MITSUBISHI ELECTRIC
Changes for the Better

for a greener tomorrow eco Changes

Mitsubishi Electric SSCNET III/H compatible Motion Controller Q173DSCPU/Q172DSCPU Simple Motion Module QD77MS16/QD77MS4/QD77MS2

The leader in productivity, safety and environmental performance

Motion control in harmony with man, machine and

Most-advanced

SSCNET III/H compatible Motion controller

Q173DSCPU/Q172DSCPU

Pursuing Ease of use

SSCNET III/H compatible Simple Motion module

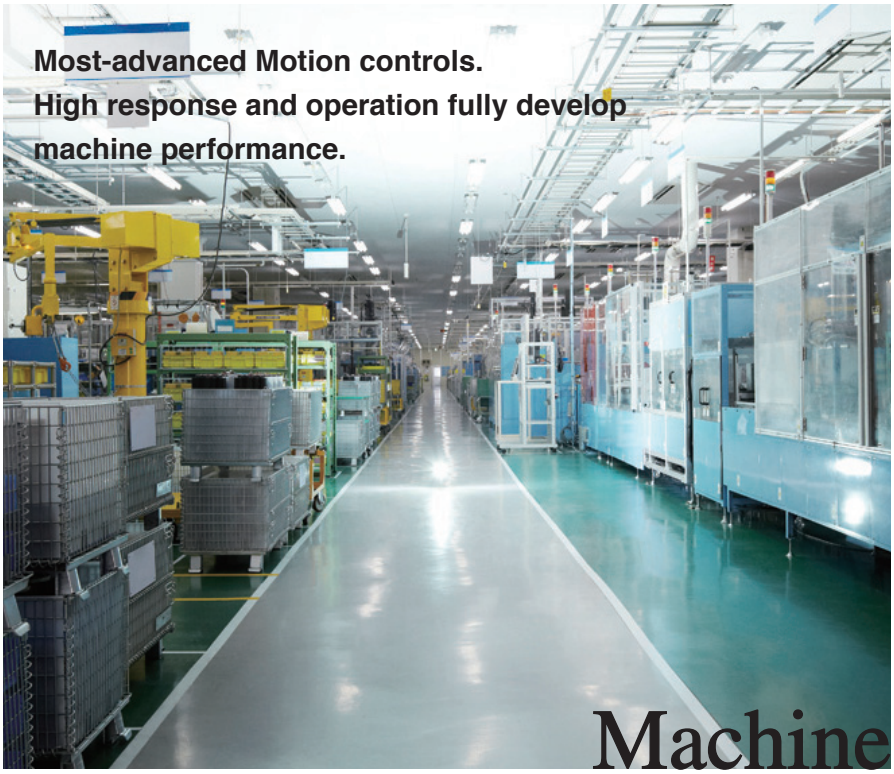
QD77MS16/QD77MS4/QD77MS2

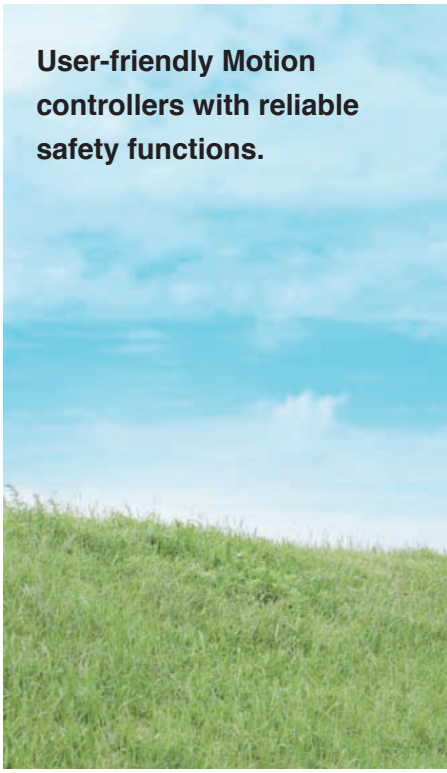
the environment

New-generation Motion Controller Debut

Servo system controllers have advanced to be safer for people, and more flexible for various applications with our reliable technology. Now, “Q17nDSCPU” the Motion controller and “QD77MS” the Simple Motion module have been released. We are confident with our new products in harmony with machine, man and the environment. With a safety-compliant system, various functions for energy conservation, and high functionality, our Motion controller leads the future of Motion control.

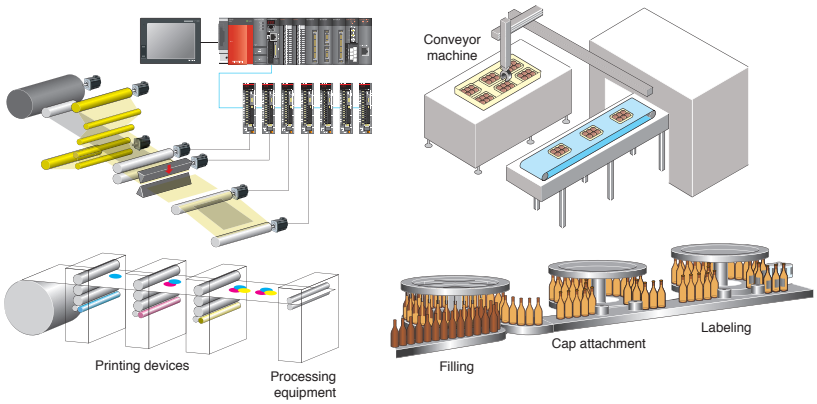
Harmony with machine, man, and the environment.





Expanding the applications

Now that high-mix low-volume production is the big trend in the market, Motion controllers are expected to be used in various applications. “Q17nDSCPU” and “QD77MS” 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 monitoring function

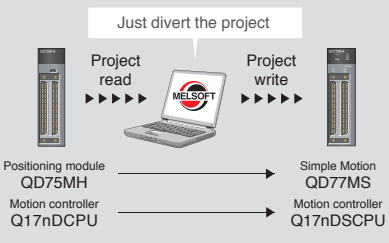
Ensuring safety in the production site is an absolute requirement; therefore devices must comply with international safety standards. “Q17nDSCPU” has safety functions as standard which achieve the safety level PLd.

User-friendly engineering environment

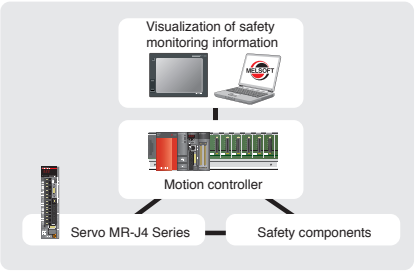
Pursuing Ease of use. The powerful functions are aimed at creating a user-friendly engineering environment such as design efficiency enhancement, debugging efficiency enhancement, reduced downtime, and data protection, etc.

Highly compatible Motion controller with the conventional products

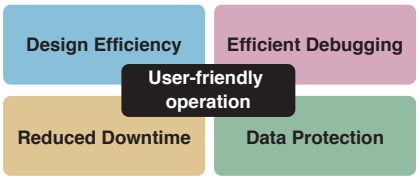
Motion Controller “Q17nDSCPU” and Simple Motion module“QD77MS” are highly compatible with the conventional servo amplifiers and Motion Controllers, so you can continue to use them.



New approach for future Motion controls.



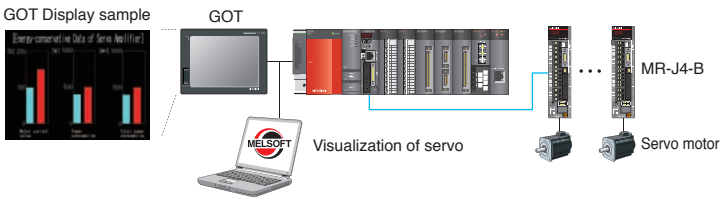
Safety components : Safety relay,
CC-Link Safety compatible products,
Contactor SD-Q Series



Servo Visualization

For energy conservation, understanding the consumption of electric power is vital.
The “Q17nDSCPU” and the “QD77MS” 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 this information on the screen to save energy.

- Motor current value
- Power consumption
- Total power consumption



Reduced wiring and space saving

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

High compatibility with the previous controllers

“Q17nDSCPU” the Motion controller and “QD77MS” the Simple Motion module are able to divert the projects from “Q17nDCPU” the Motion controller and “QD75MH” the positioning module. There’s 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 are able to be connected to the SSCNET III compatible servo amplifier “MR-J3-B”. Just place the new module into where the Motion controller “Q17nDCPU” and positioning module “QD75MH” was placed. The SSCNET III/H compatible servo amplifier “MR-J4-B” can also be used with the SSCNET III compatible servo amplifier “MR-J3-B”. You can continue to use the conventional servo amplifier.

A complete system lineup to meet your production and manufacturing

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

HUMAN MACHINE I/F

GOT1000

Personal computer

SOFTWARE

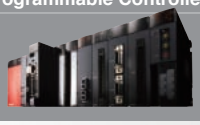
MELSOFT

iQ Platform

CONTROLLER

Q17nDSCPU

iQ Platform Compatible Programmable Controllers



SSCNET III/H compatible
Motion controller

Q173DSCPU
Q172DSCPU

NETWORK

SSCNET III/H serial bus

SERVO AMPLIFIER

MR-J4_-B

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

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

Linear servo motor

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

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

SOLUTION

e-F@ctory

Mitsubishi Electric's integrated FA solution for achieving seamless information collaboration between information systems and control systems, and enabling lateral integration of production sites.

iQ Platform

needs

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

Motion controller engineering environment — MELSOFT **MT Works2**

PLC engineering software — MELSOFT **GX Works2**

Servo setup software — MELSOFT **MR Configurator2**

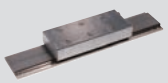
Capacity selection software

QD77MS

MELSEC-Q Series

SSCNET III/H compatible
Simple Motion module

QD77MS16
QD77MS4
QD77MS2



Core type
(natural/liquid cooling)
LM-F series
Rating: 300 to 1200 N
(natural cooling)
Rating: 600 to 2400 N
(liquid cooling)

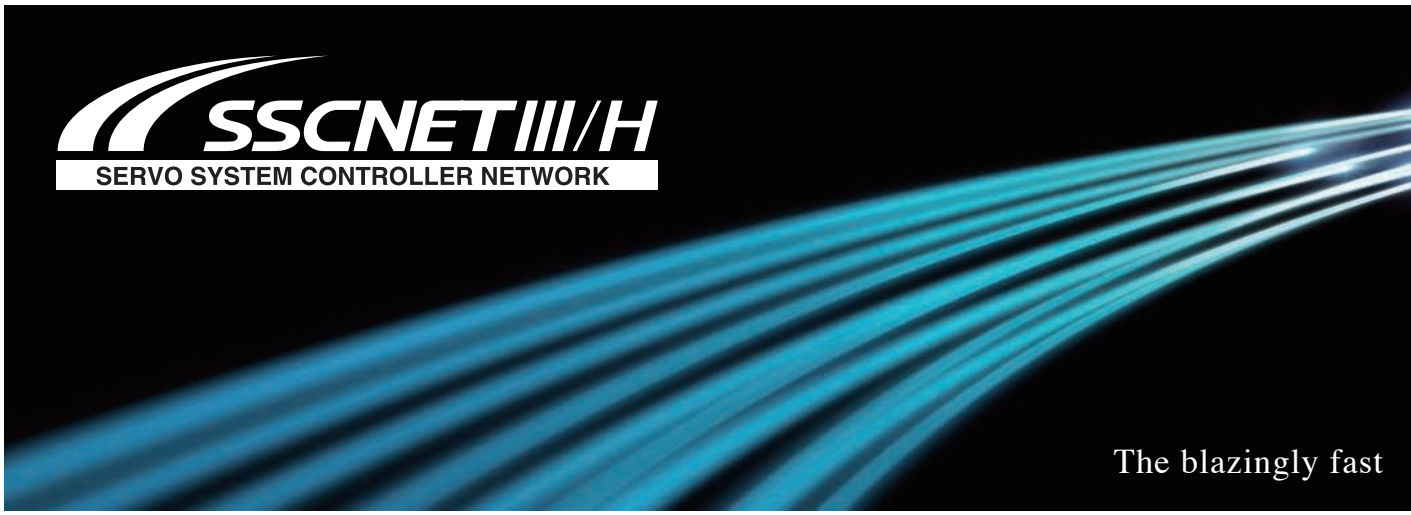
Coreless type
LM-U2 series
Rating: 50 to 800 N

Direct drive motor

TM-RFM series
Rating: 2 to 240 N·m

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

I N D E X



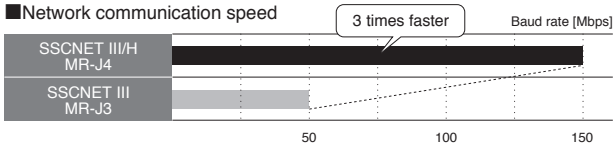
MELSERVO-J4 | High-response system achieved with SSCNET III/H

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.

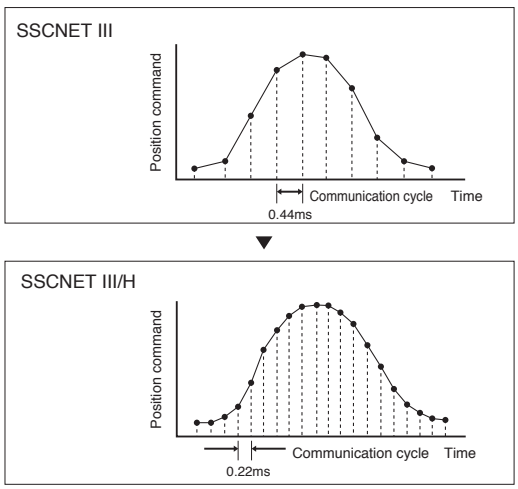
■Network communication speed



Cycle times as fast as 0.22 ms

Industry-leading levels

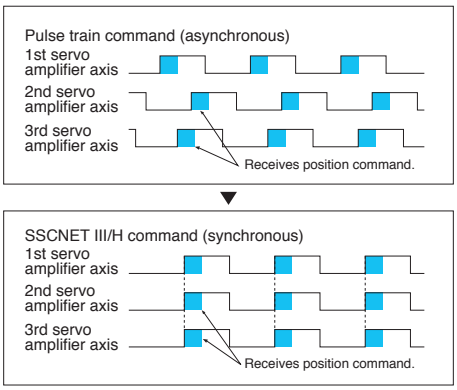
Smooth control of machine is possible using high-speed serial communication with cycle times of 0.22 ms.



Deterministic and synchronized communication

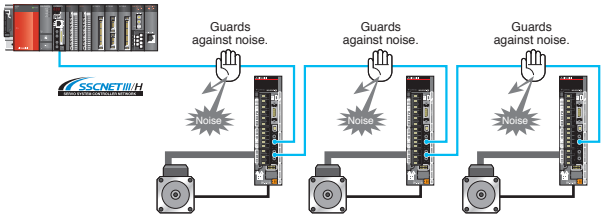
Complete deterministic and synchronized communication is achieved with SSCNET III/H, offering technical advantages in machines such as printing and food processing machines that require synchronous accuracy.

