4 (1.08) (W) $\times$ 115 (4.53) (D)  |

### Applicable system

|   |   |
|---|---|
| Universal model QCPU (Upper five digit of Serial No. is "12012" or later) | Q00UJCPU, Q00UCPU, Q01UCPU, Q02UCPU, Q03UDCPU, Q04UDHCPU, Q06UDHCPU, Q10UDHCPU, Q13UDHCPU, Q20UDHCPU, Q26UDHCPU, Q03UDECPU, Q04UDEHCPU, Q06UDEHCPU, Q10UDEHCPU, Q13UDEHCPU, Q20UDEHCPU, Q26UDEHCPU, Q50UDEHCPU, Q100UDEHCPU |
| High-speed universal model QCPU   | Q03UDVCPU, Q04UDVCPU, Q06UDVCPU, Q13UDVCPU, Q26UDVCPU   |

## Performance specification of CC-Link IE Field Network (QD77GF)

| Item                                   |                            | Specifications  |
|--|----------------------------|---|
|  |                            | Motion station  |
| Maximum number of links per network    | RX                         | 8k points (8192 points, 1k bytes)   |
|  | RY                         | 8k points (8192 points, 1k bytes)   |
|  | RWr                        | 1k points (1024 points, 2k bytes)   |
|  | RWw                        | 1k points (1024 points, 2k bytes)   |
| Maximum number of link per station     | RX                         | 8k points (8192 points, 1k bytes)   |
|  | RY                         | 8k points (8192 points, 1k bytes)   |
|  | RWr                        | 1k points (1024 points, 2k bytes)   |
|  | RWw                        | 1k points (1024 points, 2k bytes)   |
| Communication speed                    |                            | 1Gbps   |
| Maximum number of stations per network | I/O devices                | 105 (1 master and 104 device stations)  |
|  | Servo amplifier            | 16  |
| Connectable station type               | Local station              | Unable to connect   |
|  | Intelligent device station | Able to connect   |
|  | Remote device station      | Able to connect   |
|  | Remote I/O station         | Able to connect   |
| Cable type                             |                            | Ethernet cable (Category 5e or higher)  |
| Overall cable distance (max.)          | Line topology              | 12000m (with 1 master and 120 device stations connected)                            |
|  | Star topology              | Depends on the system configuration   |
| Station-to-station distance (max.)     |                            | 100m  |
| Maximum number of networks             |                            | 239   |
| Topology                               |                            | Line, star <sup>(Note-1)</sup> , and line/star mixed topologies <sup>(Note-1)</sup> |
| Synchronous communication              |                            | Available   |

(Note-1): Star topology needs a HUB. HUB applied: DT135TX (Produced by Mitsubishi Electric System & Service Co., Ltd.)

## Cable specifications (QD77GF)

| Item           |           | Specifications   |
|----------------|-----------|--|
| Ethernet cable |           | Category 5e or higher, (Double shielded/STP) Straight cable  |
|                | Standard  | The following conditioning cables:<br><ul style="list-style-type: none"> <li>• IEEE802.3 (1000BASE-T)</li> <li>• ANSI/TIA/EIA-568-B (Category 5e)</li> </ul> |
|                | Connector | RJ-45 connector with shield  |

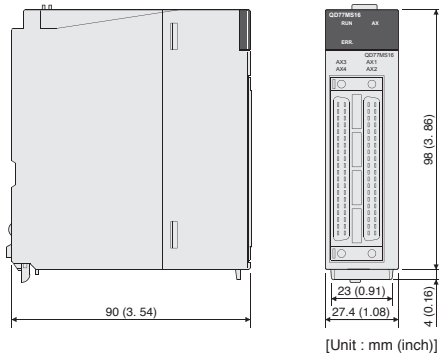
(Note): Use the cables recommended by CC-Link Partner Association for CC-Link IE Field Network.  
 CC-Link IE Field Network cables are not compatible with CC-Link IE Controller Network.  
 The cable for CC-Link IE Field Network cable is produced by Mitsubishi Electric System & Service Co., Ltd.  
 For details, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION. (Email: osb.webmaster@melsc.jp)

# Simple Motion Module

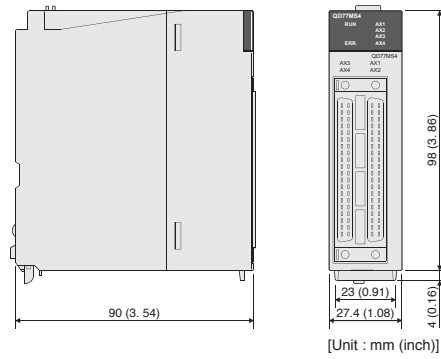
## Specifications

### Exterior dimensions

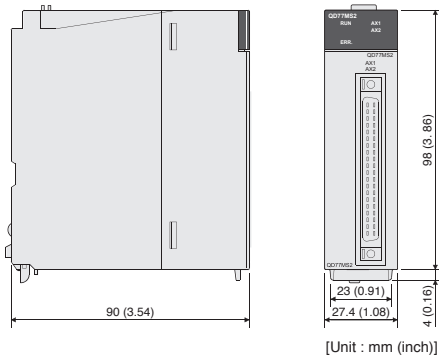
Simple Motion module QD77MS16



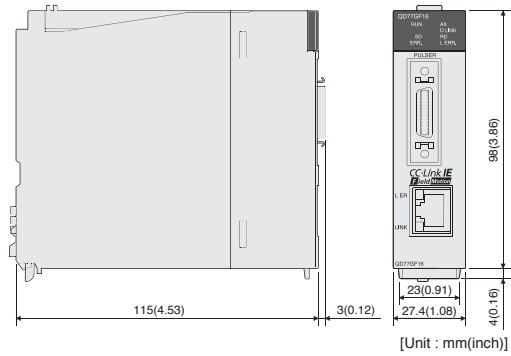
Simple Motion module QD77MS4



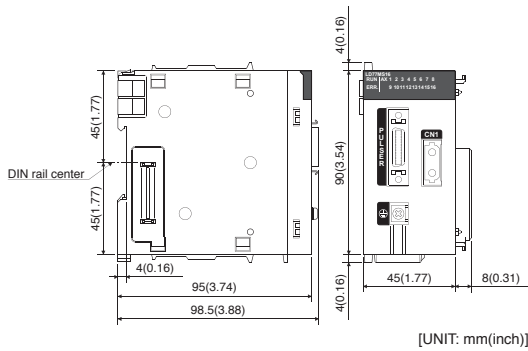
Simple Motion module QD77MS2



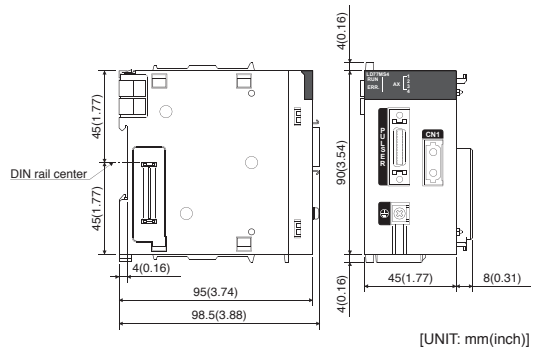
Simple Motion module QD77GF16



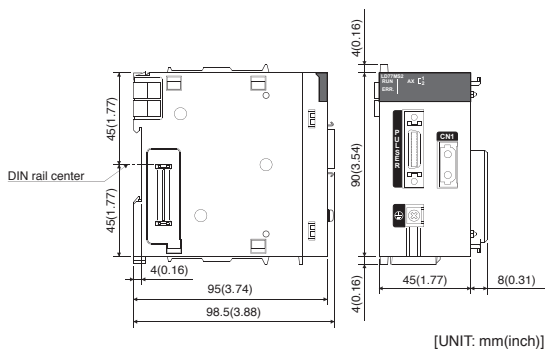
Simple Motion module LD77MS16



Simple Motion module LD77MS4



Simple Motion module LD77MS2



## ■ Components

Compliance with the indicated global standards and regulations is current as of the release date of this catalog.  
Contact your local sales office for the latest information.