■Timing of servo amplifier processing



No transmission collision

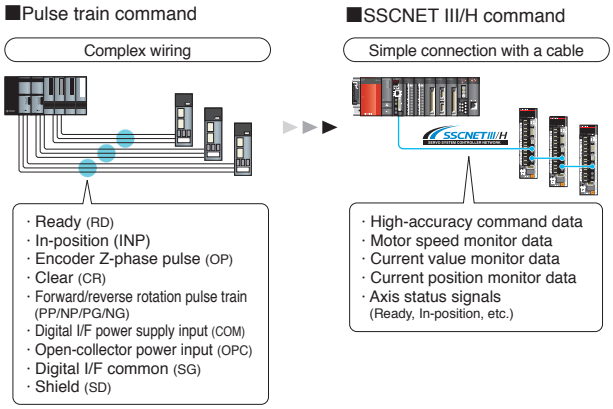
The fiber-optic cables thoroughly shut out noise that enters from the power cable or external devices. Noise immunity is dramatically improved as compared to metal cables.



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

Dramatically reduced wiring

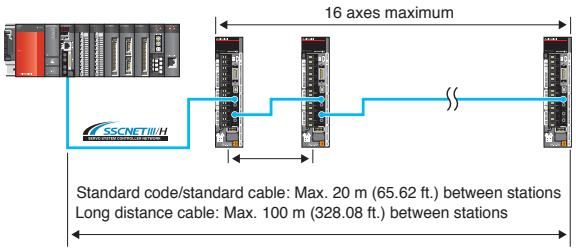
Simple connections with dedicated cables reduce both wiring time and chances of wiring errors. No more complicated wiring.



Long distance wiring up to 1600 m (5249.28 ft.) Enhanced functions

Long distance wiring is possible up to 1600 m (5249.28 ft.) per system (maximum of 100 m (328.08 ft.) between stations × 16 axes). Thus, it is suitable for large-scale systems.

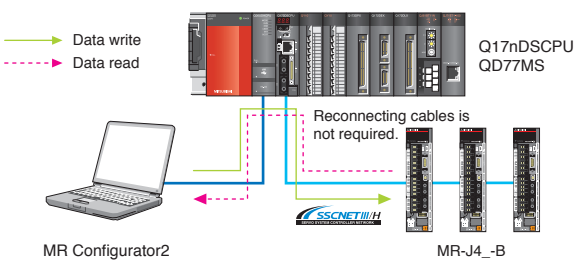
* This is when all axes are connected via SSCNET III/H.



Maximum overall distance per system
Standard code/standard cable: 320 m (1049.86 ft.) (20 m (65.62 ft.) × 16 axes)
Long distance cable: 1600m (5249.28 ft.) (100 m (328.08 ft.) × 16 axes)

Central control with network

Large amounts of servo data are exchanged in real-time between the controller and the servo amplifier.
MR Configurator2 is used on a personal computer that is connected to Q17nDSCPU or QD77MS. Information for multiple servo amplifiers is consolidated.

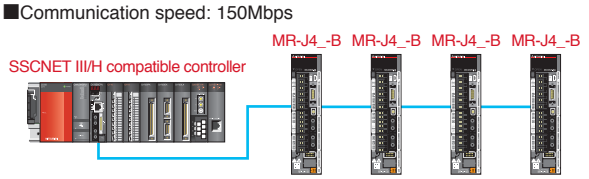


SSCNET III/H compatible and SSCNET III compatible products connected in a same system

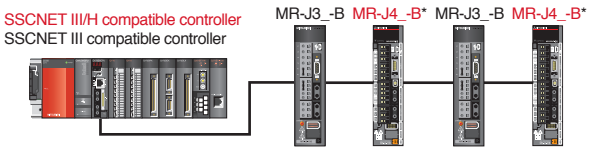
SSCNET III/H compatible and SSCNET III compatible servo amplifiers are connected in a same system.

* When using SSCNET III/H compatible and SSCNET III compatible products together, the communication speed is 50 Mbps, and the function and performance are equivalent to when using MR-J3.

■Communication speed: 150Mbps



■Communication speed: 50 Mbps



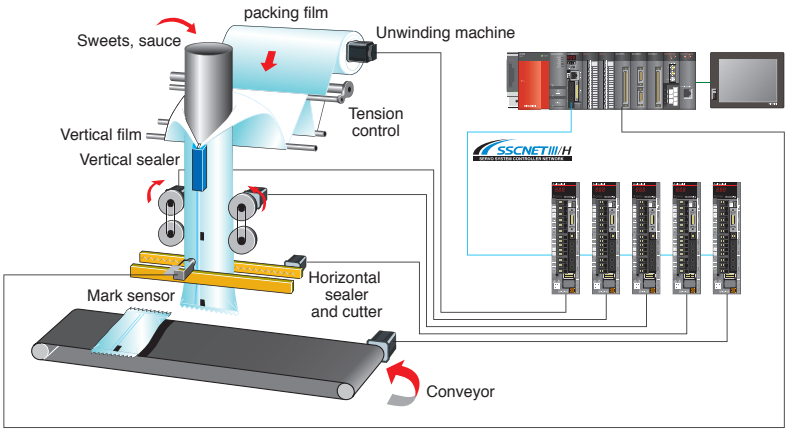
Q17nDSCPU & QD77MS solutions for advanced Motion control

Solutions

CASE1 Packing machines (Synchronous control, Cam control, Mark detection function)

Q17nDSCPU QD77MS

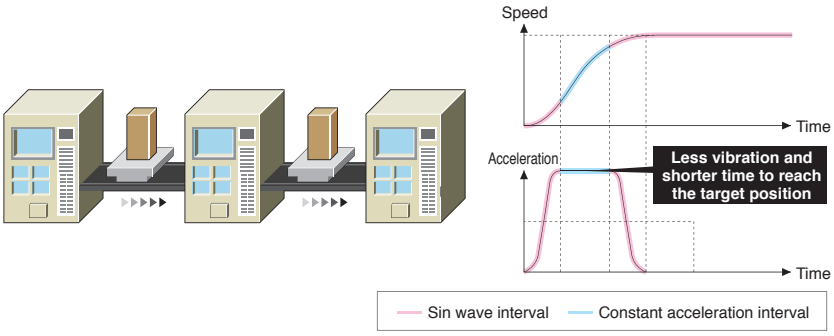
When the machine packs materials, each process is synchronized by using synchronous control and cam control. The packing film is cut using the register mark as a reference with mark detection function.



CASE2 Conveyor machines (Advanced S-curve acceleration/deceleration function)

Q17nDSCPU

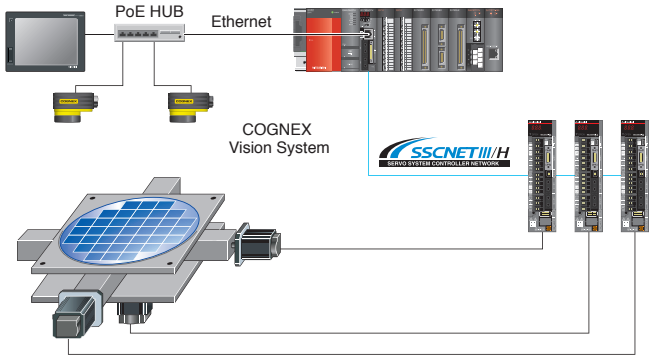
Vibration is minimized and a short tact time is achieved with the advanced S-curve acceleration/deceleration function, which sets the interval of smooth acceleration and the interval of acceleration at the maximum speed.



CASE3 Alignment system (Ethernet connection,Vision system,Target position change function)

Q17nDSCPU

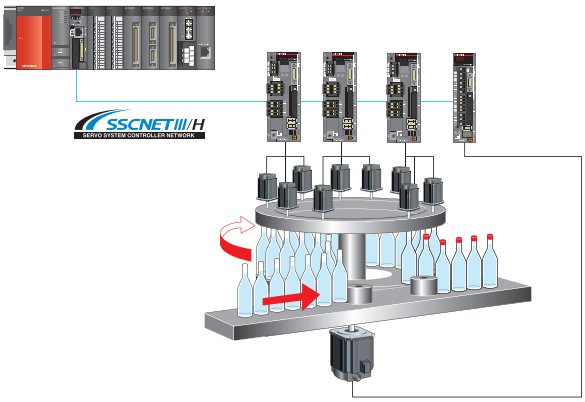
COGNEX Vision System is connected to the built-in PERIPHRAL I/F of the Motion CPU with Ethernet. Alignment time is reduced with the target position change function which uses the work piece position data from the vision system for high-speed Motion control.



CASE4 Cap tightening machines (Position control, Torque control,Tightening & Press-fit control)

Q17nDSCPU QD77MS

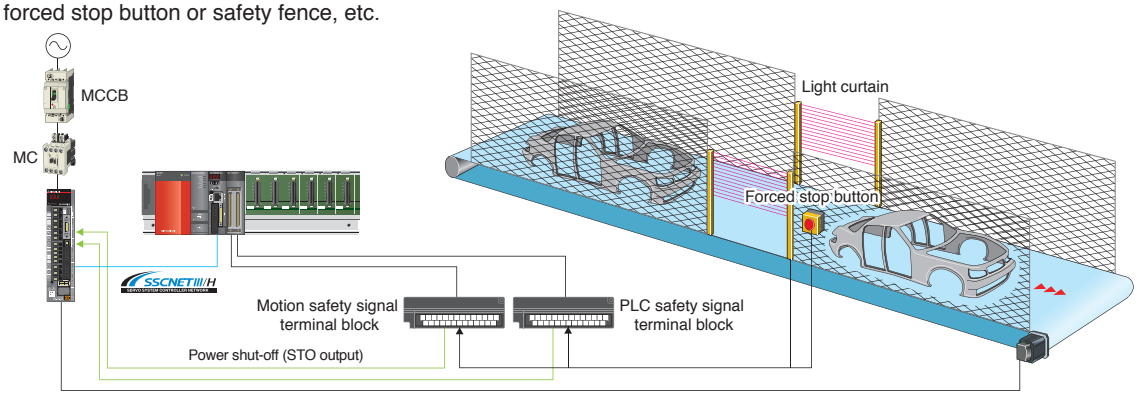
Control mode is able to be switched, such as from position control to torque control or vice verse is also possible. Tightening & Press-fit control, which switches from positioning control to torque control without stopping during positioning, is also available. The absolute position is stored even if the machine is in control modes (except position control), so positioning is carried out smoothly even after switching to positioning control.



CASE5 Safety system (Safety signal comparison function)

Q17nDSCPU

Safety systems is simply structured using the light curtain, forced stop button or safety fence, etc.

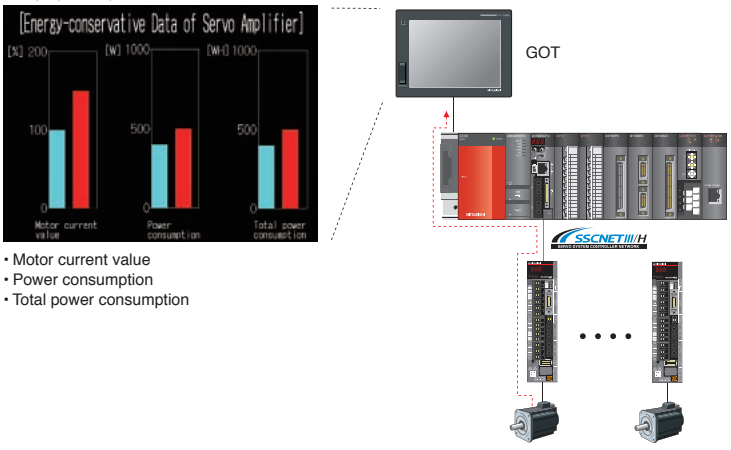


CASE6 Servo visualization (Optional data monitor function)

Q17nDSCPU QD77MS

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

Harmony with a wide range of applications and controls

Line up

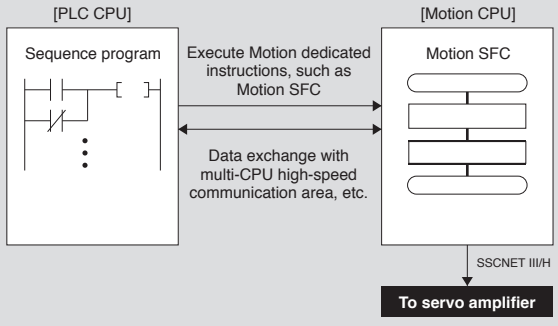
Features of the Motion Controllers and the Simple Motion Modules

Most-advanced Motion controller

SSCNET III/H compatible Motion controller

Q173DSCPU
Q172DSCPU

The Motion controller is a CPU module used with the PLC CPU for Motion control. The Motion controller using Motion SFC program separately controls I/O modules, etc., from PLC CPUs; therefore high speed control is achieved.

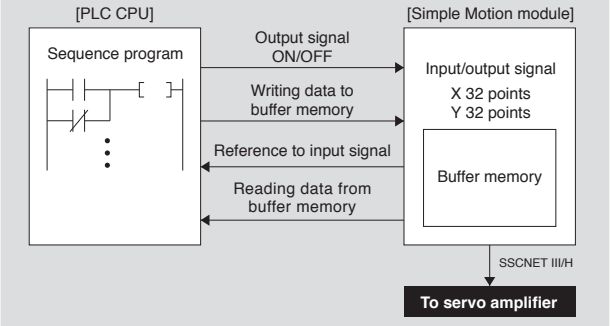


Advanced control but simple use as the positioning module

SSCNET III/H compatible Simple Motion module

QD77MS16
QD77MS4
QD77MS2

The Simple Motion module is an intelligent function module performing positioning control following the PLC CPU's command. Synchronous control that was unavailable with the previous positioning module is now available with this new Simple Motion module, which is used easily just like the positioning module.
The positioning function in this Simple Motion module is used in the same way as the positioning module.



Comparison of Motion controller and Simple Motion module

■ Superior

	Motion controller		Simple Motion module		
	Q173DSCPU	Q172DSCPU	QD77MS16	QD77MS4	QD77MS2
Module type	CPU module		Intelligent Function Module		
Servo amplifier interface	SSCNET III/H NEW		SSCNET III/H NEW		
	2 systems	1 system	1 system		
Servo amplifier type	MR-J4-B NEW		MR-J4-B NEW		
Number of control axes	32 axes	16 axes NEW	16 axes NEW	4 axes	2 axes
Operation cycle	0.22 ms or more		0.88ms / 1.77ms	0.88ms	
Engineering environment	MT Woks2 / MR Configurator2 (Note-1)		Simple Motion Module Setting Tool / MR Configurator2 (Note-2)		
Programming language	Motion SFC		—		
Control modes	Position control / Speed control NEW / Torque control NEW / Tightening & Press-fit control NEW / Synchronous control / Cam control / Advanced synchronous control NEW		Position control / Speed control NEW / Torque control NEW / Tightening & Press-fit control NEW / Cam control NEW / Synchronous control NEW		
Positioning control	Linear interpolation / Circular interpolation / Trajectory control / Helical interpolation / Position follow-up control / Speed control with fixed position stop / High-speed oscillation control / Speed/position switching control		Linear interpolation / Circular interpolation / Trajectory control / Speed/position switching control (ABS) / Speed/position switching control (INC) / Position-speed switching control		
Acceleration/ deceleration control	Automatic trapezoidal acceleration/ deceleration / S-curve acceleration/deceleration / Advanced S-curve acceleration/deceleration		Automatic trapezoidal acceleration/ deceleration / S-curve acceleration/deceleration		
Manual control	JOG operation / Manual pulse generator operation / JOG operation simultaneous start		JOG operation / Manual pulse generator operation / Inching operation		
Functions to change the control details	Current value change / Target position change NEW / Torque limit value change / Speed change		Current value change / Target position change / Torque limit value change / Speed change / Override / Acceleration/deceleration time change		
Home position return type	Proximity dog type 1 / Proximity dog type 2 / Scale home position signal detection type / Count type 1 / Count type 2 / Count type 3 / Data set type 1 / Data set type 2 / Dog cradle type / Stopper type 1 / Stopper type 2 / Limit switch combined type		Proximity dog type / Scale home position signal detection type NEW / Count type 1 / Count type 2 / Data set type		
Sub functions	Forced stop / Hardware stroke limit / Software stroke limit / Absolute position system / Amplifier-less operation / Unlimited length feed / Optional data monitor / Mark detection / ROM operation / M-code output / Error history / Digital oscilloscope / Safety observation NEW / Vision system connection / Software security key NEW / High-speed reading / Limit switch output NEW / Cam auto-generation NEW		Forced stop / Hardware stroke limit / Software stroke limit / Absolute position system / Amplifier-less operation NEW / Unlimited length feed / Optional data monitor NEW / Mark detection NEW / Flash ROM backup / M-code output / Error history NEW / Digital oscilloscope NEW / Cam auto-generation NEW		

(Note-1) : MELSOFT MR Configurator2 is included in MELSOFT MT Works2.
(Note-2) : The Simple Motion module setting tool is included in MELSOFT GX Works2.

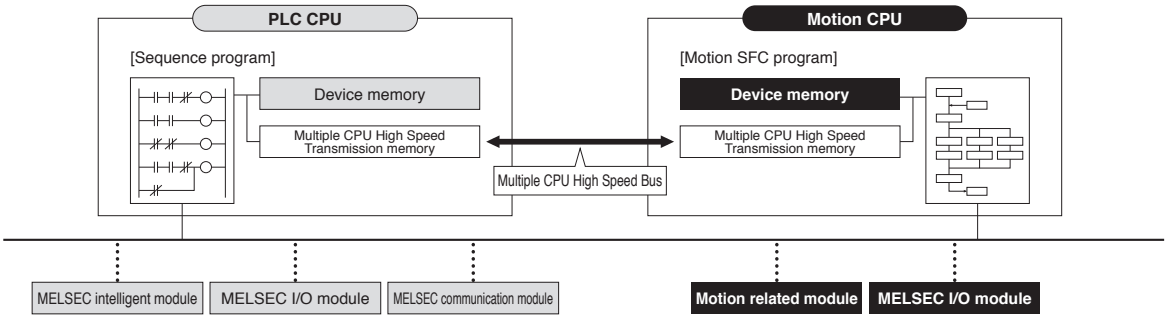
Reduced wiring, basic performance, Multiple CPU control for all customer needs.

Multiple CPU control by PLC CPU and Motion CPU

Q17nDSCPU

Loads are dispersed by distributing tasks such as servo control, machine control, and information control among multiple processors.
By selecting the Motion CPU and PLC CPU according to the application, a flexible system is configured.
The program of Motion CPU is described by the Motion SFC program.

[Multiple CPU High Speed Bus] Maximum of 14k words are transferred every 0.88ms by the dedicated multiple CPU high speed bus.
The Multiple CPU high speed transmission cycle is synchronized with the Motion control cycle thus optimizing the control system.

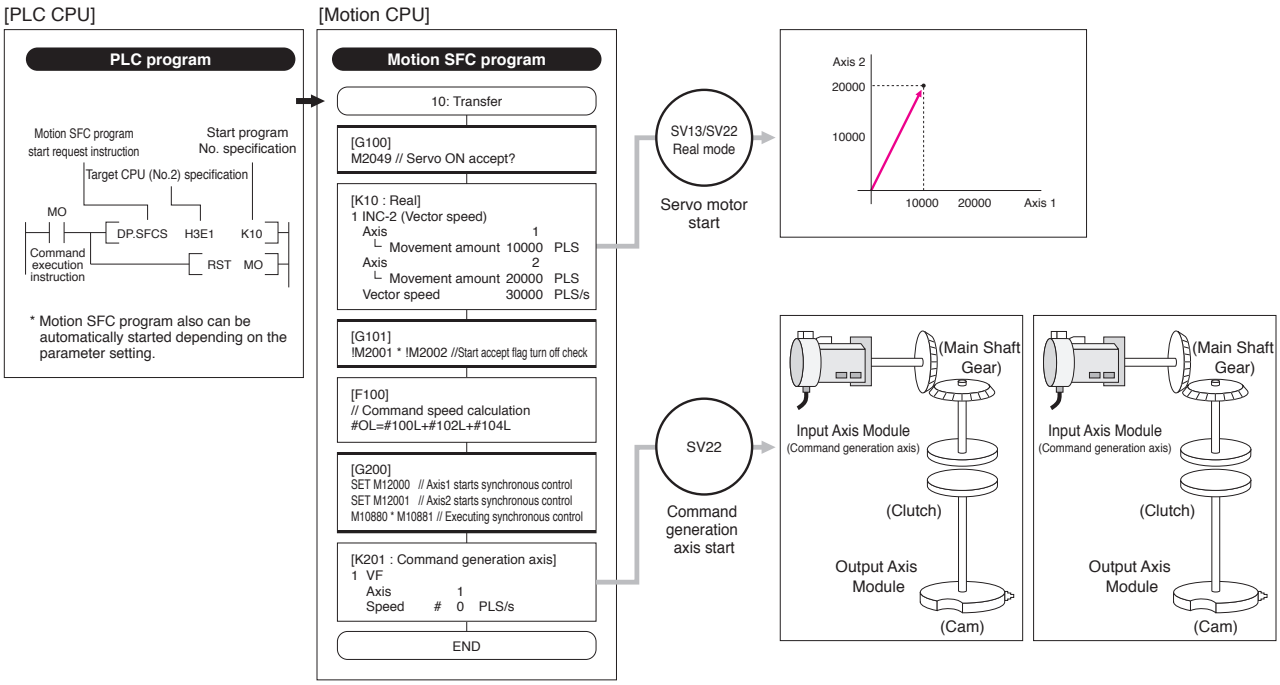


[Sequence program]
- Ladder description is suitable for scan process (Importance focused on condition control)
- Sequence control (Compatible with multiple I/O points, multiple operations)
- System stop processing at error detection

[Motion SFC program]
- Motion SFC description is suitable for event processes (Importance focused on sequential control, pursuit of event responsiveness)
- Servo high-speed response (Start)
- Positioning address, speed data operation, speed change
- High functionality with multitasking and branching

Control flow

Q17nDSCPU



Q173DSCPU/Q172DSCPU

Faster response time enabling shorter tact time

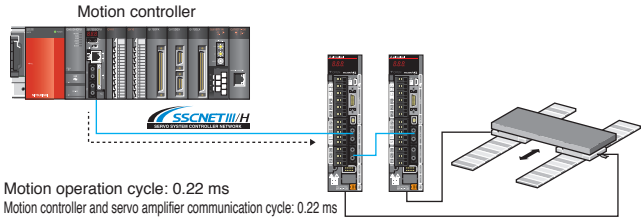
Operation Cycle of 0.22 ms/4 axes

Q17nDSCPU

We have achieved a Motion operation cycle of 0.22 ms /4 axes to meet the needs for a shorter tact time. Even at an operation cycle of 0.44 ms, up to 10 axes are controlled without losing the 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: 4,194,304PLS/rev) achieve a shorter operation cycle and smooth motion.

	Operation cycle	
	0.22 ms	0.44 ms
Q173DSCPU	4 axes	10 axes
Q173DCPU	–	6 axes



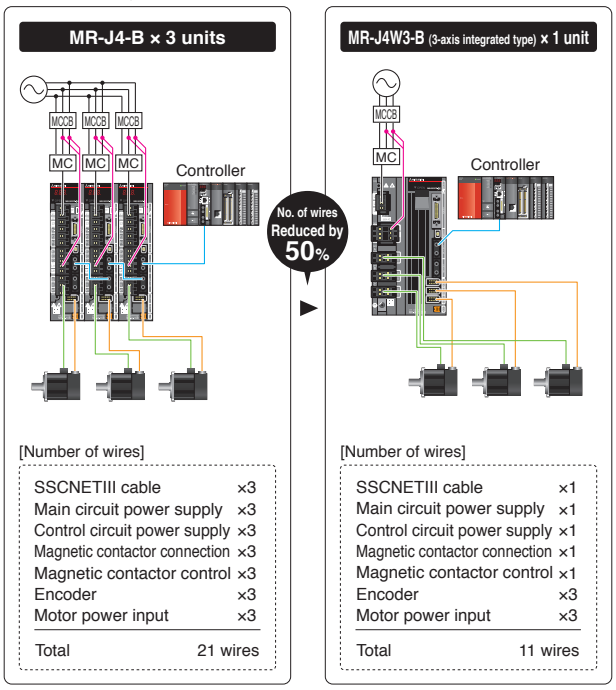
Motion controller with MR-J4 series greatly reduces wiring

Reduced wiring, space saving

Q17nDSCPU QD77MS

The number of wires and parts is drastically reduced when the Motion controller is used with MR-J4 Series 2-axis servo amplifier or 3-axis servo amplifier. When the Motion controller is used with the 3-axis amplifier “MR-J4W3-B”, the installation space is reduced by approximately 30%.

[Reduced wiring]



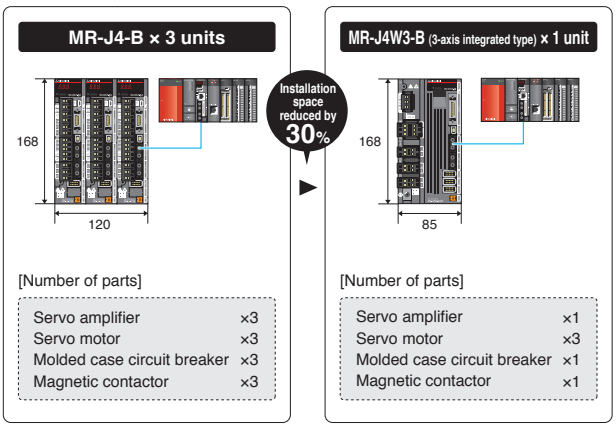
[Number of wires]

SSCNETIII cable	×3
Main circuit power supply	×3
Control circuit power supply	×3
Magnetic contactor connection	×3
Magnetic contactor control	×3
Encoder	×3
Motor power input	×3
Total	21 wires

[Number of wires]

SSCNETIII cable	×1
Main circuit power supply	×1
Control circuit power supply	×1
Magnetic contactor connection	×1
Magnetic contactor control	×1
Encoder	×3
Motor power input	×3
Total	11 wires

[Space saving]



[Number of parts]

Servo amplifier	×3
Servo motor	×3
Molded case circuit breaker	×3
Magnetic contactor	×3

[Number of parts]

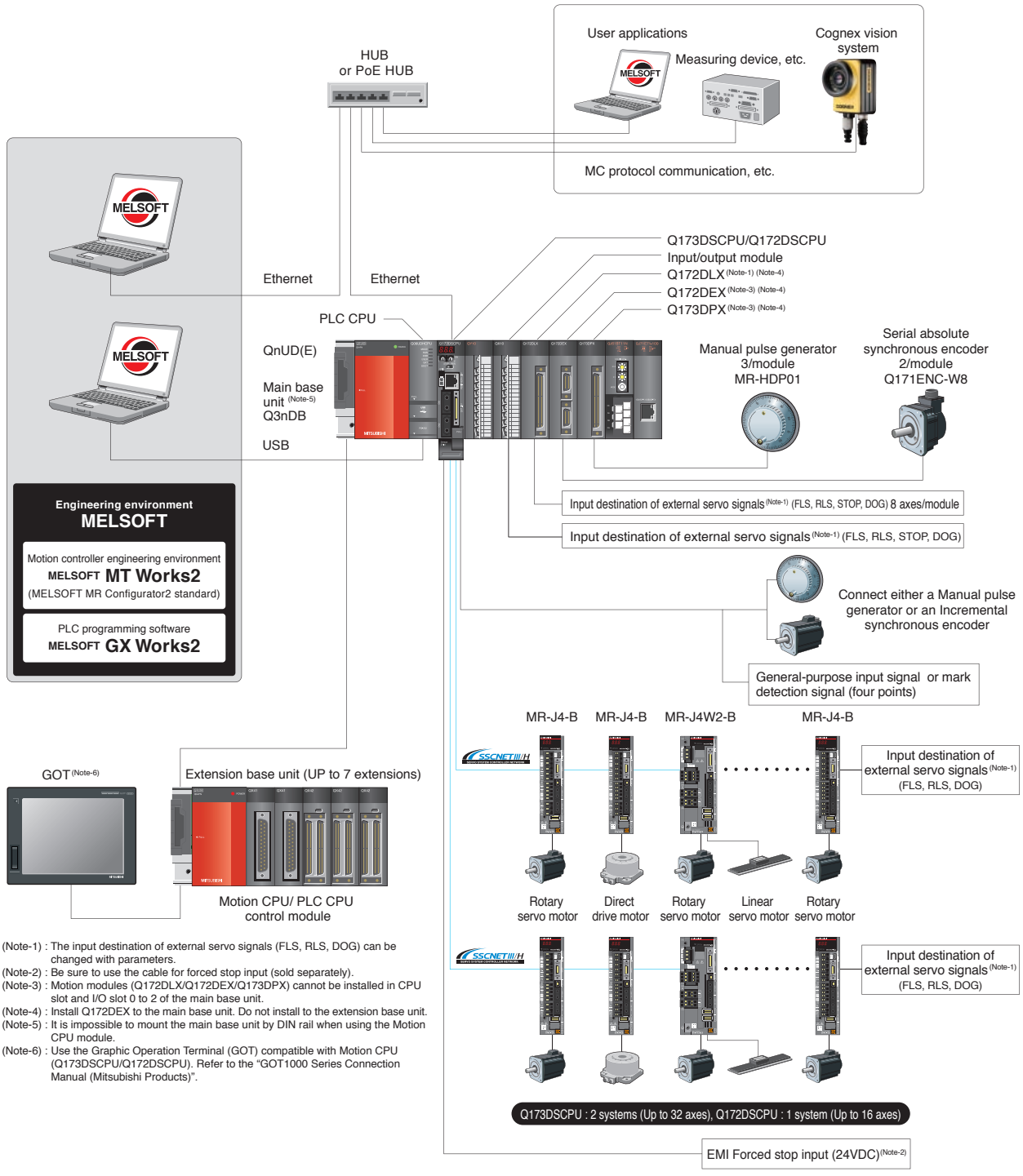
Servo amplifier	×1
Servo motor	×3
Molded case circuit breaker	×1
Magnetic contactor	×1

Multiple CPU system for high-speed Motion control

System Configuration

Q17nDSCPU

■Compatible with the Q Series PLC (Platform) in the Multiple CPU system.
■You can select the Motion CPU and the PLC CPU according to your application.
■The Multiple CPU system is capable of using up to four CPU modules. (one PLC CPU must be used.)
■Over 100 types of Q series modules are available, and enhance system scalability.
■Up to 96 axes of servo motors can be controlled by using three modules of the Q173DSCPU.