### Simple Motion module QD77MS/LD77MS/QD77GF

#### [Simple Motion dedicated module]

| Part                                      | Model                            | Description   |   | Standards  |
|---|----------------------------------|---|---|------------|
| Simple Motion Module                      | QD77MS16 <sup>(Note-1)</sup>     | Up to 16 axes   |   | CE, UL, KC |
|   | QD77MS4 <sup>(Note-1)</sup>      | Up to 4 axes  |   | CE, UL, KC |
|   | QD77MS2 <sup>(Note-1)</sup>      | Up to 2 axes  |   | CE, UL, KC |
|   | LD77MS16 <sup>(Note-2)</sup>     | Up to 16 axes   |   | CE, UL, KC |
|   | LD77MS4 <sup>(Note-2)</sup>      | Up to 4 axes  |   | CE, UL, KC |
|   | LD77MS2 <sup>(Note-2)</sup>      | Up to 2 axes  |   | CE, UL, KC |
|   | QD77GF16 <sup>(Note-2)</sup>     | Up to 16 axes   |   | CE, UL, KC |
| SSCNET III cable <sup>(Note-3)</sup>      | MR-J3BUS_M                       | · Simple Motion module<br>⇔MR-J4-B  | Standard code for inside panel<br>0.15m (0.49ft.), 0.3m (0.98ft.),<br>0.5m (1.64ft.), 1m (3.28ft.), 3m (9.84ft) | —          |
|   | MR-J3BUS_M-A                     |   | Standard code for outside panel<br>5m (16.40ft.), 10m (32.81ft.),<br>20m (65.62ft.)                             | —          |
|   | MR-J3BUS_M-B <sup>(Note-4)</sup> | · MR-J4-B⇔MR-J4-B   | Long distance cable<br>30m (98.43ft.), 40m (131.23ft.),<br>50m (164.04ft.)                                      | —          |
| Manual pulse generator                    | MR-HDP01                         | Number of pulses per revolution: 25pulse/rev (100pulse/rev after magnification by 4),<br>Permitted speed: 200r/min (Normal rotation)                  |   | —          |
| Connector for external input signal cable | LD77MHIOCON                      | Manual pulse generator/Incremental synchronous encoder interface, Interface for forced stop input, External command signal/Switching signal interface |   | —          |

(Note-1): Order the A6CON1, A6CON2, and A6CON4 separately because the connectors are not included in the package.

(Note-2): Order the LD77MHIOCON separately because the connector is not included in the package.

(Note-3): " \_ " indicates cable length (015: 0.15m (0.49ft.), 03: 0.3m (0.98ft.), 05: 0.5m (1.64ft.), 1: 1m (3.28ft.), 3: 3m (9.84ft.), 5: 5m (16.40ft.), 10: 10m (32.81ft.), 20: 20m (65.62ft.), 30: 30m (98.43ft.), 40: 40m (131.23ft.), 50: 50m (164.04ft))

(Note-4): For long distance cable up to 100m (328.08ft.) and ultra-long bending life cable, please contact Mitsubishi Electric System & Service Co., Ltd. OVERSEAS SERVICE SECTION.  
(Email: osb.webmaster@melsc.jp)

# SSCNET III/H

SERVO SYSTEM CONTROLLER NETWORK

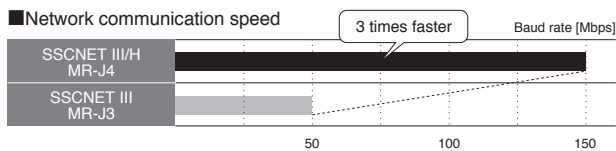
The blazingly fast

## High-response System Achieved with SSCNET III/H

### Three Times Faster Communication Speed

Industry-leading levels

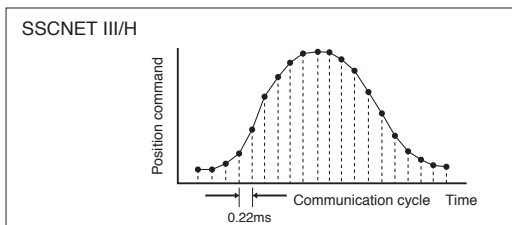
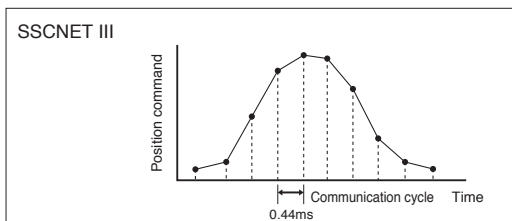
Communication speed is increased to 150 Mbps full duplex (equivalent to 300 Mbps half duplex), three times faster than the conventional speed. System response is dramatically improved.



### Cycle Times as Fast as 0.22 ms

Industry-leading levels

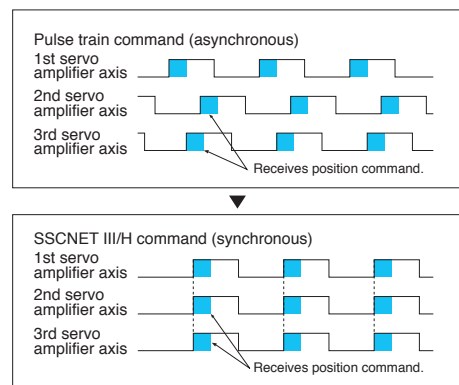
Smooth control of machine is possible using high-speed serial communication with cycle times of 0.22 ms.



### Deterministic and Synchronized Communication

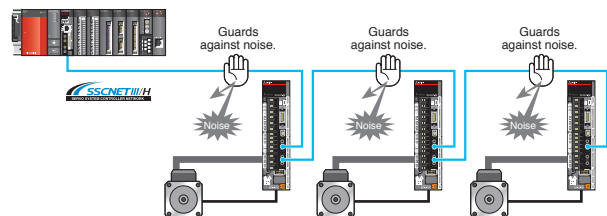
Complete deterministic and synchronized communication is achieved with SSCNET III/H, offering technical advantages in machines such as printing and food processing machines that require synchronous accuracy.

#### Timing of servo amplifier processing



### No Transmission Collision

The fiber-optic cables thoroughly shut out noise that enters from the power cable or external devices. Noise tolerance is dramatically improved as compared to metal cables.



speed and response of 150 Mbps full-duplex baud rate SSCNET III/H optical networking

Outline

Motion Controller

Simple Motion Module

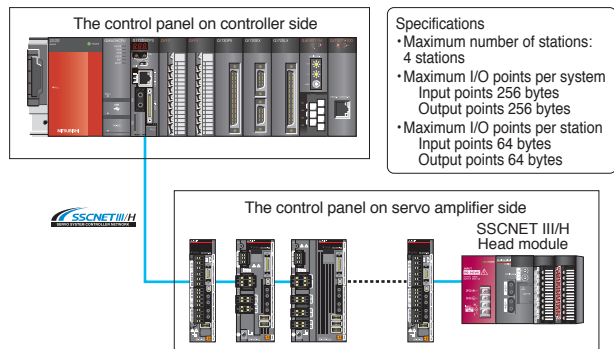
Network

Servo Amplifier

Engineering Environment

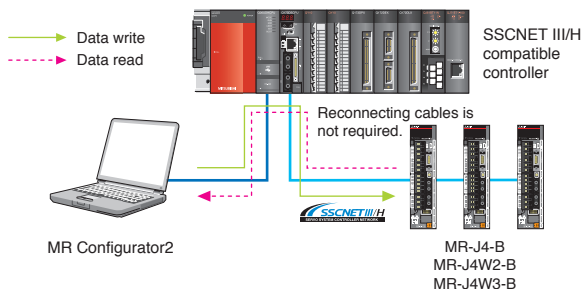
## Dramatically Reduced Wiring

The SSCNET III/H Head module allows the controller to connect remotely with various modules (I/O, analog, high-speed counter, etc.) via SSCNET III/H. This results in reduced wiring since the Motion controller receives the I/O and analog I/O signals directly from the servo amplifier side.



## Central Control with Network

Large amounts of servo data are exchanged in real-time between the controller and the servo amplifier. Using MELSOFT MR Configurator2 on a personal computer that is connected to the Motion controller or the Simple Motion module helps consolidate information such as parameter settings and monitoring for the multiple servo amplifiers.

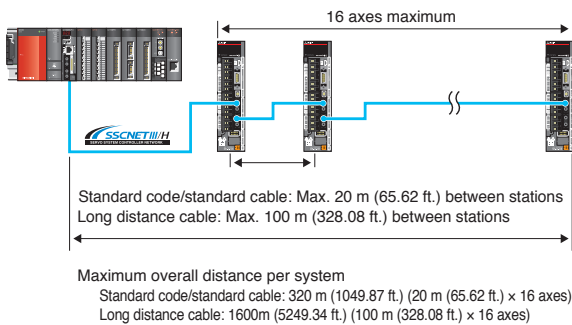


## Long Distance Wiring up to 1600 m (5249.34 ft.)

Enhanced performance

Long distance wiring is possible up to 1600 m (5249.34 ft.) per system (maximum of 100 m (328.08 ft.) between stations × 16 axes). Thus, it is suitable for large-scale systems.

\* This is when all axes are connected via SSCNET III/H.

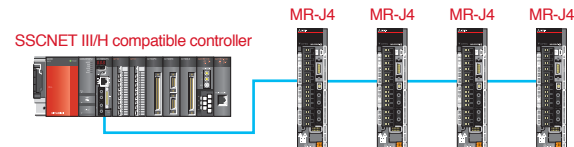


## SSCNET III/H Compatible and SSCNET III Compatible Products Connected in a Same System

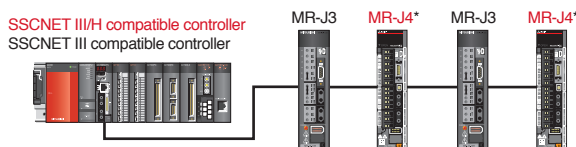
SSCNET III/H and SSCNET III compatible controllers support the use of SSCNET III/H and SSCNET III compatible servo amplifiers together in a same system.

\* When the SSCNET III compatible products are in the system, the communication speed is 50 Mbps, and the function and the performance are equivalent to those of MR-J3.