(Note-1) : The input destination of external servo signals (FLS, RLS, DOG) can be changed with parameters.
(Note-2) : Be sure to use the cable for forced stop input (sold separately).
(Note-3) : Motion modules (Q172DLX/Q172DEX/Q173DPX) cannot be installed in CPU slot and I/O slot 0 to 2 of the main base unit.
(Note-4) : Install Q172DEX to the main base unit. Do not install to the extension base unit.
(Note-5) : It is impossible to mount the main base unit by DIN rail when using the Motion CPU module.
(Note-6) : Use the Graphic Operation Terminal (GOT) compatible with Motion CPU (Q173DSCPU/Q172DSCPU). Refer to the "GOT1000 Series Connection Manual (Mitsubishi Products)".

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

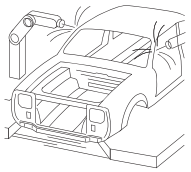
Q17nDSCPU

"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
- Paint applicator
- Chip mounting
- Wafer slicer
- Loader and Unloader
- Bonding machine
- X-Y table

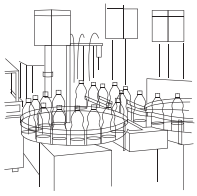


- Circular interpolation
- Constant-speed control
- Fixed-pitch feed
- Speed control with fixed position stop
- Speed switching control
- Speed control
- Speed/position switching control
- Linear interpolation (1 to 4 axes)
- Teaching
- Speed-torque control

Motion SFC Program

```
2 axes positioning
[G 101]
M2415*M2435    // Servo ON
[K 11 : Real]
1 ABS-2 (Vector speed)
Axis                1
 Address       100000.0 µm
Axis                2
 Address       200000.0 µm
Vector Speed   30000.00 mm/min
[G 111]
!M2001*!M2002  // Start accept flag turns off
END
```

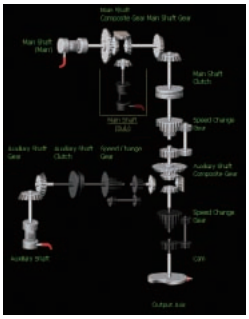
- Press feeder
- Food processing
- Food packaging
- Winding machine
- Spinning machine
- Textile machine
- Knitter
- Printing machine
- Book binder
- Tire molder
- Paper-making machine



- 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.

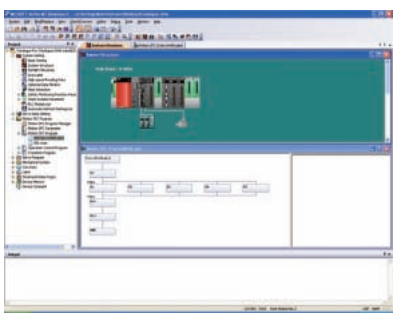
Engineering environment MELSOFT

Q17nDSCPU

MELSOFT MT Works2

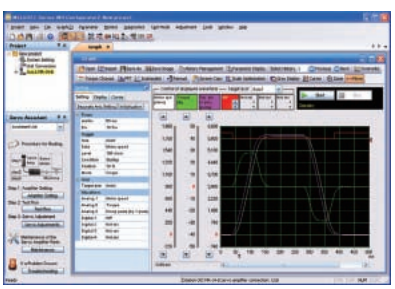
[MELSOFT MT Developer2]

Motion SFC programming, parameter setting, digital oscilloscope function, and simulation function are available. All process steps of Motion controller are created with this software, from system designing, programming, debugging, to maintenance.



[MELSOFT MR Configurator2]

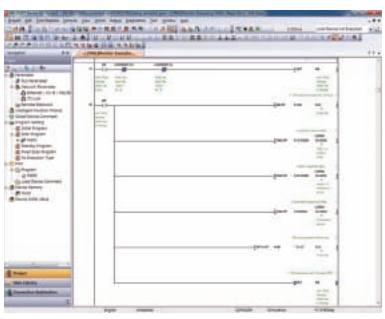
Parameter setting, adjustment and monitoring of servo amplifiers are available. MELSOFT MR Configurator2 is used with MELSOFT MT Works2.



* MELSOFT MR Configurator2 is included with MELSOFT MT Works2 as a standard.

MELSOFT GX Works2

Sequence programming, configuration tool of intelligent function module, and simulation function are available. All process steps of programmable controller are created with this software, from system designing, programming, debugging, to maintenance.

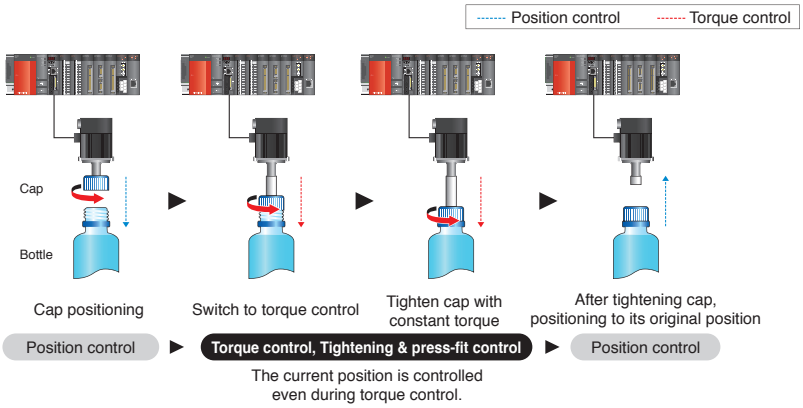


High functionality for advanced Motion controls

Switch to various controls as you want

Speed-torque control (Tightening & press-fit control) NEW Tightening & Press-fit control Patent pending Q17nDSCPU

Torque control and tightening & press-fit control are also available in addition to position control and speed control. Switching the control mode from position control to torque control and back to 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 once to ensure safety. “Tightening & press-fit control” which starts during movement. The current position is stored during both torque control and speed control, so positioning on the absolute position coordinates is possible even after switching to position control.

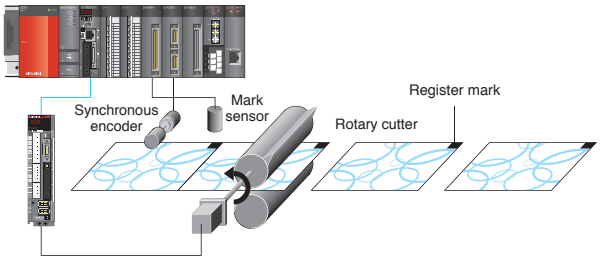


Register mark detection

Mark detection function Q17nDSCPU

This function detects register marks on the packing material moving at high speed by sensor and sets the current position to the device. The position of the register marks is aligned and the packing material is cut at the set position.

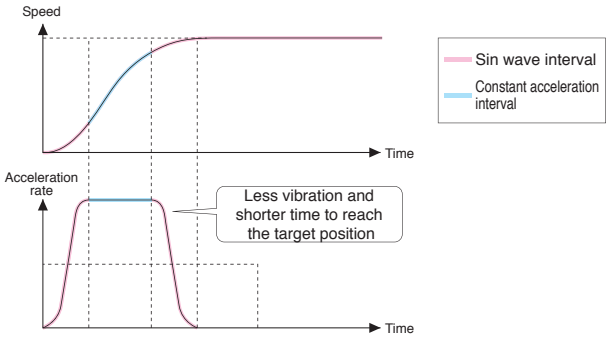
[Position alignment during register mark detection]



Smooth and faster acceleration

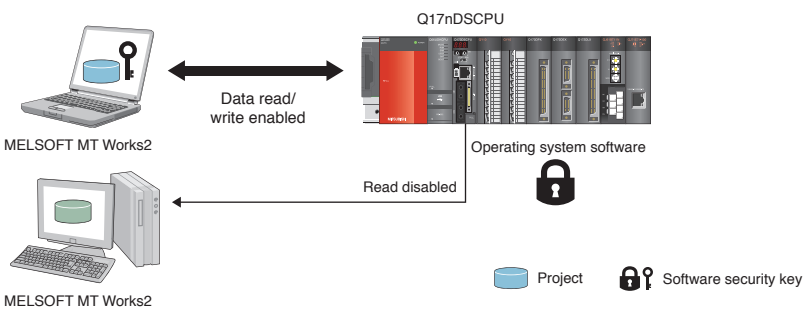
Advanced S-curve acceleration/deceleration Q17nDSCPU

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



Software security key function NEW Q17nDSCPU

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



Wide variety of functions for Motion controller

Various Basic Functions

Q17nDSCPU

Servo external input signals

Upgraded

The servo external input signals (FLS, RLS, DOG) are now 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 convenient to use.

Internal Input signal (4-point)

NEW

The Motion CPU has a internal input signal I/F (max. 4 points)
You are allowed to use them as the general-purpose input signal and mark detection input signal.

ROM operation function

Upgraded

Systems are 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 is carried out without a battery.

Various home position return methods

Upgraded

12 home position return methods such as a retry function and shift function etc. are available to establish the home position used as the machine reference point. Select the home position return method according to the machine type.

Target position change function

NEW

The target position is able to be changed during positioning. When calibrating the position with the vision sensor, etc., positioning to the final position is completed without starting positioning again.

Optional data monitor function

Upgraded

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

NEW

Servo parameters are individually changed through the Motion SFC program and etc., without connecting to MELSOFT MR Configurator2 in control operation.

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

Upgraded

In addition to the standard functions such as binary operation, bit operation, type conversion and trigonometric in the Motion SFC, the command for the scaling function that is suitable for calculating coordinate conversions, the cam data reading and writing, and the dedicated instruction that executes the cam auto generation have been added. 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 pulses synchronous encoder

NEW

4 million (22-bit) pulses synchronous encoder equipped as standard greatly improves the synchronous operation accuracy. (16 times higher than conventional model.) High-accuracy control is achieved when used with MR-J4-B (standard 4 million (22-bit) pulses resolution).

Limit switch output function

Within a set data range, a signal is able to be set to turn ON/OFF 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, after the speed control with fixed position turns OFF, stopped at the specified position. Both the speed and the duration of acceleration/deceleration can be changed to any value during operation.

Digital oscilloscope function

Upgraded

With the digital oscilloscope of MELSOFT MT Works2, collection of data which is synchronized with the operation cycle and waveform display are available. Just follow 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

Upgraded

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

Upgraded

Control mode switch command such as the gain switching function, PI-PID control and control loop (full closed, semi-closed) can be executed to the servo amplifier.

Electronic cam control

Upgraded

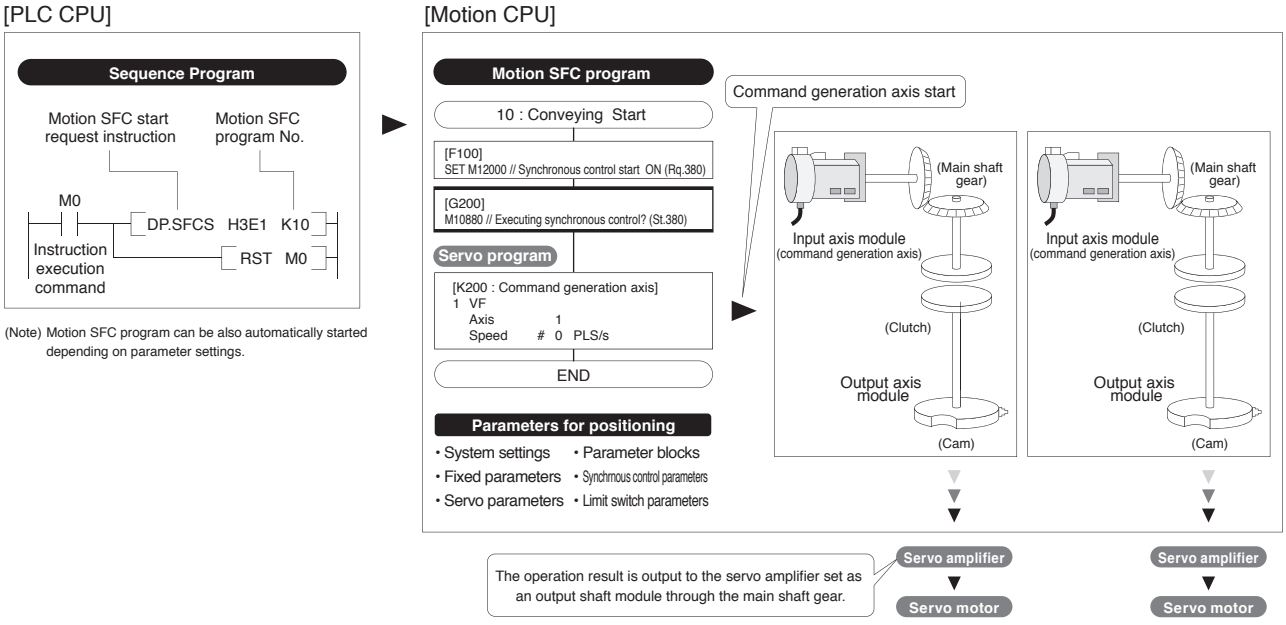
The electronic cam control is available with cam data created on MELSOFT MT Works2. Cam control for a degree axis and indirect designation of the number of pulses per cam axis rotation are possible now with new Motion CPU.

Advanced Synchronous Control NEW

Q17nDSCPU

"Synchronous control" can be executed easily using software instead of controlling mechanically with gears, shafts, speed change gears or cam etc. "Synchronous control start/stop" can be set on each output axis. 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.