### Communication speed: 150 Mbps



### Communication speed: 50 Mbps

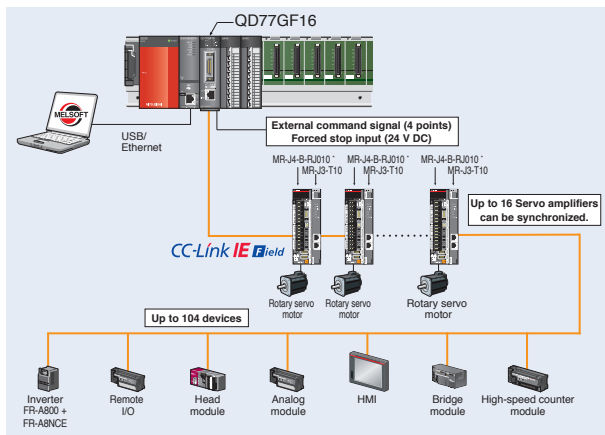


## CC-Link IE Field Network

### CC-Link IE Field Network — All-rounder network opens up new areas of control

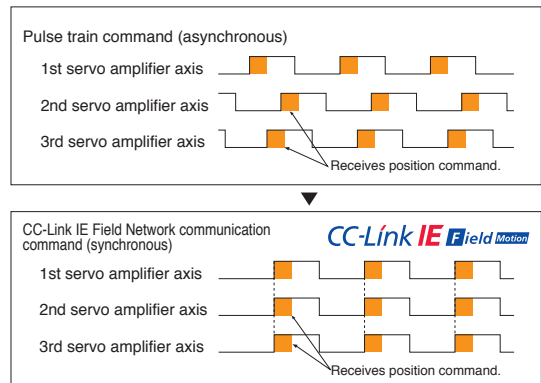
#### All-Rounder Network

CC-Link IE Field Network is an Ethernet-based open network. Its highly flexible wiring to match your device layout can perform high-speed controller distributed control, I/O control and safety control. Because the CC-Link IE Field Network is based on the Ethernet, cables and connectors are readily available in the world.



#### Motion Control Achieved

CC-Link IE Field Network is now equipped with Motion function. High-speed positioning control, synchronous control and cam control can be performed easily at a control cycle of 0.88 ms, 1.77 ms, or 3.55 ms just with simple parameter settings and startup from the sequence program. This network is suitable for food processing machines and machine tools which require synchronous control.

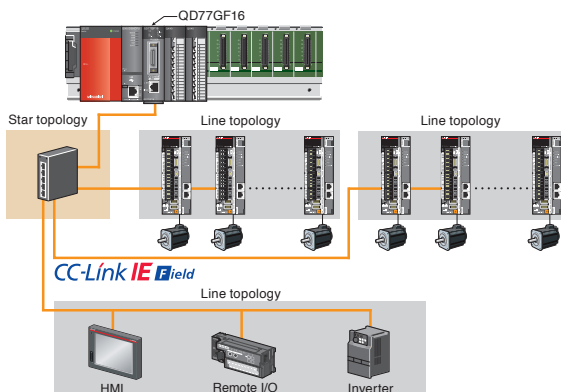


#### Flexible Network Topology

Line, star, and line/star mixed topologies are available for the CC-Link IE Field Network wiring layout.

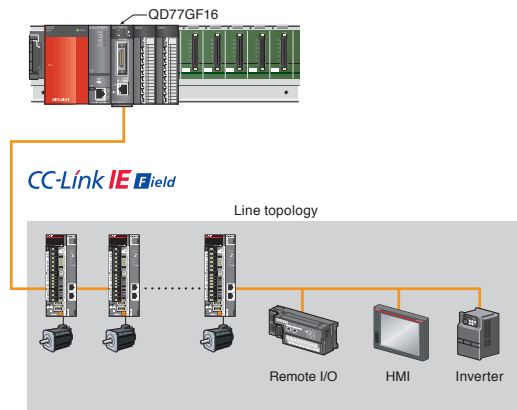
#### Line/star mixed topology

Star topology is available using an industrial switching HUB. HUB applied: DT135TX (manufactured by Mitsubishi Electric System & Service Co., Ltd.)



#### Line topology

The Simple Motion modules (Master station) can be connected to device stations without using a HUB, which reduces cost.

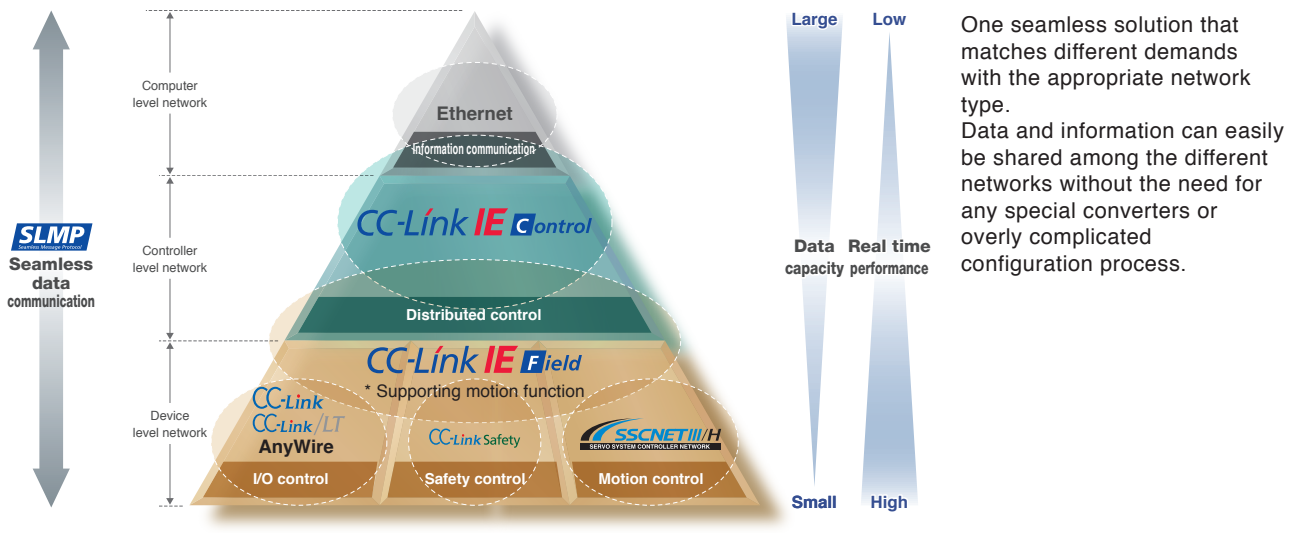




FA Integrated Network

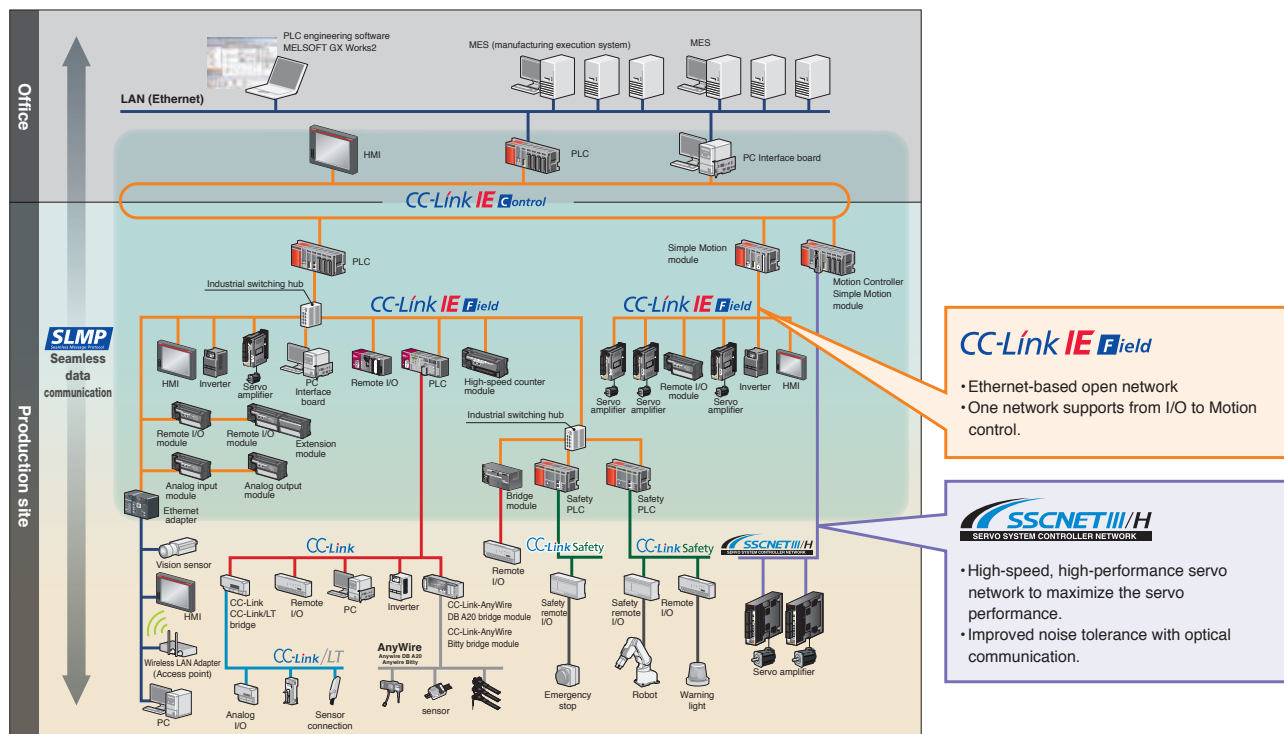
FA integrated network for optimal FA environment

Seamless Data Communication with FA Integrated Network



FA Integrated Network System Architecture

Connections and accesses to various devices are possible through CC-link IE Control, the controller network; CC-Link IE Field, the field network; and SSCNET III/H, the Motion network; and Anywire, the sensor network.



Servos in harmony with man, machine and the environment



## Servo Amplifier

Compatible with the advanced high-speed Motion network "SSCNET III/H", these servo amplifiers operate rotary/linear servo motors or direct drive motors as standard <sup>(Note)</sup>. Multi-axis servo amplifiers are also available, achieving energy conservation, space-saving, and reduced wiring.

(Note): MR-J4-B-RJ010 servo amplifiers are compatible only with rotary servo motors.



SSCNET III/H compatible servo amplifier  
**MR-J4-B**  
**MR-J4-B-RJ**



SSCNET III/H compatible 2-axis servo amplifier  
**MR-J4W2-B**



SSCNET III/H compatible 3-axis servo amplifier  
**MR-J4W3-B**



CC-Link IE Field Network servo amplifier with Motion  
**MR-J4-B-RJ010**  
**+MR-J3-T10**

## Servo Motor

A variety of models are available to match various applications. These include rotary servo motors for high-torque output during high speed, linear servo motors for highly accurate tandem synchronous control, and direct drive motors for compact and rigid machine, and high-torque operations.

### Rotary servo motor



Small capacity, low inertia  
**HG-KR** series  
Capacity: 50 to 750 W



Small capacity, ultra-low inertia  
**HG-MR** series  
Capacity: 50 to 750 W



Medium capacity, medium inertia  
**HG-SR** series  
Capacity: 0.5 to 7 kW



Medium/large capacity, low inertia  
**HG-JR** series  
Capacity: 0.5 to 55 kW



Medium capacity, ultra-low inertia  
**HG-RR** series  
Capacity: 1 to 5 kW



Medium capacity, flat type  
**HG-UR** series  
Capacity: 0.75 to 5 kW

### Linear servo motor



Core type  
**LM-H3** series  
Rating: 70 to 960 N



Core type (natural/liquid cooling)  
**LM-F** series  
Rating: 300 to 3000 N (natural cooling)  
Rating: 600 to 6000 N (liquid cooling)



Core type with magnetic attraction counter-force  
**LM-K2** series  
Rating: 120 to 2400 N



Coreless type  
**LM-U2** series  
Rating: 50 to 800 N



Low-profile flange type  
**TM-RG2M** series  
Low-profile table type  
**TM-RU2M** series  
Rating: 2.2 to 9 N·m



High rigidity  
**TM-RFM** series  
Rating: 2 to 240 N·m

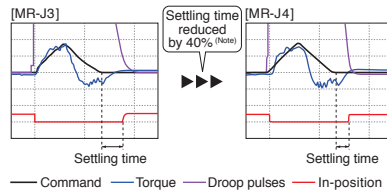
## Machine

### Industry-Leading Level of Servo Amplifier Basic Performance

Industry-leading levels

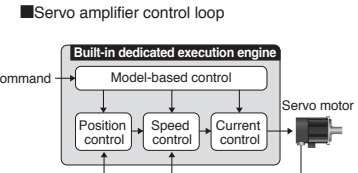
Our original high-speed servo control architecture is evolved from the conventional two-degrees-of-freedom model adaptive control and applied to the dedicated execution engine. **Speed frequency response is increased to 2.5 kHz.** Compatible servo motors are equipped with a **high-resolution absolute position encoder of 4,194,304 pulses/rev (22-bit)**, enabling high-speed and high-accuracy operation. The performance of the high-end machine is utilized to the fullest.

[Settling time comparison with the prior model]



(Note): The result is based on our evaluation condition.

[Dedicated execution engine]

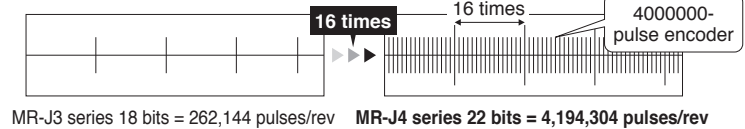


### Improving Machine Performance with High-Performance Servo Motors

Industry-leading levels

Rotary servo motors achieve high-accuracy positioning and smooth rotation with a high-resolution encoder and improved processing speed.

[Resolution comparison with the prior model]

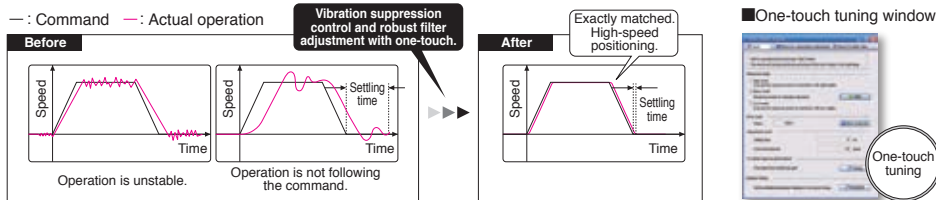


### Advanced One-Touch Tuning Function

Enhanced functions

Servo gain adjustment is complete just by turning on the one-touch tuning function. With this function, machine resonance filter, advanced vibration suppression control II (Note), and robust filter are automatically adjusted to maximize your machine performance. This function also sets responsiveness automatically while the real-time auto tuning requires manual setting.

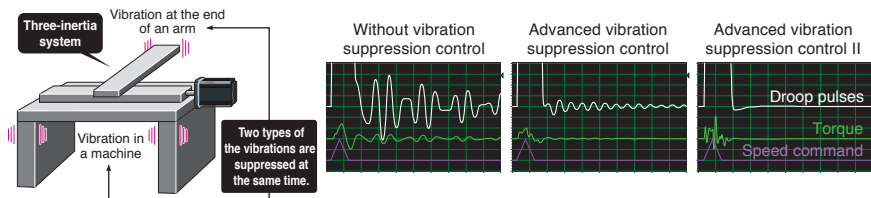
(Note): The advanced vibration suppression control II automatically adjusts one frequency.



### Advanced Vibration Suppression Control II

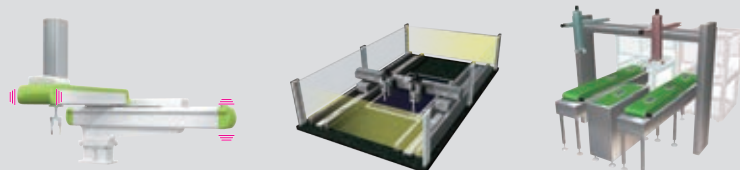
Patented Enhanced functions

The advanced vibration suppression control II suppresses two types of low frequency vibrations owing to vibration suppression algorithm which supports three-inertia system. This function is effective in suppressing residual vibration with relatively low frequency of approximately 100 Hz or less generated at the end of an arm and in a machine, enabling a shorter settling time. Adjustment is easily performed on MR Configurator2.



#### Application examples

[Pick and place robots]    [Automatic assembly equipment]    [Material handling systems]



Outline

Motion Controller

Simple Motion Module

Network

Servo Amplifier

Engineering Environment

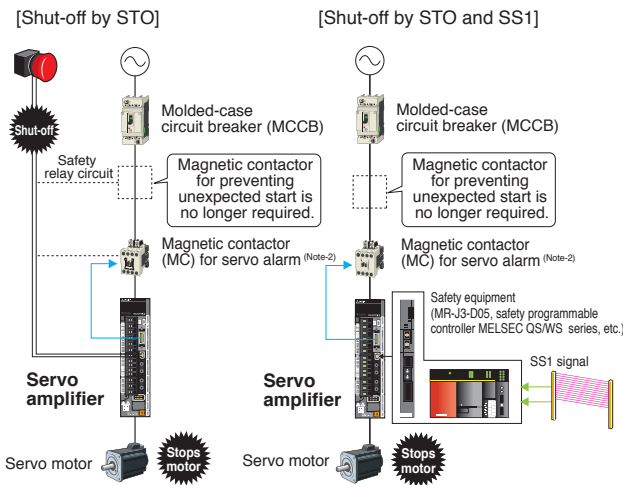
## Man

### Functions According to IEC/EN 61800-5-2

STO (Safe torque off) and SS1 <sup>(Note-1)</sup> (Safe stop 1) are integrated as standard, enabling the safety system to be configured easily in the machine.