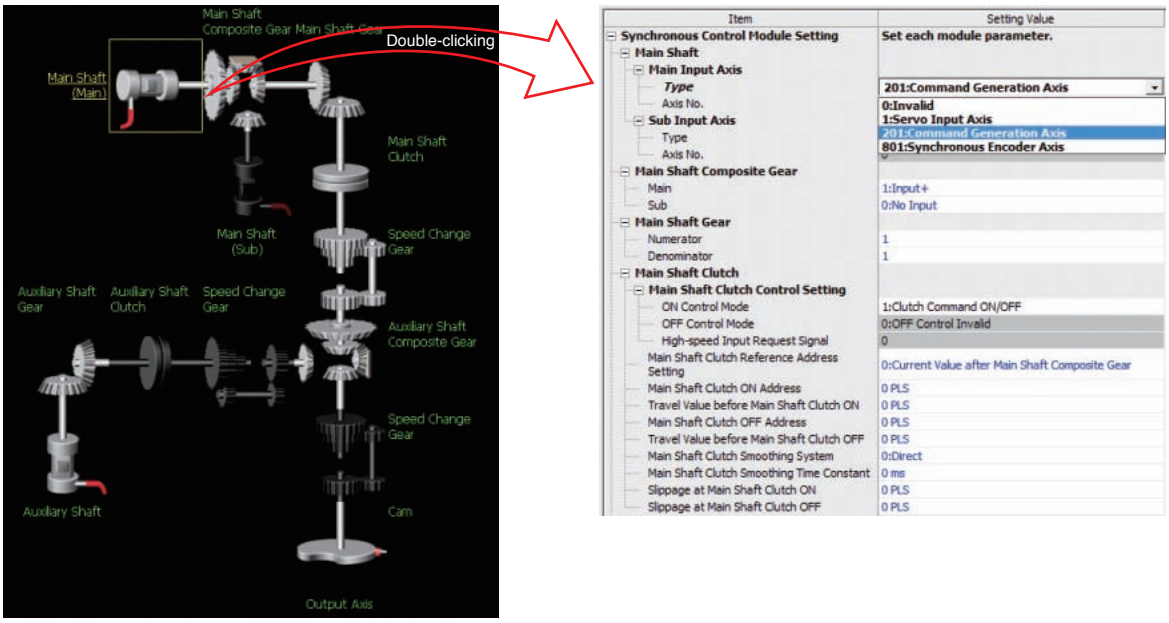
Control flow



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

Synchronous Control Parameters

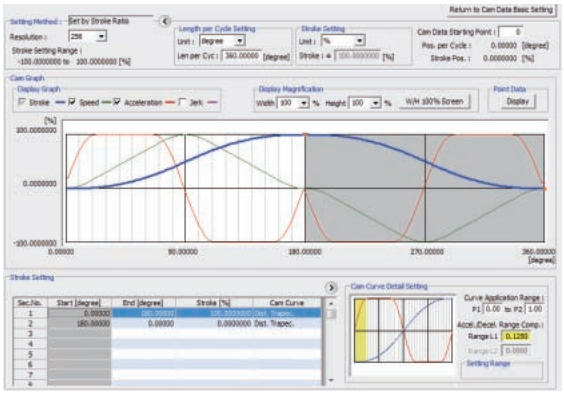
- ●Synchronous control is easily executed by setting parameters.
- ●The movement amount of the main shaft can be transmitted to output axes via the clutch.
- ●"Command generation axis" is not considered as a control axis; therefore the output axes can be set using all of the available control axes.



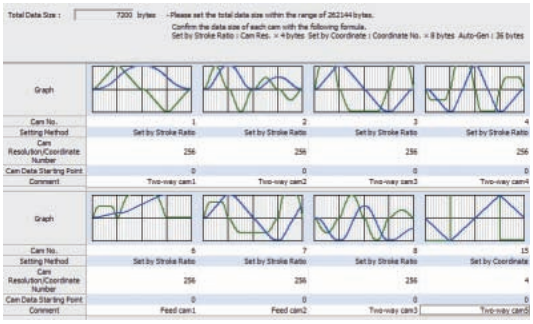
Electric cam

A wide variety of cam patterns can be easily created.

[Cam Data Creation Screen]



[Cam Data List]

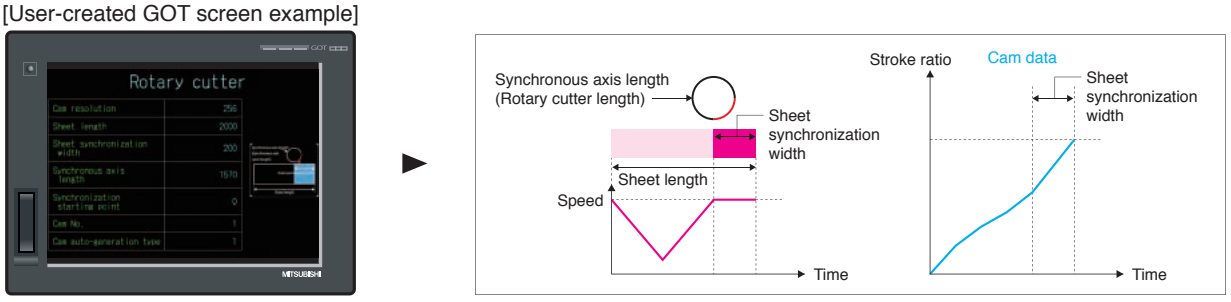


- ●Cam data has been created more freely than the previous ones. Various cam data is available.
- ●Click the graph and drag it, which causes the waveform to automatically change according to the pointer's movement.
- ●Stroke, speed, acceleration, and jump of speed can be set while checking the change of the graph.
- ●Cam data can be imported and exported in CSV format.
- ●The created cam data is easily checked with the thumbnail display.
- ●The screen for cam data creation will open by double-clicking the cam data to be edited.

Cam auto-generation function

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

[User-created GOT screen example]



Mechanical system program

Q17nDSCPU

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

Advanced synchronous control with simple settings

Synchronous control can be easily structured using the 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.

[Easy programming with a mouse]

Programming screen using mechanical system program

Event processing and programming environment have been drastically improved.

Task operation examples of Motion SFC program (SV13/SV22) Q17nDSCPU

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 , controlling total machine operation.
- The entire system operation is easily programmed by using the icons such as F (Arithmetic Operation, I/O Control), G (Transition Conditional Judgement) 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

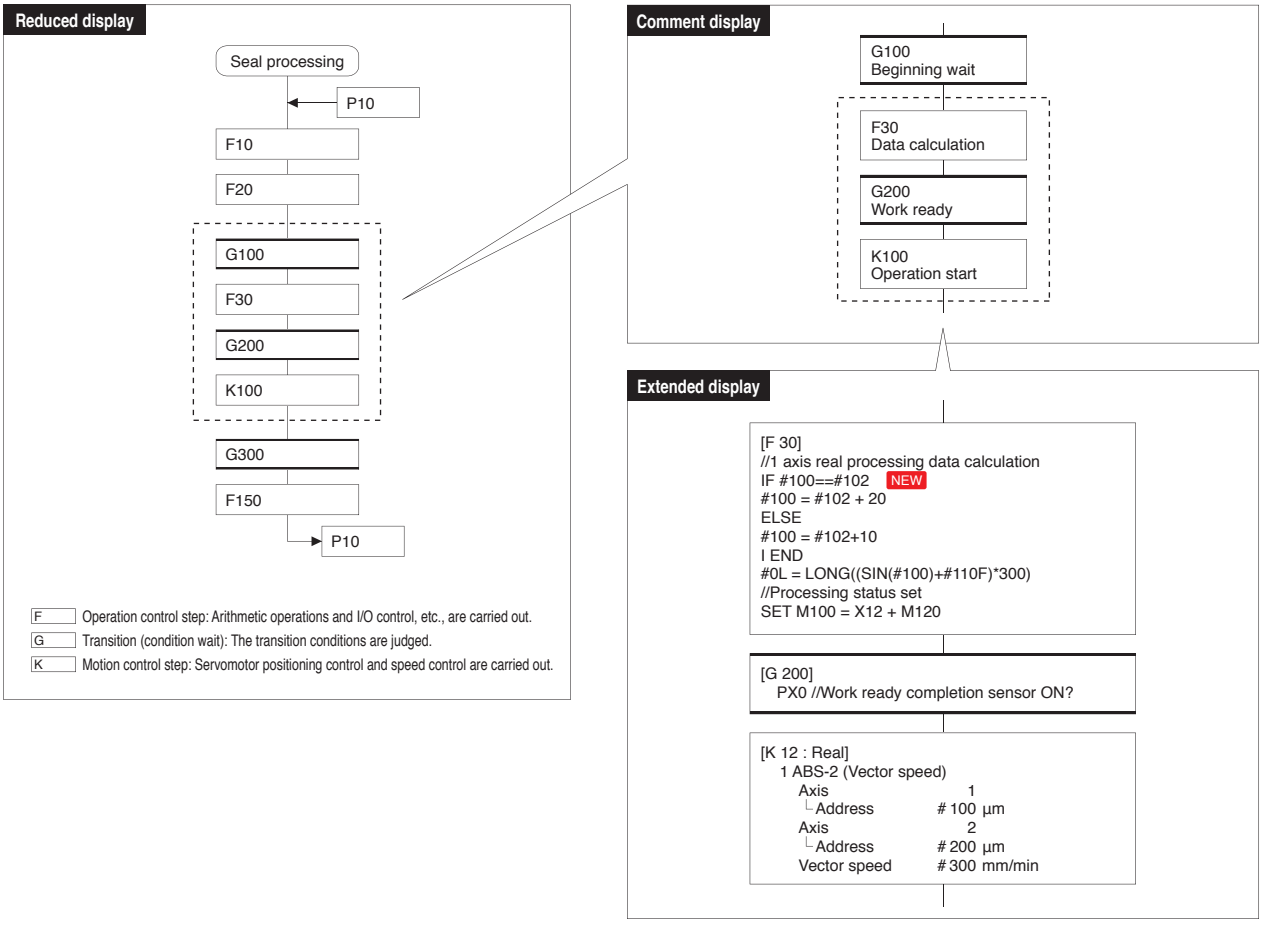
- Operation commands are easily described by creating comments.
- Operation commands are detailed in a step by step format in a layered structure program.

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 the servo control by itself, eliminating the need of creating the sequence program for the servo control.

Enhanced operation functions

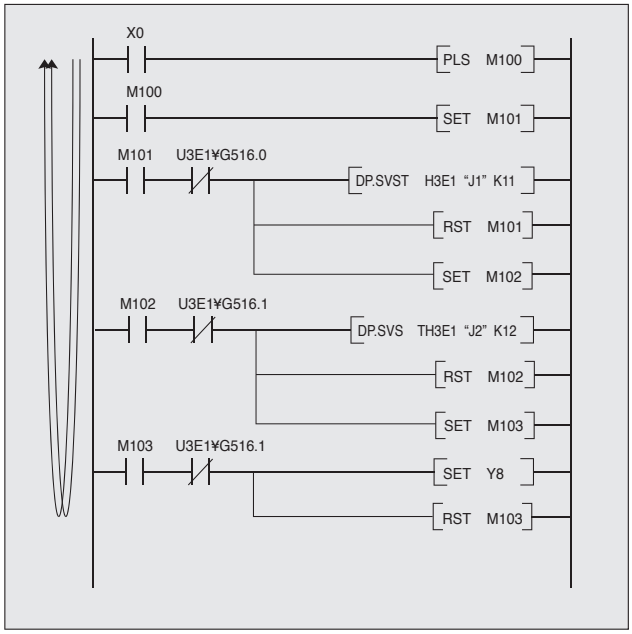
- Commands are able to be described with arithmetic and logic operation expressions.
- Compatible with 64-bit floating-point operations.
- Arithmetic functions include trigonometric functions, square root, natural logarithm, etc.
- The conditional branch (IF ELSE IEND), selective branch (SELECT CASE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



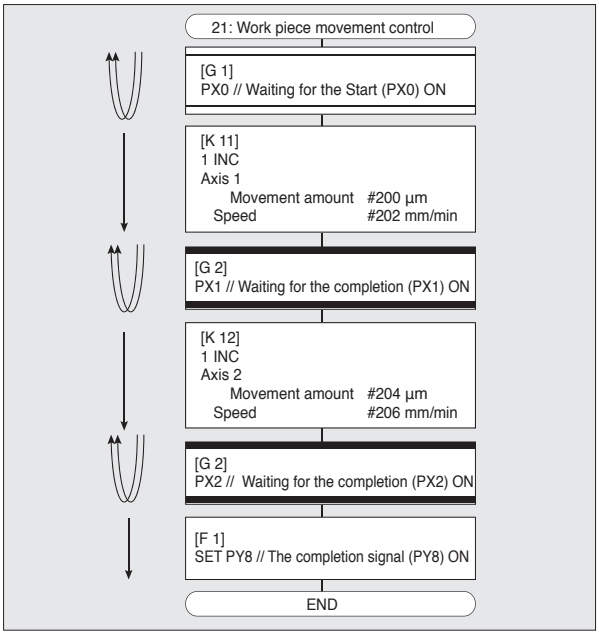
Motion SFC scanning method

The sequence program runs using “Scan execution method” where all of the steps are scanned at all times, but the Motion SFC program runs using “STEP execution method” where the steps are scanned following the “SHIFT” instruction.

Scanning all the steps in the sequence programs



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



Program control instruction and editing

Instructions such as conditional branch (FOR, NEXT), selective branch (SELECT CASE SEND), and repeat (FOR NEXT) are all available in Step F . NEW

[Motion SFC program edit example]

IF-ELSE-IEND

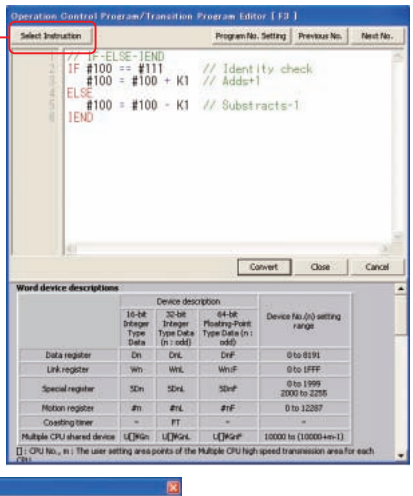
```
[F 3]
// IF-ELSE-IEND
IF      #100 ==#111      // Identity check
        #100 =#100 + K1  // Adds +1
ELSE
        #100 =#100 – K1  // Subtracts +1
IEND
```

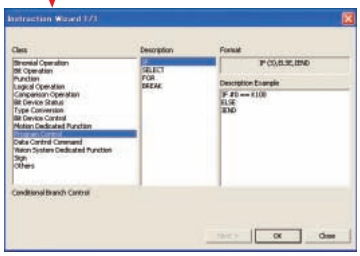
```
[F 4]
// SELECT-CASE-SEND
SELECT
  CASE  #0 == K100       // In case that #0 is 100
        #100 = #100 + K1
  CEND
  CASE  #0 >= K200       // In case that #0 is 200 or more
        #100 = #100 – K1
  CEND
  CELSE                  // In other cases
        #100 = 0
  CEND
SEND
```

```
[F 5]
// FOR-NEXT
#202 = K1000
FOR     #200 = K1   T0 K10
        #(#202) = K0     // Set “0” to from #1000 to #1009
        #202 = #202 + 1
NEXT
```

END

Double-clicking





You can select instructions from the instruction wizard, and describe them in the Motion SFC program without using any manuals.

Leading the industry in safety

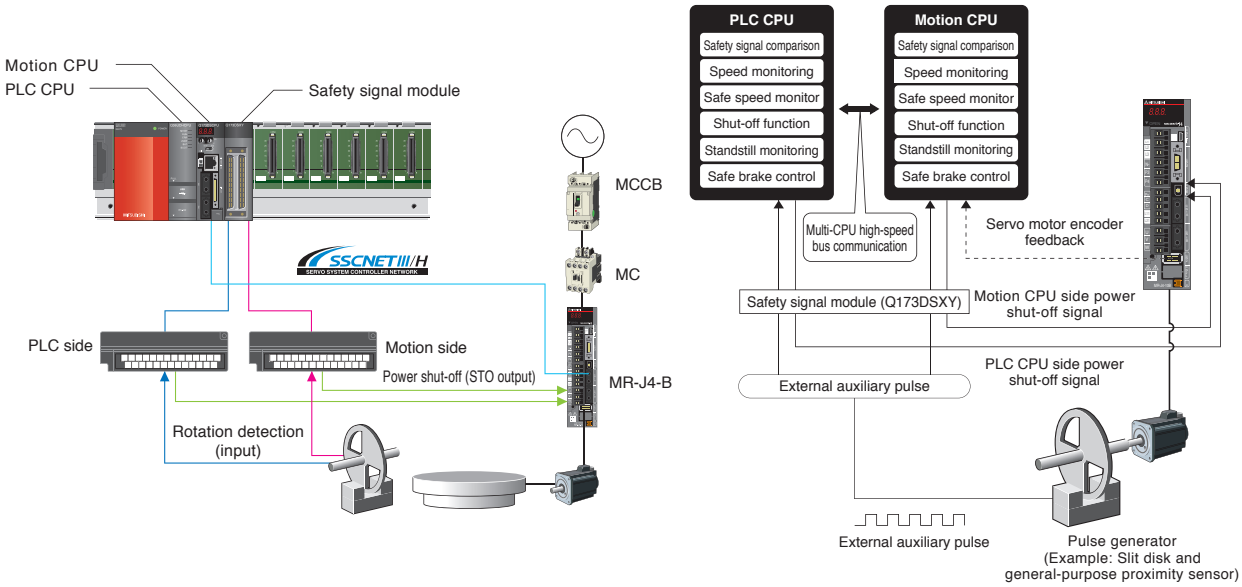
Safety System NEW

Q17nDSCPU

The safety system complies with “EN ISO13849-1:2008 Category 3 PLd” and “EN62061/IEC61508 SIL CL2” the harmonized standard for European machinery directive. Safely-limited speed (SLS) and the shut-off function are added as standard to 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 safety functions are freely programmed by the PLC CPU and Motion CPU ladder circuits. A safety system is also structured with the safe stop functions (SS1, SS2, SOS), the safe shut-off functions (STO, SBC) and Safe speed monitor (SSM).

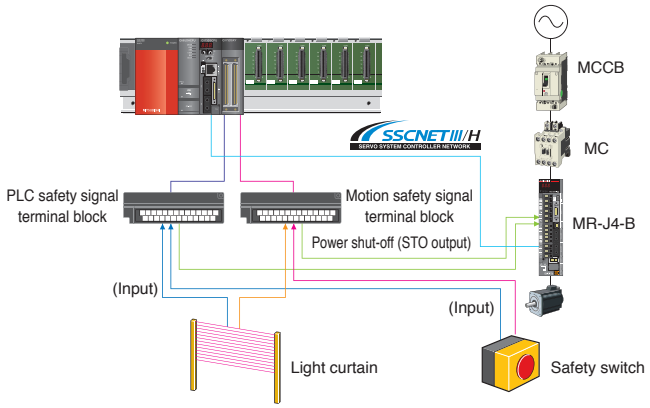
Speed monitoring Function

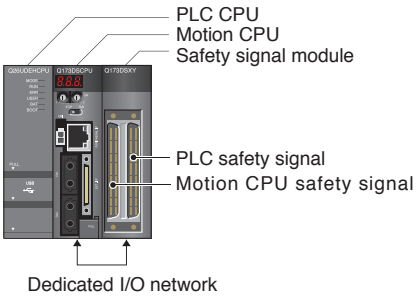
The motor speed is monitored not to exceed the safety speed by the Motion CPU and the PLC CPU.



Safety signal comparison function

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





PLC CPU	QnUD(E)(H)CPU
Motion CPU	Q17nDSCPU
Safety signal module	Q173DSXY (up to 3 units can be installed) (Note-2)
Max. number of input points	60 points × 2 systems
Max. number of output points	36 points × 2 systems

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

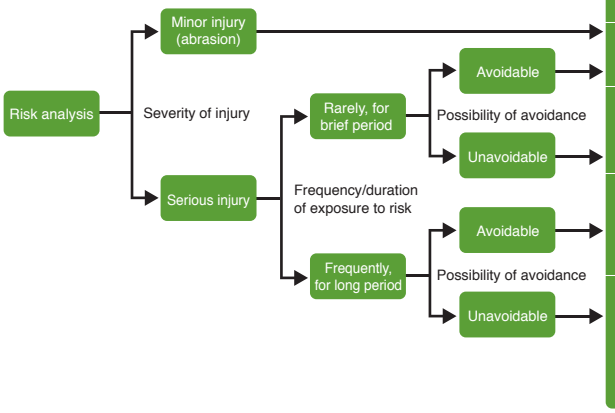
(Note-1): Power shut-off signal turns: ON when safety signal comparison function status is normal. OFF when error is detected.
(Note-2): All output signal points at the 2nd and 3rd modules can be used as user safety signals.

Safety Category

Q17nDSCPU

ISO13849-1 Safety categories

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



■Safety category requirements

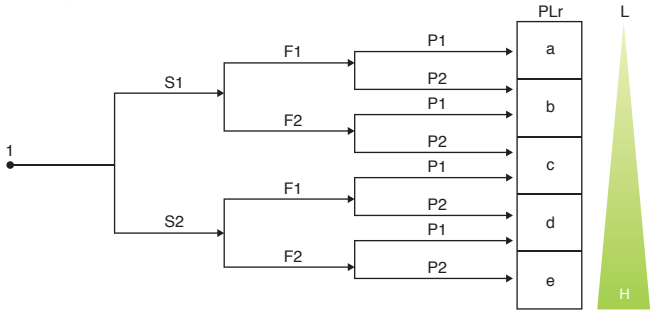
Category	Requirement summary	System behaviour
B	• Shall realize the intended functions of safety- related parts of the machine control system.	• The occurrence of a fault can lead to the loss of the safety function.
1	• Shall meet the requirements of Category B. • Shall use well-examined reliable components and observe safety principles.	• The same as Category B, but the safety-related part has more reliable safety function.
2	• Shall meet the requirements of Category B. • Shall observe safety principles. • Shall check the safety function at appropriate intervals.	• Although the loss of the safety function can be detected by checking, the safety function is lost between checks.
3	• Shall meet the requirements of Category B. • Shall observe safety principles. • Design requirements: A single fault shall not lead to the loss of the safety function. • Detect as many single faults as possible.	• The safety function is not lost by a single fault. • Some but not all faults can be detected. Accumulation of undetected faults may lead to the loss of the safety function.
4	• Shall meet the requirements of Category B. • Shall observe safety principles. • Design requirements: Detect a single fault at or before executing safety function. In cases where this is not possible, the safety function shall not be disabled by accumulated faults.	• The safety function is always in effect whenever a fault occurs. • Faults will be detected in time to prevent the loss of the safety function.

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 safety function



S	F	P
Severity of injury	Frequency or duration of exposure to risk	Possibility of avoiding or deterring risk
S1	**F1**	**P1**
Minor injury	Rarely to low frequency or for a brief period	Possible under certain conditions
S2	**F2**	**P2**
Serious injury	Frequently to continuously or for a long period	Almost impossible

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

A robust and easy-to-use programming environment for advanced Motion control

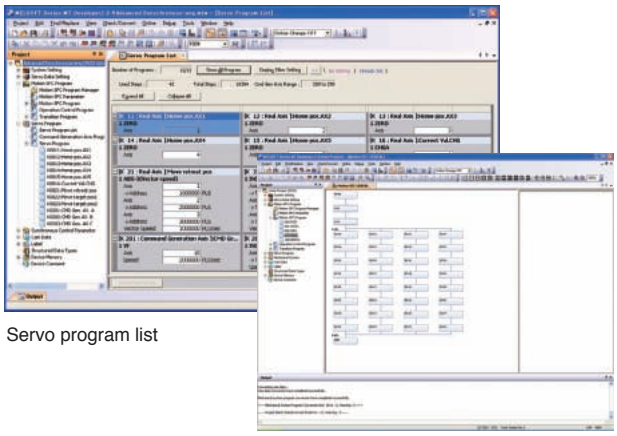
Motion controller programming software **MELSOFT MT Works2**

Programming

Q17nDSCPU

User-friendly functions for program development

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

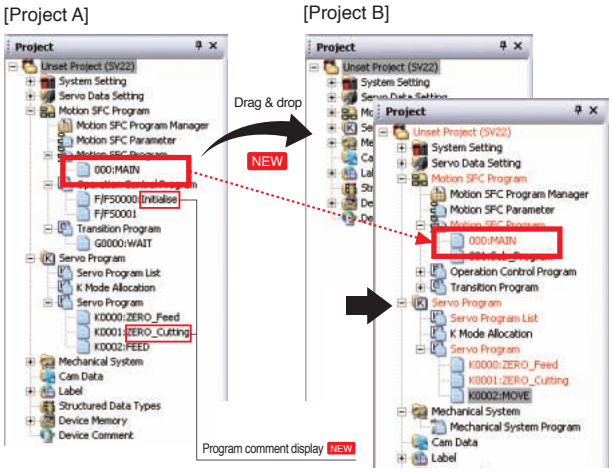


Servo program list

Motion SFC program

Easily diverting the existing program NEW

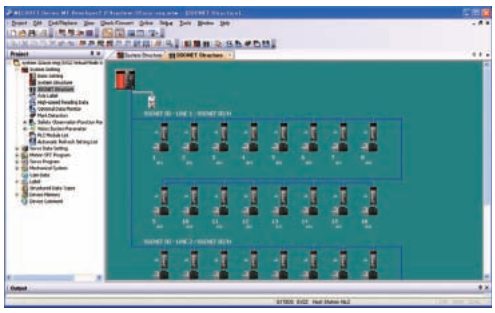
- Easily divert the existing SFC program from the original project to the new project just by drag&drop.
- You can add the program comments to project tree for easy identification of programs.



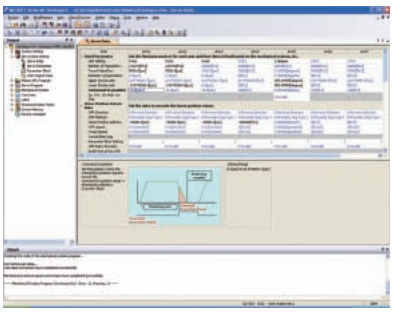
System design

Q17nDSCPU

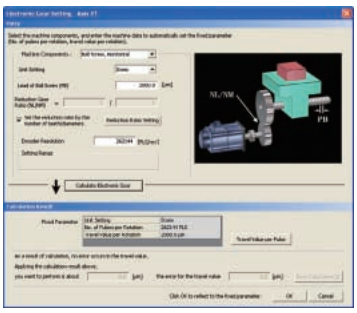
- Easily set servo amplifiers and modules with a graphical system setting screen.
- The one-point help is available to set parameters without the manual.
- You can easily set the complicated electronic gear just by inputting the machine specifications (reduction ratio, ball screw pitch, etc.). NEW



System Structure



Servo Data



Electric Gear Setting

Setup and adjustment

Q17nDSCPU

Calibration and testing tools for a quick and easy process setup

Monitor function

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

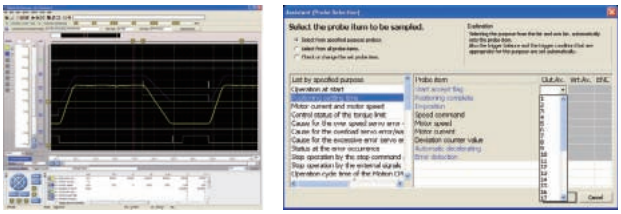
- Motion SFC program monitor
- Mechanical program monitor
- Current value monitor, positioning monitor, scroll monitor, error history monitor

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.

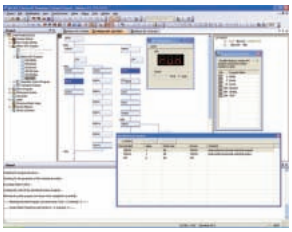
- The assistant function explains all work steps.
- Set often-viewed data easily with the purpose-based probe setting.
- Sample 16CH word and 16CH bit data. Of which, 8CH words and 8CH bits can be displayed in real time. NEW



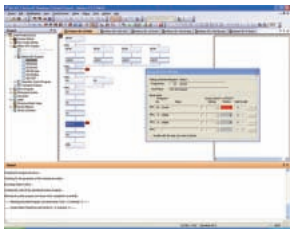
Digital oscilloscope

Various test operation functions

- Basic startup is able to be confirmed without a program in the test mode.
- The simulator function is available to debug the Motion SFC program and mechanical system programs without an actual machine.
- Step execution and brake point setting are possible with the Motion SFC program debug function.



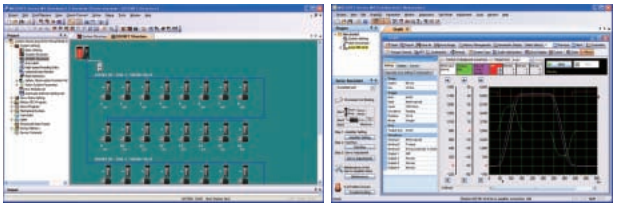
Simulator



Test

Collaboration with MELSOFT MR Configurator2

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



Graph

A variety of security options

Q17nDSCPU

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 NEW

- 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.