- Turning off the control power of servo amplifier is not required, cutting out the time for restart. Additionally, home position return is not required.
- Magnetic contactor for preventing unexpected motor start is not required. <sup>(Note-2)</sup>

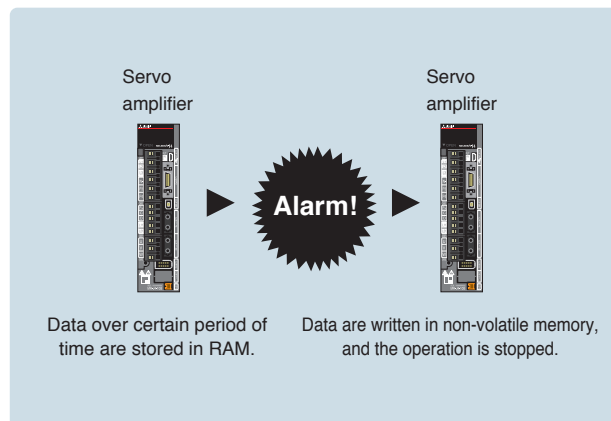
<sup>(Note-1):</sup> Safety equipment (MR-J3-D05, safety programmable controller MELSEC QS/WS series, etc.) is required.  
<sup>(Note-2):</sup> MR-J4 series servo amplifiers do not require a magnetic contactor to satisfy the requirements of STO; however, the figure shows a magnetic contactor installed to prevent servo alarms and a risk of electric shock.



### Large Capacity Drive Recorder

Patented Enhanced functions

- Servo data such as motor current and position command before and after the alarm occurrence are stored in non-volatile memory of the servo amplifier. The data read on MELSOFT MR Configurator2 during restoration are used for cause analysis.
- Check the waveform ((analog 16 bits × 7 channels + digital 8 channels) × 256 points) of 16 alarms in the alarm history and the monitor value.

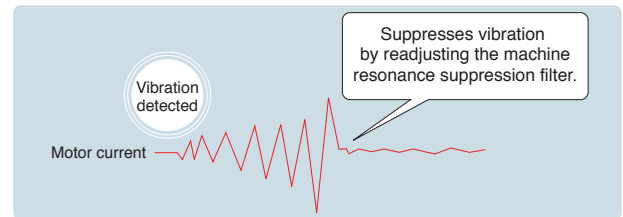


### Tough Drive Function

Enhanced functions

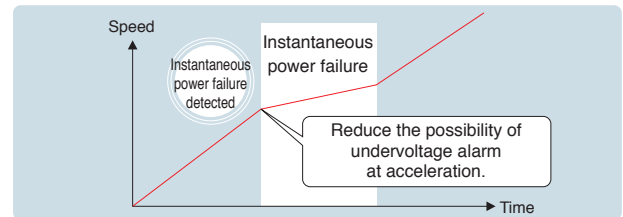
#### Vibration tough drive

Machine resonance suppression filter is automatically readjusted when a change in machine resonance frequency is detected by the servo amplifier. Losses from the machine stop due to age-related deterioration are reduced.



#### Instantaneous power failure tough drive

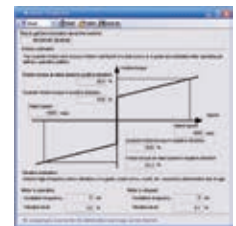
The possibility of undervoltage alarm is reduced when instantaneous power failure is detected in the input power.



### Machine Diagnosis Function

Patented

This function detects changes of machine parts (ball screw, guide, bearing, belt, etc.) by analyzing machine friction, load moment of inertia, unbalanced torque, and changes in vibration component from the data inside the servo amplifier, supporting timely maintenance of the driving parts.

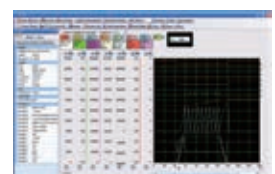


Machine diagnosis window

Servo setup software

### MELSOFT MR Configurator2

Tuning, monitor display, diagnosis, reading/writing parameters, and test operations are easily performed on a personal computer. This start-up support tool achieves a stable machine system, optimum control, and short setup time.



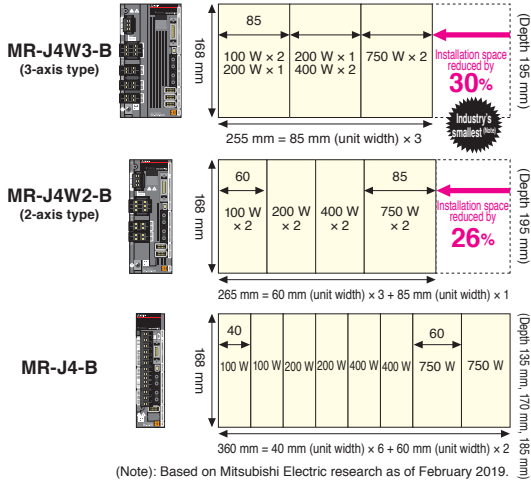
Graph window

The Environment

Space-Saving with Industry's Smallest (Note) 3-Axis Type

2-axis servo amplifier MR-J4W2-B requires 26% less installation space than two units of MR-J4-B. 3-axis servo amplifier MR-J4W3-B requires 30% less installation space than three units of MR-J4-B.

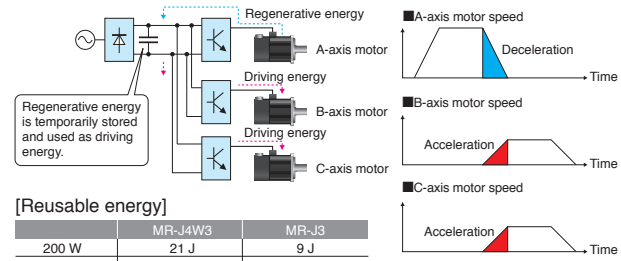
[Installation space: Configuration example of installing two units of 100 W, 200 W, 400 W, and 750 W each]



Supporting Energy-Conservative Machine Using Regenerative Energy

In the multi-axis servo amplifier, the regenerative energy of an axis is used as driving energy for the other axes, contributing to energy-conservation of machine. Reusable regenerative energy stored in the capacitor is increased for MR-J4W2-B/MR-J4W3-B as compared to the prior model. Regenerative option is no longer required (Note-1).

(Note-1): Regenerative option may be required depending on the conditions.

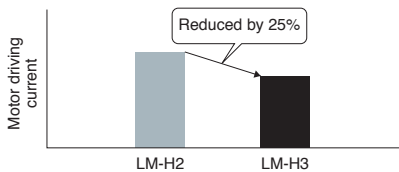


In the multi-axis servo amplifier, the amount of temporarily stored regenerative energy can be increased by using a capacitor bank. (Available in the future) Contact your local sales office for more details.

Energy-Conservation Achieved by LM-H3 Linear Servo Motor Series

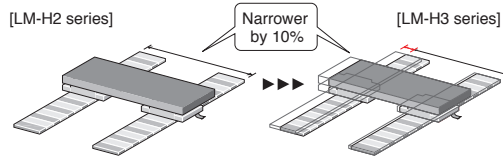
Reduced motor driving power

LM-H3 has achieved a reduction of 25% in motor driving current due to a new magnetic design with optimized magnet form, contributing to power conservation for machines. The motor coil is lighter as compared to the prior model, which also contributes to saving energy for driving the moving part. (Note): For 720 N rated linear servo motor.



Space saving

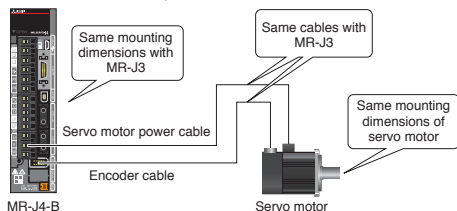
For LM-H3, widths of the motor coil and the magnet are reduced by 10% from the prior model. Increased thrust to current ratio results in using the servo amplifier in smaller capacity, contributing to more compact machine (the reduction of materials).



Heritage

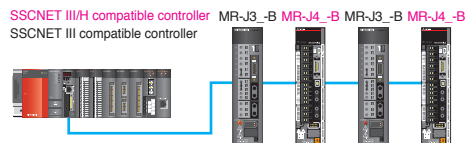
- MR-J4-B has the same mounting dimensions (Note-1) with MR-J3-B. HG rotary servo motor series has the same mounting dimensions (Note-2) and uses the same option cables for the power, the encoder (Note-3), and the electromagnetic brake as HF series or HC-RP/HC-UP series.

(Note-1): Mounting dimensions are smaller for 200 V 5 kW, 400 V 3.5 kW, 200 V/400 V 11 kW, and 200 V/400 V 15 kW servo amplifiers. (Note-2): For a replacement of HA-LP series with HG-JR series, contact your local sales office. (Note-3): An encoder cable is incompatible with HG-JR series of 11 kW to 55 kW.



- SSCNET III/H compatible and SSCNET III compatible products can be used together.

(Note): When the SSCNET III compatible products are in the system, the communication speed is 50 Mbps, and the function and the performance are equivalent to those of MR-J3.



- Parameters are automatically converted by changing MR-J3-B to MR-J4-B with MELSOFT MT Works2 (Note-1).

(Note-1): Update your MT Works2 to the latest version.