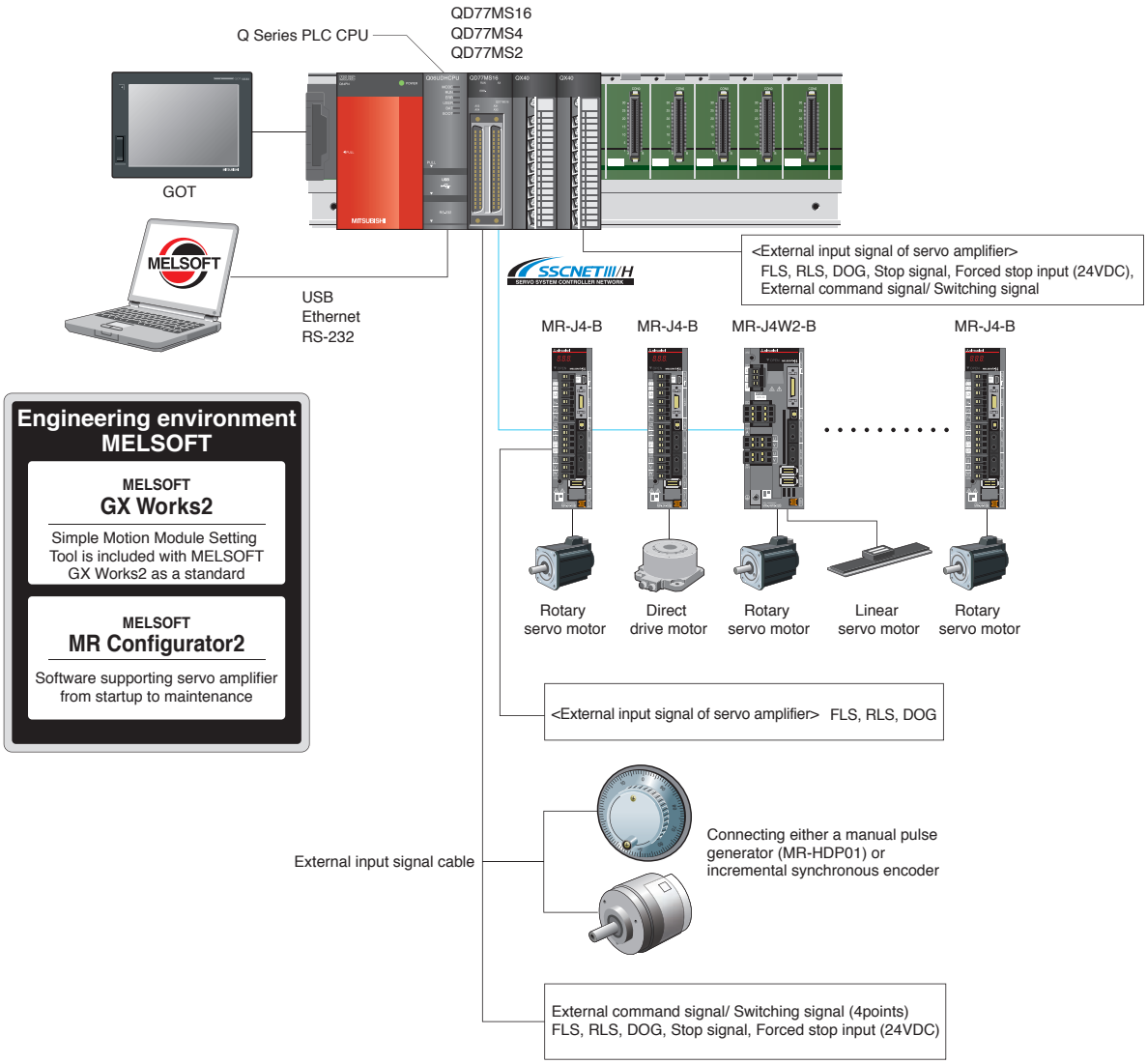
Controlling access to Motion CPU NEW

- A software security key set to the Motion CPU and personal computer prevents the Motion CPU from being illegally accessed.

System Configuration

QD77MS

The maximum number of axes controlled by a module: up to 16 axes (QD77MS16), up to 4 axes (QD77MS4), up to 2 axes (QD77MS2). QD75MH project is diverted to QD77MS.

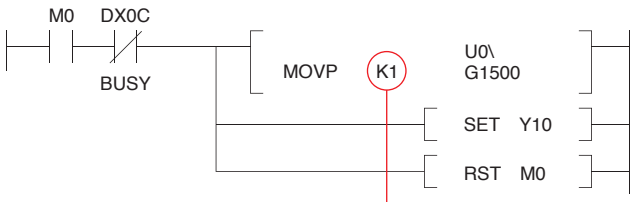


Control flow

QD77MS

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

PLC CPU



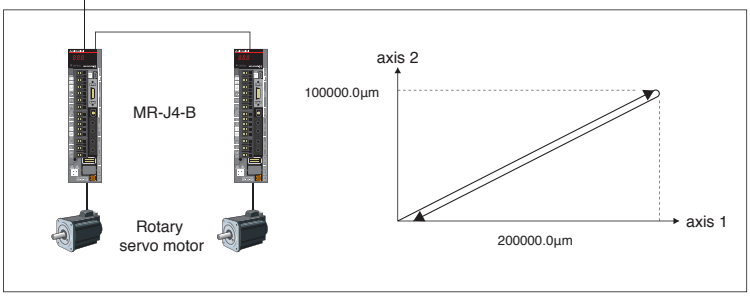
Simple Motion module

Axis #1 Positioning Data

No.	Operation pattern	Control system	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address	Arc address	Command speed
1	1: CONT	0Bh: INC Linear 2	Axis #2	0: 1000	0: 1000	200000.0 µm	0.0 µm	20000.00 mm/min
	<Positioning Comment>							
2	0: END	0Bh: INC Linear 2	Axis #2	0: 1000	0: 1000	-200000.0 µm	0.0 µm	10000.00 mm/min
	<Positioning Comment>							

Axis #2 Positioning Data

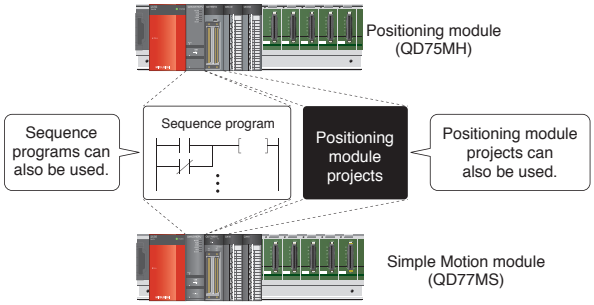
No.	Operation pattern	Control system	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address	Arc address	Command speed
1						100000.0 µm	0.0 µm	0.00 mm/min
	<Positioning Comment>							
2						-100000.0 µm	0.0 µm	0.00 mm/min
	<Positioning Comment>							



High compatibility with the previous models

QD77MS

The positioning module (QD75MH) projects and sequence programs are easily diverted to the Simple Motion module (QD77MS) projects.



High functionality with our cutting-edge technology

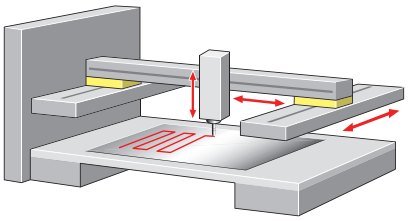
Positioning control

QD77MS

- Various machines can be extensively controlled by various control methods such as linear interpolation control, 2-axis circular interpolation control, fixed feed control and continuous trajectory control.
- Automatic operation is executed by setting the positioning addresses and speeds, etc., to a sequence program.
- Powerful sub-functions such as M codes, skip function, step operation and target position change function.

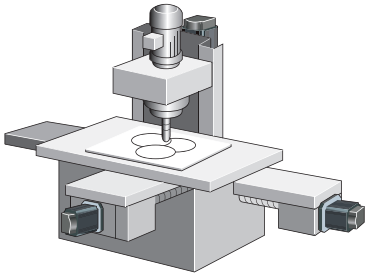
Sealing

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



X-Y table

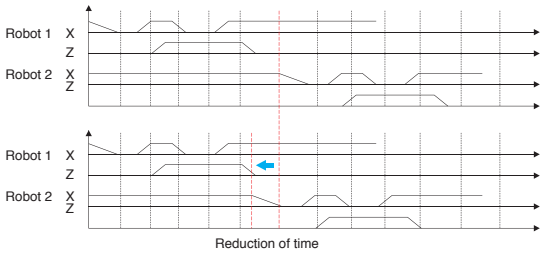
- 2-axis linear interpolation
- 2-axis circular interpolation
- 3-axis linear interpolation
- Continuous orbit control

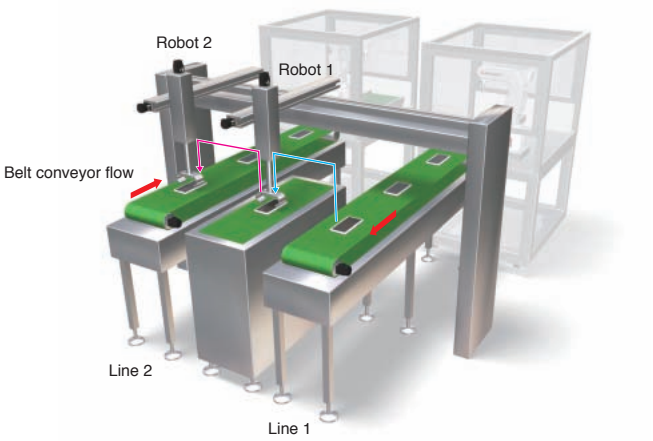


Synchronous/Cam control NEW

QD77MS

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



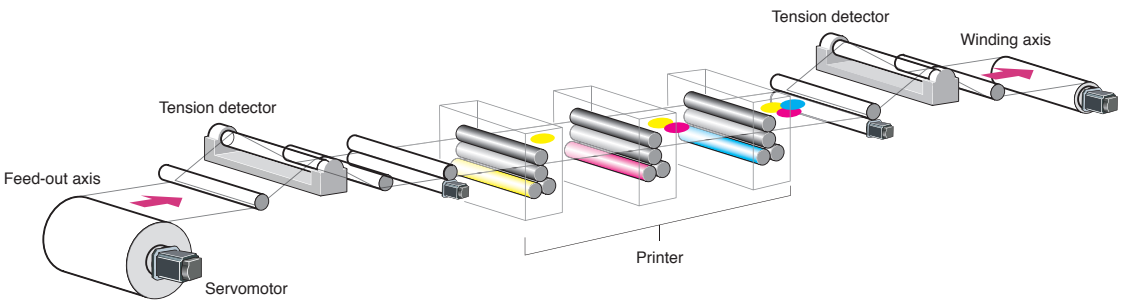


Speed-torque control (Tightening & Press-fit control) NEW

Tightening & Press-fit control Patent pending

QD77MS

Tension control such as rewinding and winding of axes are available. Since the absolute position is stored even during the Speed-torque control, the positioning on coordinates is possible after switching from the Speed-torque control to position control.

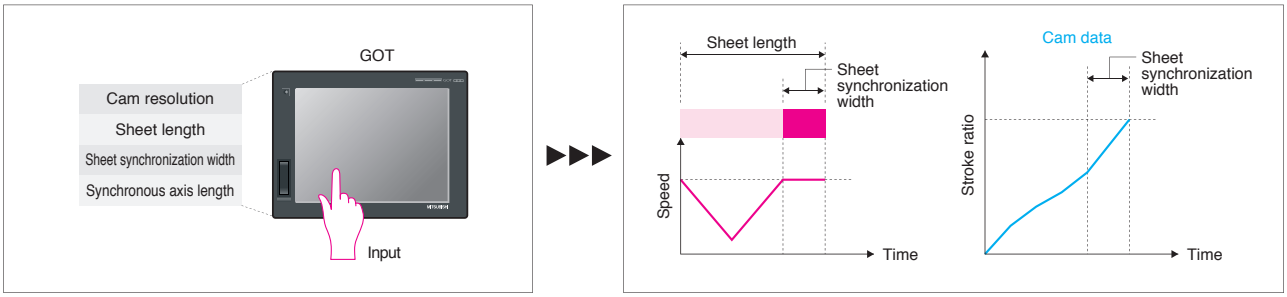


Simple cam profile creation

Cam auto-generation function NEW

QD77MS

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



Various servo data is at the palm of your hand

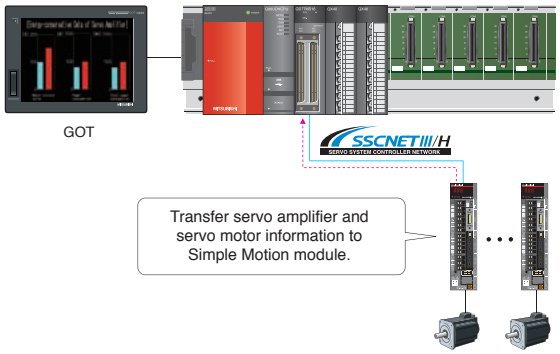
Optional data monitor function NEW

QD77MS

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

Designatable data

Effective Load Ratio, Regenerative Load Ratio,
Peak Torque Ratio, Load Inertia Ratio, Position Loop Gain 1,
Main Circuit Bus Voltage, Position feed back,
ABS ENC single Rev. Pos, Power Consumption, Total power consumption, etc.

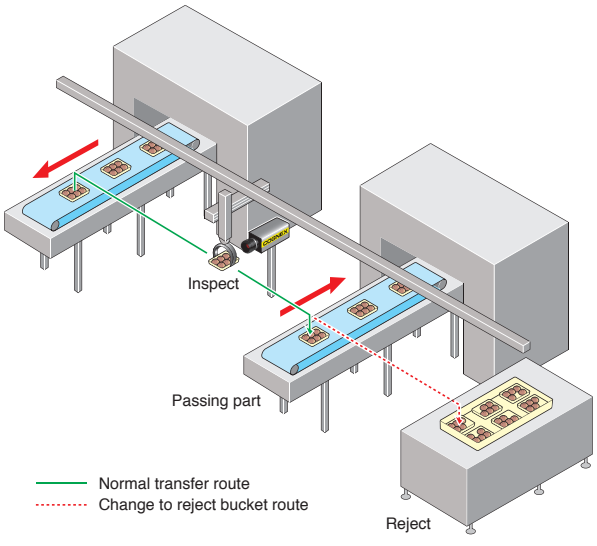


Flexible to change the target position

Target position change function

QD77MS

The target position is able to be changed at any timing even when objects are moving (1-axis linear control). In the machine process shown on the right, the product is being examined while moving to the next line. If a faulty object is found, the target position is changed so that the faulty object is put in the reject bucket.



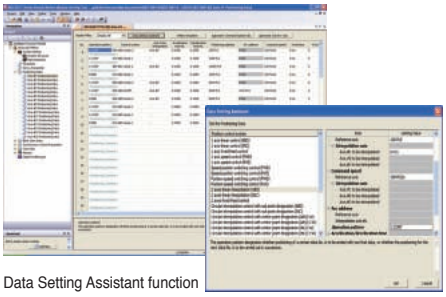
Simple Operation for Ease of Use

Positioning data

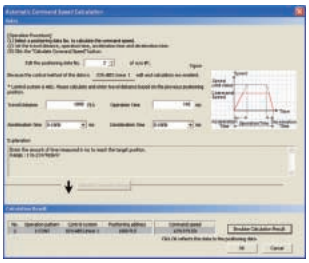
QD77MS

Execute positioning control with the data table method.

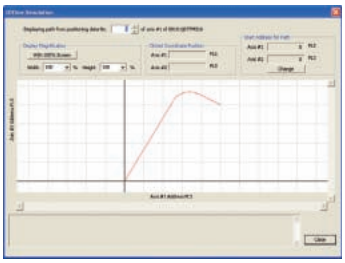
- The Data Setting Assistant function simplifies the setting input process.
- Positioning data can be set very simply by using functions such as Automatic Command Speed Calculation, Offline Simulation, and automatic calculation of auxiliary arc, etc.