Fully supporting all your needs from model selection, system design, startup to maintenance with diverse software

Motion Controller Engineering Software  
**MELSOFT MT Works2**

**Comprehensively supporting Motion controller design and maintenance**

Motion SFC programming, parameter setting, digital oscilloscope function, and simulation function are available. This software supports all necessary steps including system configuration, programming, debugging, and maintenance of Motion controllers.

Programmable Controller Engineering Software  
**MELSOFT GX Works2**

**Supporting settings of Simple Motion modules as well as sequence program creation**

This software supports sequence program creation and the necessary setup steps for use of Simple Motion modules, such as the creation, startup, debugging, and maintenance of parameters, positioning data, and cam data.

Servo Setup Software  
**MELSOFT MR Configurator2**

**Startup support tool for a suitable machine system, optimum control and short setup time**

Tuning, monitor display, diagnosis, reading/writing parameters, and test operations are easily performed on a personal computer. This startup support tool achieves a stable machine system, optimum control, and short setup time.

Motion Controller Engineering Software  
Programmable Controller Engineering Software

**MELSOFT MT Works2**  
**MELSOFT GX Works2**

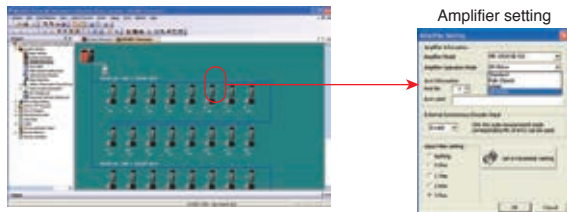


**System design**

**SSCNET settings**



Servo amplifiers and modules can be set easily with a graphical system setting screen.



**System configuration**



Motion modules can be set easily with a graphical screen.

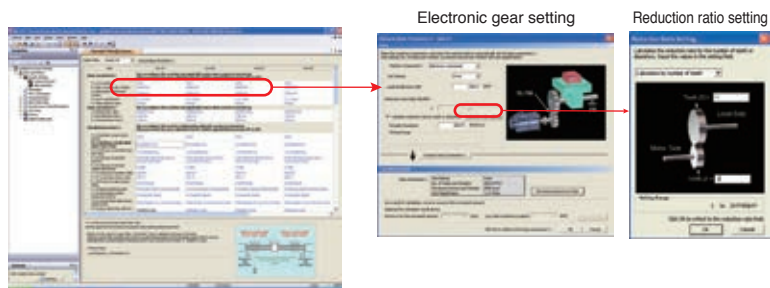


**Servo data setting**



One-point help allows parameters to be set without a manual.

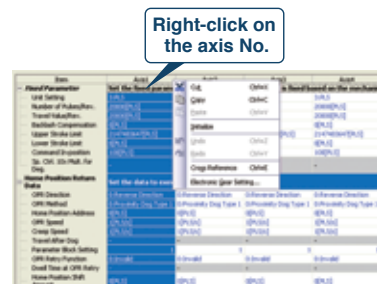
The electronic gear can be set easily just by inputting the machine specifications (reduction ratio, ball screw pitch, etc.).

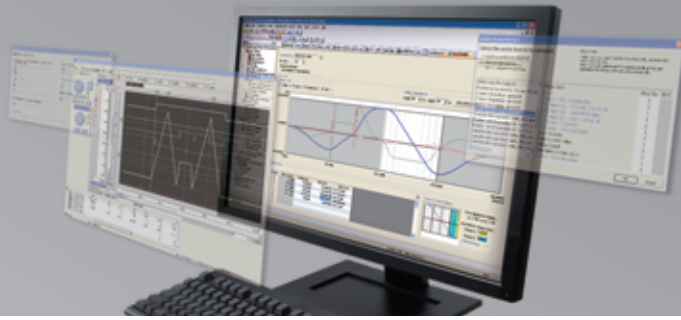


**Copying servo data**



Copy & paste the data between axes easily.



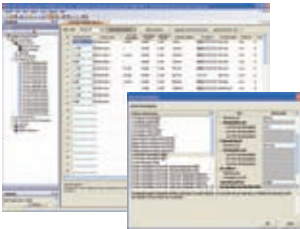


## Programming

### Positioning data setting

GX Works2

Functions such as Data setting assistant, and Automatic calculation of auxiliary arc simplify the setting input process of positioning data.



### Command speed automatic calculation

GX Works2

The speed is automatically calculated by specifying the movement distance, operation time, and acceleration/deceleration time.



### Programming

MT Works2

User-friendly functions facilitate Motion controller program development.



### Synchronous control parameter

MT Works2

GX Works2

Using software to replace machine mechanisms, such as the gear, shaft, speed change gear and cam achieves synchronous control, just by setting parameters.

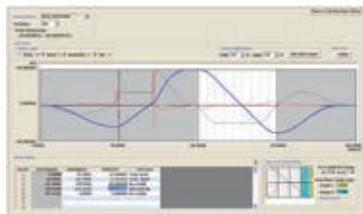


### Cam data creation

MT Works2

GX Works2

Cam control has become more flexible than the conventional. Various cam patterns are created.

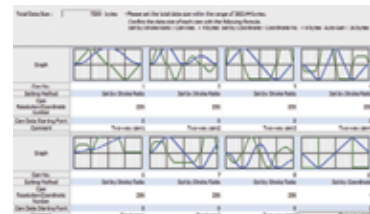


### Cam data list

MT Works2

GX Works2

The created cam data are easily viewed as thumbnails.



## Startup and adjustment

### Monitor

MT Works2

GX Works2

The items and axes to be displayed can be selected from various monitored information.



### Digital oscilloscope

MT Works2

GX Works2

Operation check and troubleshooting are powerfully supported with data collection and wave displays which are synchronized to the Motion operation cycle.



The assistant function explains all work steps. Set often-viewed data easily with the purpose-based probe setting.

### Simulator

MT Works2

Program debugging can be executed without using a Motion controller, which improves designing efficiency.

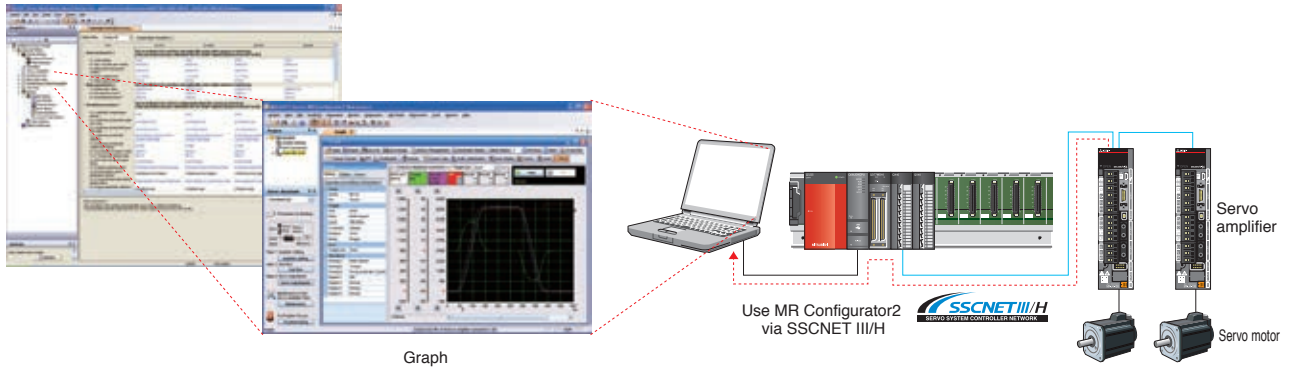


Easy setup

Servo setup software **MELSOFT MR Configurator2**



MR Configurator2



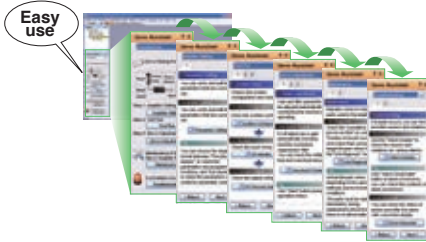
(Note): MELSOFT MR Configurator2 is included in MELSOFT MT Works2.

## Setting and startup

MR Configurator2

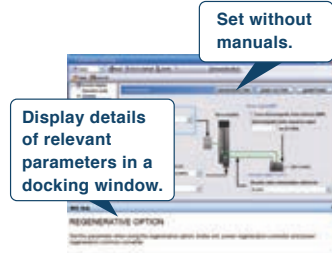
### ■ Servo assistant function

Complete setting up the servo amplifier just by following guidance displays.



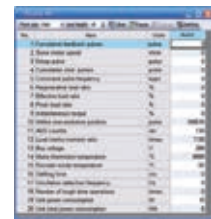
### ■ Parameter setting function

Display parameter setting in list or visual formats, and set parameters by selecting from the drop-down list.



### ■ Monitor function

Monitor operation status on the [Display all] window. Measurement equipment such as electric power meter is not required since power consumption is monitored.

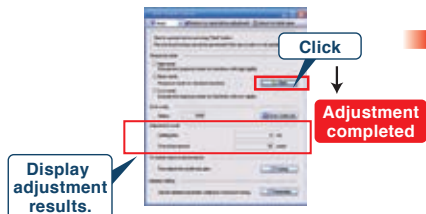


## Servo adjustment

MR Configurator2

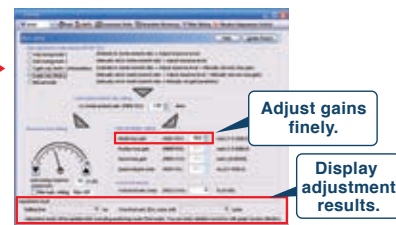
### ■ One-touch tuning function

Adjustments including estimating load to motor inertia ratio, adjusting gain, and suppressing machine resonance are automatically performed for the maximum servo performance just by clicking the start button.



### ■ Tuning function

Adjust control gain finely on the [Tuning] window manually for further performance after the one-touch tuning.



### ■ Alarm window

In MR-J4 series, servo alarms are displayed in three digits. Troubleshooting at alarm occurrence is easy.







Select the most suitable motor for your machine

## Capacity selection software MRZJW3-MOTSZ111E


The most suitable servo amplifier, servo motor, and regenerative option can be selected just by setting machine specifications and operation pattern. Select the operation pattern from either position control mode or speed control mode. The capacity selection software is available for free download. Contact your local sales office for more details.




■ Horizontal ball screws, vertical ball screws, rack and pinions, roll feeds, rotating tables, carts, elevators, conveyors, linear servo, other devices  
 ■ Prints entered specifications, operation pattern, calculation process, graph of selection process feed speed and torque, and sizing results.



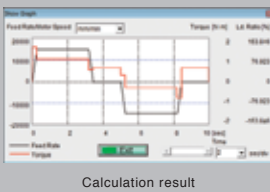
Amplifier series selection



Motor series selection



Operation pattern



Calculation result

Implements a seamless engineering environment

## MELSOFT iQ Works

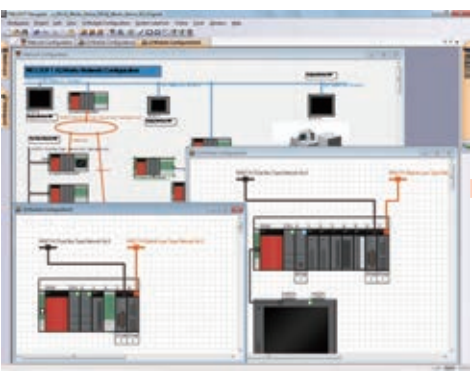
# MELSOFT iQ Works

MELSOFT iQ Works is an integrated engineering software product, composing of GX Works2, MT Works2, GT Works3, and RT ToolBox2. By sharing information such as system designs and programming as the entire control system, the system design and programming efficiency are improved and total cost reduction is achieved.


### MELSOFT Navigator

In combination with GX Works2, MT Works2, GT Works3, and RT ToolBox2, this software performs upstream system design and inter-software operation.


It provides such convenient functions as system configuration design, batch setting of parameters, system labeling, and batch reading.




MELSOFT Navigator




Programmable Controller  
Engineering Software  
MELSOFT GX Works2



Motion Controller  
Engineering Software  
MELSOFT MT Works2



Screen Design Software  
MELSOFT GT Works3



Robot Total Engineering  
Support Software  
MELSOFT RT ToolBox2

## Operating environment

### MELSOFT MT Works2

| Item                     | Description  |  |
|--------------------------|--|--|
| OS                       | Microsoft® Windows®11 (Home, Pro, Enterprise, Education)<br>Microsoft® Windows®10 (Home, Pro, Enterprise, Education, IoT Enterprise 2016 LTSP*) *1: 64-bit edition supported |  |
| CPU                      | Windows®11   | Two or more cores on a compatible 64-bit processor or System on a Chip (SoC) |
|                          | Windows®10   | Intel® Core™ 2 Duo Processor 2 GHz or more recommended                       |
| Required memory          | Windows®11   | 4 GB or more recommended   |
|                          | Windows®10   | 64-bit OS: 2 GB or more recommended<br>32-bit OS: 1 GB or more recommended   |
| Required hard disk space | For installation: 13 GB or more free hard disk space<br>For operation: 512 MB or more free virtual memory space  |  |
| Monitor                  | Resolution 1024 x 768 or more  |  |

(Note-1) Refer to Installation Instructions for precautions and restrictions regarding the operating environment.

### MELSOFT GX Works2

| Item                     | Description  |  |
|--------------------------|--|--|
| OS                       | Microsoft® Windows®11 (Home, Pro, Enterprise, Education)<br>Microsoft® Windows®10 (Home, Pro, Enterprise, Education, IoT Enterprise 2016 LTSP*) *1: 64-bit edition supported |  |
| CPU                      | Windows®11   | Two or more cores on a compatible 64-bit processor or System on a Chip (SoC) |
|                          | Windows®10   | Intel® Core™ 2 Duo Processor 2 GHz or more recommended                       |
| Required memory          | Windows®11   | 4 GB or more recommended   |
|                          | Windows®10   | 64-bit OS: 2 GB or more recommended<br>32-bit OS: 1 GB or more recommended   |
| Required hard disk space | For installation: 3 GB or more free hard disk space<br>For operation: 512 MB or more free virtual memory space   |  |
| Monitor                  | Resolution 1024 x 768 or more  |  |

(Note-1) Refer to Installation Instructions for precautions and restrictions regarding the operating environment.

## Engineering software list

| Item              | Model         | Description   |     |
|-------------------|---------------|---|-----|
| MELSOFT MT Works2 | SW1DND-MTW2-E | Parameter setting and program creation of Motion CPU  | DVD |
| MELSOFT GX Works2 | SW1DND-GXW2-E | Programmable controller engineering software (including GX Developer)   | DVD |
| MELSOFT iQ Works  | SW2DND-IQWK-E | FA engineering software <sup>(Note-1)</sup><br>• System management software: MELSOFT Navigator<br>• Programmable controller engineering software: MELSOFT GX Works3 (including GX Works2, GX Developer, PX Developer <sup>(Note-2)</sup> )<br>• Motion controller engineering software: MELSOFT MT Works2<br>• HMI/GOT screen design software: MELSOFT GT Works3<br>• Robot engineering software: MELSOFT RT ToolBox3 <sup>(Note-3)</sup><br>• Inverter setup software: MELSOFT FR Configurator2<br>• Servo setup software: MELSOFT MR Configurator2<br>• C Controller setting and monitoring tool: MELSOFT CW Configurator<br>• MITSUBISHI ELECTRIC FA Library | DVD |

(Note-1) For detailed information about supported modules, refer to the manuals of the relevant software package.

(Note-2) Includes both programming tool and monitor tool for process control.

(Note-3) RT ToolBox3 mini (simplified version) will be installed if iQ Works product ID is used. When RT ToolBox3 (with simulation function) is required, please purchase RT ToolBox3 product ID.

MEMO

Lined area for notes, consisting of multiple horizontal lines.

Outline

Motion Controller

Simple Motion Module

Network

Servo Amplifier

Engineering Environment

# Extensive global support coverage providing expert help whenever needed

## ■ Global FA centers

### ■ EMEA

#### Europe FA Center

MITSUBISHI ELECTRIC EUROPE B.V. Polish Branch  
Tel: +48-12-347-65-00

#### Germany FA Center

MITSUBISHI ELECTRIC EUROPE B.V. German Branch  
Tel: +49-2102-486-0

#### UK FA Center

MITSUBISHI ELECTRIC EUROPE B.V. UK Branch  
Tel: +44-1707-27-8780

#### Czech Republic FA Center

MITSUBISHI ELECTRIC EUROPE B.V. Czech Branch  
Tel: +420-734-402-587

#### Italy FA Center

MITSUBISHI ELECTRIC EUROPE B.V. Italian Branch  
Tel: +39-039-60531

#### Turkey FA Center

MITSUBISHI ELECTRIC TURKEY Elektrik Urunleri A.S.  
Tel: +90-216-969-2500

### ■ Asia-Pacific

#### China

##### Beijing FA Center

MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD.  
Beijing FA Center  
Tel: +86-10-6518-8830

##### Guangzhou FA Center

MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD.  
Guangzhou FA Center  
Tel: +86-20-8923-6730

##### Shanghai FA Center

MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD.  
Shanghai FA Center  
Tel: +86-21-2322-3030

##### Tianjin FA Center

MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD.  
Tianjin FA Center  
Tel: +86-22-2813-1015

#### Taiwan

##### Taipei FA Center

SETSUYO ENTERPRISE CO., LTD.  
Tel: +886-2-2299-9917

#### Korea

##### Korea FA Center

MITSUBISHI ELECTRIC AUTOMATION KOREA CO., LTD.  
Tel: +82-2-3660-9630

#### Thailand

##### Thailand FA Center

MITSUBISHI ELECTRIC FACTORY AUTOMATION  
(THAILAND) CO., LTD.  
Tel: +66-2682-6522 to 31

#### ASEAN

##### ASEAN FA Center

MITSUBISHI ELECTRIC ASIA PTE. LTD.  
Tel: +65-6470-2475

#### Malaysia

##### Malaysia FA Center

Malaysia FA Center  
Tel: +60-3-7626-5080

#### Indonesia

##### Indonesia FA Center

PT. MITSUBISHI ELECTRIC INDONESIA  
Cikarang Office  
Tel: +62-21-2961-7797

#### Vietnam

##### Hanoi FA Center

MITSUBISHI ELECTRIC VIETNAM COMPANY LIMITED  
Hanoi Branch Office  
Tel: +84-24-3937-8075

##### Ho Chi Minh FA Center

MITSUBISHI ELECTRIC VIETNAM COMPANY LIMITED  
Tel: +84-28-3910-5945

#### Philippines

##### Philippines FA Center

MELCO Factory Automation Philippines Inc.  
Tel: +63-(0)2-8256-8042

#### India

##### India Ahmedabad FA Center

MITSUBISHI ELECTRIC INDIA PVT. LTD.  
Ahmedabad Branch  
Tel: +91-7965120063

##### India Bangalore FA Center

MITSUBISHI ELECTRIC INDIA PVT. LTD.  
Bangalore Branch  
Tel: +91-80-4020-1600

##### India Chennai FA Center

MITSUBISHI ELECTRIC INDIA PVT. LTD.  
Chennai Branch  
Tel: +91-4445548772

##### India Coimbatore FA Center

MITSUBISHI ELECTRIC INDIA PVT. LTD.  
Coimbatore Branch  
Tel: +91-422-438-5606

##### India Gurgaon FA Center

MITSUBISHI ELECTRIC INDIA PVT. LTD.  
Gurgaon Head Office  
Tel: +91-124-463-0300

##### India Pune FA Center

MITSUBISHI ELECTRIC INDIA PVT. LTD.  
Pune Branch  
Tel: +91-20-2710-2000

### ■ Americas

#### USA

##### North America FA Center

MITSUBISHI ELECTRIC AUTOMATION, INC.  
Tel: +1-847-478-2100

#### Mexico

##### Mexico City FA Center

MITSUBISHI ELECTRIC AUTOMATION, INC.  
Mexico Branch  
Tel: +52-55-3067-7500

##### Mexico FA Center

MITSUBISHI ELECTRIC AUTOMATION, INC.  
Queretaro Office  
Tel: +52-442-153-6014

##### Mexico Monterrey FA Center

MITSUBISHI ELECTRIC AUTOMATION, INC.  
Monterrey Office  
Tel: +52-55-3067-7599

#### Brazil

##### Brazil FA Center

MITSUBISHI ELECTRIC DO BRASIL COMERCIO E  
SERVICOS LTDA.  
Tel: +55-11-4689-3000

# Warranty

## 1. Warranty period and coverage

We will repair any failure or defect hereinafter referred to as "failure" in our FA equipment hereinafter referred to as the "Product" arisen during warranty period at no charge due to causes for which we are responsible through the distributor from which you purchased the Product or our service provider. However, we will charge the actual cost of dispatching our engineer for an on-site repair work on request by customer in Japan or overseas countries. We are not responsible for any on-site readjustment and/or trial run that may be required after a defective unit is repaired or replaced.

### [Term]

For terms of warranty, please contact your original place of purchase.

### [Limitations]

- (1) You are requested to conduct an initial failure diagnosis by yourself, as a general rule.  
It can also be carried out by us or our service company upon your request and the actual cost will be charged.  
However, it will not be charged if we are responsible for the cause of the failure.
- (2) This limited warranty applies only when the condition, method, environment, etc. of use are in compliance with the terms and conditions and instructions that are set forth in the instruction manual and user manual for the Product and the caution label affixed to the Product.
- (3) Even during the term of warranty, the repair cost will be charged on you in the following cases;
  - (i) a failure caused by your improper storing or handling, carelessness or negligence, etc., and a failure caused by your hardware or software problem
  - (ii) a failure caused by any alteration, etc. to the Product made on your side without our approval
  - (iii) a failure which may be regarded as avoidable, if your equipment in which the Product is incorporated is equipped with a safety device required by applicable laws and has any function or structure considered to be indispensable according to a common sense in the industry
  - (iv) a failure which may be regarded as avoidable if consumable parts designated in the instruction manual, etc. are duly maintained and replaced
  - (v) any replacement of consumable parts (battery, fan, etc.)
  - (vi) a failure caused by external factors such as inevitable accidents, including without limitation fire and abnormal fluctuation of voltage, and acts of God, including without limitation earthquake, lightning and natural disasters
  - (vii) a failure generated by an unforeseeable cause with a scientific technology that was not available at the time of the shipment of the Product from our company
  - (viii) any other failures which we are not responsible for or which you acknowledge we are not responsible for

## 2. Term of warranty after the stop of production

- (1) We may accept the repair at charge for another seven (7) years after the production of the product is discontinued. The announcement of the stop of production for each model can be seen in our Sales and Service, etc.
- (2) Please note that the Product (including its spare parts) cannot be ordered after its stop of production.

## 3. Service in overseas countries

Our regional FA Center in overseas countries will accept the repair work of the Product. However, the terms and conditions of the repair work may differ depending on each FA Center. Please ask your local FA Center for details.

## 4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to:

- (1) Damages caused by any cause found not to be the responsibility of Mitsubishi.
- (2) Loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products.
- (3) Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.
- (4) Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

## 5. Change of Product specifications

Specifications listed in our catalogs, manuals or technical documents may be changed without notice.

## 6. Application and use of the Product

- (1) For the use of our servo system controller, its applications should be those that may not result in a serious damage even if any failure or malfunction occurs in the servo system controller, and a backup or fail-safe function should operate on an external system to the servo system controller when any failure or malfunction occurs.
- (2) Our servo system controller is designed and manufactured as general purpose product for use at general industries.  
Therefore, applications substantially influential on the public interest for such as atomic power plants and other power plants of electric power companies, and also which require a special quality assurance system, including applications for railway companies and government or public offices are not recommended, and we assume no responsibility for any failure caused by these applications when used.  
In addition, applications which may be substantially influential to human lives or properties for such as airlines, medical treatments, railway service, incineration and fuel systems, man-operated material handling equipment, entertainment machines, safety machines, etc. are not recommended, and we assume no responsibility for any failure caused by these applications when used.  
We will review the acceptability of the abovementioned applications, if you agree not to require a specific quality for a specific application. Please contact us for consultation.
- (3) Mitsubishi Electric shall have no responsibility or liability for any problems involving programmable controller trouble and system trouble caused by DoS attacks, unauthorized access, computer viruses, and other cyberattacks.

Microsoft and Windows are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

Celeron and Pentium are registered trademarks of Intel Corporation in the U.S. and/or other countries.

All other company names and product names used in this document are trademarks or registered trademarks of their respective companies.

## Safety Warning

To ensure proper use of the products listed in this catalog, please be sure to read the instruction manual prior to use.



## Creating Solutions Together.



Low-voltage Power Distribution Products



Transformers, Med-voltage Distribution Products



Power Monitoring and Energy Saving Products



Power (UPS) and Environmental Products



Compact and Modular Controllers



Servos, Motors and Inverters



Visualization: HMIs



Edge Computing Products



Numerical Control (NC)



Collaborative and Industrial Robots



Processing machines: EDM, Lasers



SCADA, analytics and simulation software

Mitsubishi Electric's product lineup, from various controllers and drives to energy-saving devices and processing machines, all help you to automate your world. They are underpinned by software, innovative data monitoring, and modelling systems supported by advanced industrial networking and Edgecross IT/OT connectivity. Together with a worldwide partner ecosystem, Mitsubishi Electric factory automation (FA) has everything to make IoT and Digital Manufacturing a reality.

With a complete portfolio and comprehensive capabilities that combine synergies with diverse business units, Mitsubishi Electric provides a one-stop approach to how companies can tackle the shift to clean energy and energy conservation, carbon neutrality and sustainability, which are now a universal requirement of factories, buildings, and social infrastructure.

We at Mitsubishi Electric FA are your solution partners waiting to work with you as you take a step toward the realization of sustainable manufacturing and society through the application of automation. Let's automate the world together!

# SERVO SYSTEM CONTROLLERS

| Country/Region | Sales office   |                         |
|----------------|--|-------------------------|
| USA            | Mitsubishi Electric Automation, Inc.<br>500 Corporate Woods Parkway, Vernon Hills, IL 60061, U.S.A.  | Tel : +1-847-478-2100   |
| Mexico         | Mitsubishi Electric Automation, Inc. Mexico Branch<br>Boulevard Miguel de Cervantes Saavedra 301, Torre Norte Piso 5, Int. 502, Ampliacion Granada,<br>Miguel Hidalgo, Ciudad de Mexico, Mexico, C.P.11520 | Tel : +52-55-3067-7500  |
| Brazil         | Mitsubishi Electric do Brasil Comercio e Servicos Ltda.<br>Avenida Adelino Cardana, 293, 21 andar, Bethaville, Barueri SP, Brazil  | Tel : +55-11-4689-3000  |
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Mitsubishi Electric's e-F@ctory concept utilizes both FA and IT technologies, to reduce the total cost of development, production and maintenance, with the aim of achieving manufacturing that is a "step ahead of the times". It is supported by the e-F@ctory Alliance Partners covering software, devices, and system integration, creating the optimal e-F@ctory architecture to meet the end users needs and investment plans.



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