Data Setting Assistant function



Automatic Command Speed Calculation



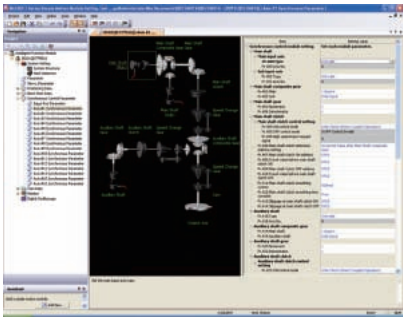
Offline Simulation

Synchronous control data

QD77MS

Synchronous control data is easily created with software by placing mechanical modules on screen, such as the gear, shaft, speed change gear and cam.

- Easily perform the Synchronous control with parameter settings. There is no need to create complicated programs.
- Start and stop synchronous control for each axis.
  Use the synchronous control axis and positioning control axis together.
- Transmit the travel value of main shaft to the output axis via the clutch.



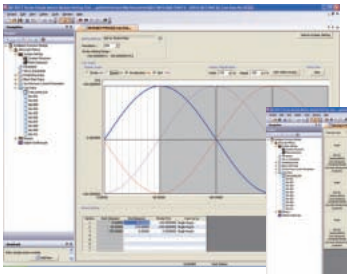
Synchronous Control Parameter Settings

Cam control data

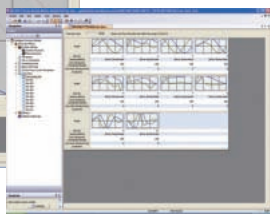
QD77MS

Easily create cam data for various patterns.

- Cam control has become more flexible than the conventional ones. Various cam pattern is available.
- You can set the stroke, speed, acceleration and throb while simultaneously checking the profile on a graph.
- The created cam data can be checked by viewing as thumbnail displays of cam data.
- Import and export cam data in CSV format.



Cam Data



Cam Data List

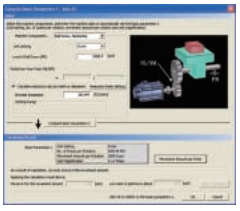
Parameter settings

QD77MS

- One-point help allows parameters to be set without needing a manual.
- Easily set the applicable servo amplifier on a graphical screen.
- The complicated electric gear settings can be completed just by specifying the mechanism configuration (reduction ratio, ball screw pitch, etc.).

Parameter Settings

System Structure Setting



Electronic Gear Settings

Installation

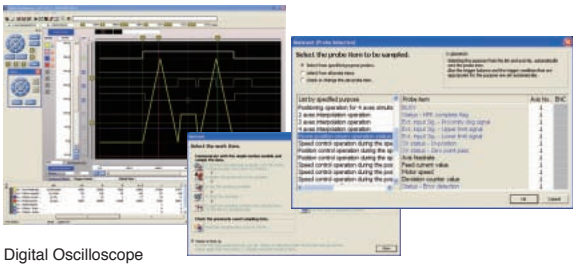
QD77MS

Digital oscilloscope function

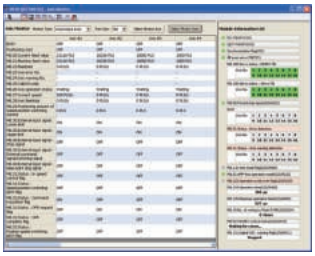
- Operation confirmation and troubleshooting are powerfully supported with data collection and wave displays which are synchronized to the Motion operation cycle.
- The assistant function explains all steps.
- Set often-viewed data easily with the purpose-based probe setting.
- Sample 16CH word and 16CH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

Monitor and test functions

- Easily complete system installation and operation checks with powerful monitor and test functions.
- The items to be displayed on the monitor can be selected from the extensive information monitor options.
- The test function enables you to check basic operations without a sequence program.



Digital Oscilloscope



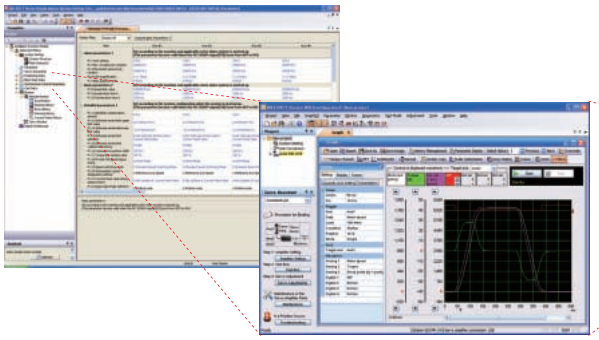
Axis Monitor

Positioning Test

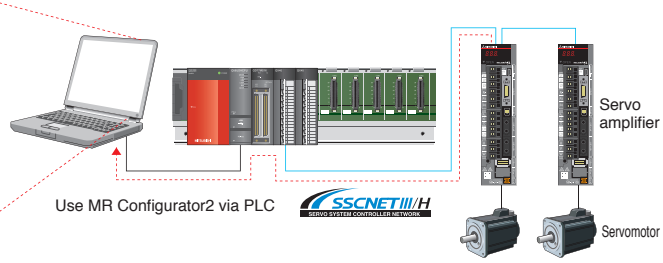
Adjustment of servo amplifier parameters

QD77MS

Collaboration with the MR Configurator2 increases the ease of servo installation.
You can set and adjust servo amplifier parameters with the MR Configurator2, the software created with Mitsubishi servo know-how.



Graph



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. Multi-axis servo amplifiers are also available, achieving energy conservation, space-saving, and reduced wiring.

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

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

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

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

Linear servo motor

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

Core type
(natural/liquid cooling)
LM-F series
Rating: 300 to 1200 N
(natural cooling)
Rating: 600 to 2400 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

Direct drive motor

TM-RFM series
Rating: 2 to 240 N•m

Machine

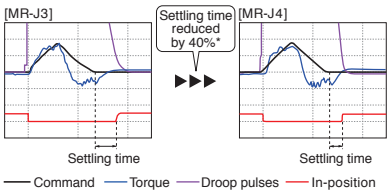
Industry-leading level of servo amplifier basic performance

Industry-leading levels

Our original, ever-evolving high-speed servo control architecture is applied to the dedicated execution engine. **Speed frequency response is increased to 2.5 kHz, achieving the industry leading level of speed***. Compatible servo motors are equipped with **a high-resolution absolute encoder of 4,194,304 pulses/rev (22-bit)**, improving the processing speed substantially.
The performance of the high-end machine is utilized to the fullest.

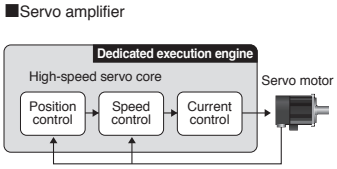
* Based on Mitsubishi Electric research as of August 2012.

[Settling time comparison with the prior model]



* The result is based on our evaluation condition.

[Dedicated execution engine]

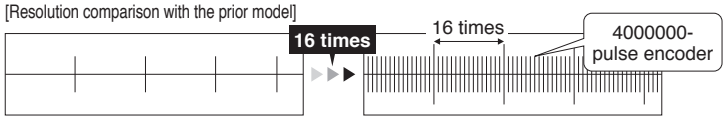


Improving machine performance with high-performance motors

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]

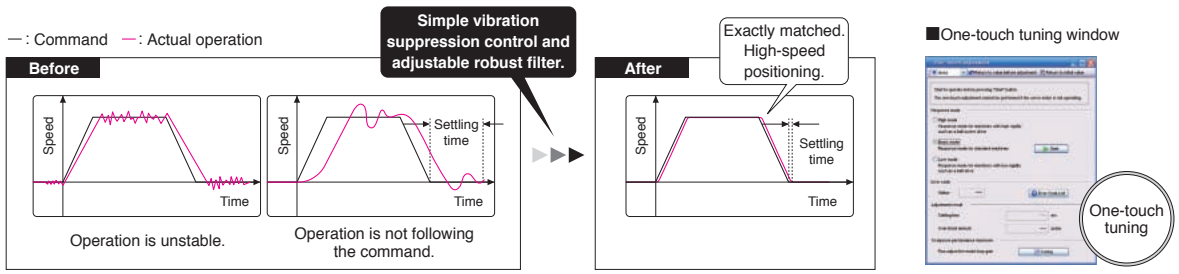


MR-J3 series 18 bits = 262,144 pulses/rev **MR-J4 series 22 bits = 4,194,304 pulses/rev**

Advanced one-touch tuning function

Enhanced functions

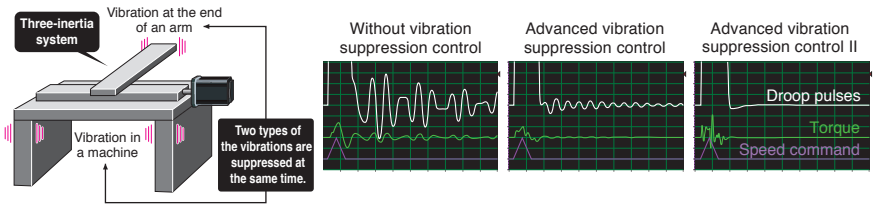
Servo gains including machine resonance suppression filter, advanced vibration suppression control II, and robust filter are adjusted just by turning on the one-touch tuning function. Machine performance is utilized to the fullest using the advanced vibration suppression control function.



Advanced vibration suppression control II

Patent pending Enhanced functions

Due to vibration suppression algorithm which supports three-inertia system, two types of low frequency vibrations are suppressed at the same time. Adjustment is performed with one-touch operation. This function is effective in suppressing vibration at the end of an arm and in reducing residual vibration in a machine.

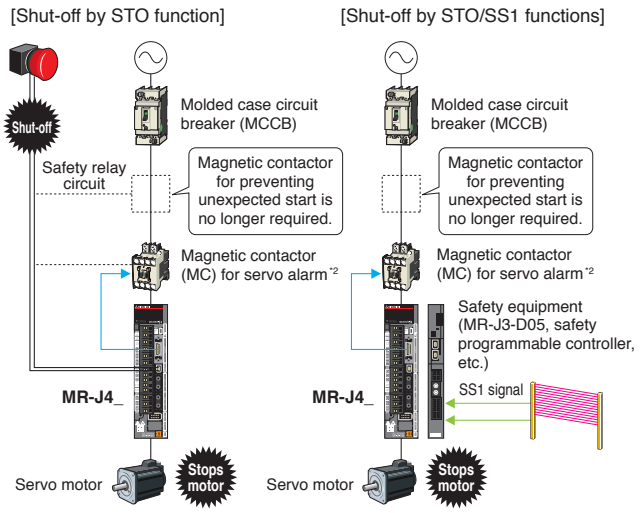


Compatible with safety function IEC/EN 61800-5-2 as standard

MELSERVO-J4 series servo amplifiers have integrated STO (Safe Torque Off) and SS1[*1] (Safe Stop 1) functions.
Safety system is easily configured in the machine. (SIL 2)

- 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.[*2]

*1. Safety equipment (MR-J3-D05, etc.) or Motion controller safety signal module (Q173DSXY) is required.
*2. Two magnetic contactors are not required when STO function is used. However, in this diagram, one magnetic contactor is used to shut off the power at alarm occurrence.



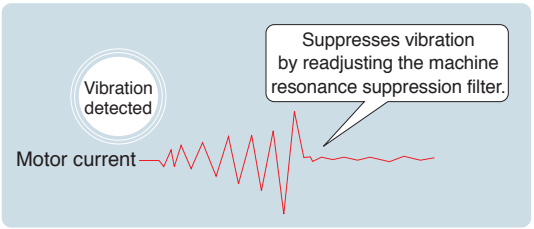
Tough drive function

Enhanced functions

Detect changes in the operating environment to automatically adjust the servo control status.

Vibration tough drive

Machine resonance suppression filter is readjusted when vibration is detected by the current command inside the servo amplifier.



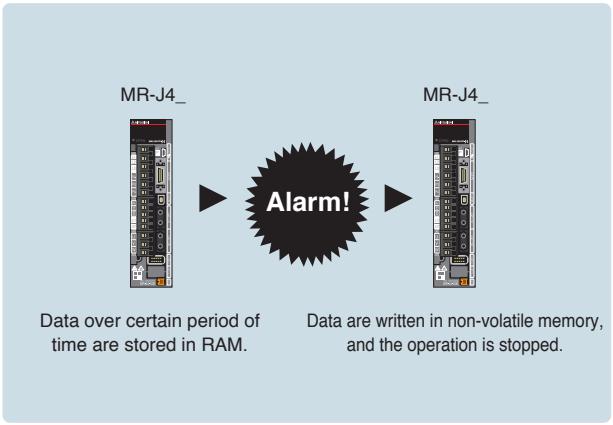
Instantaneous power failure tough drive

Undervoltage alarm is prevented by changing detection time when instantaneous power failure in main circuit power is detected.

Large capacity drive recorder

Patent pending | Enhanced functions

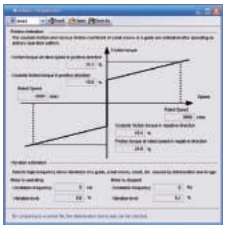
- Servo data such as motor current and position command before and after the alarm occurrence are stored in non-volatile memory of servo amplifier. The data read on MR Configurator2 during restoration are used for cause analysis.
- Check the waveform of 16 alarms in the alarm history ((analog 16 bits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



Machine diagnosis function

Patent pending | NEW

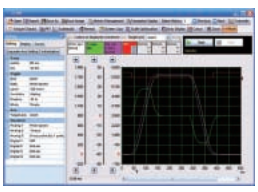
This function detects faulty machine parts (ball screw, guide, bearing, belt, etc.) by analyzing machine friction, load moment of inertia, unbalanced torque, and changes in vibration component from the data inside the servo amplifier, supporting timely maintenance of the driving parts.


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.

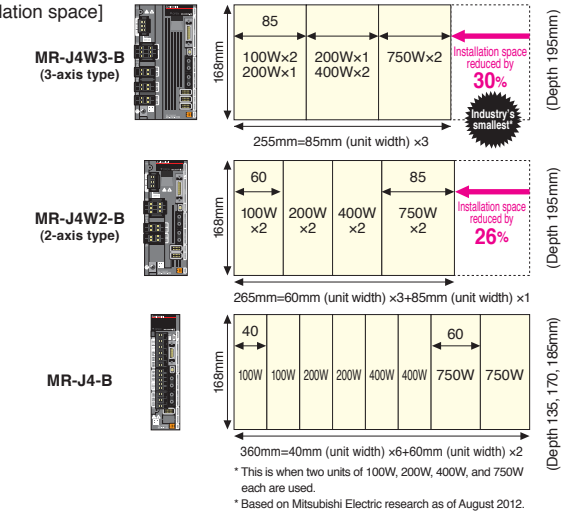

Graph window

2-axis/3-axis types for energy-conservative, miniaturized, and low-cost machine

Space-saving with industry's smallest* 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]

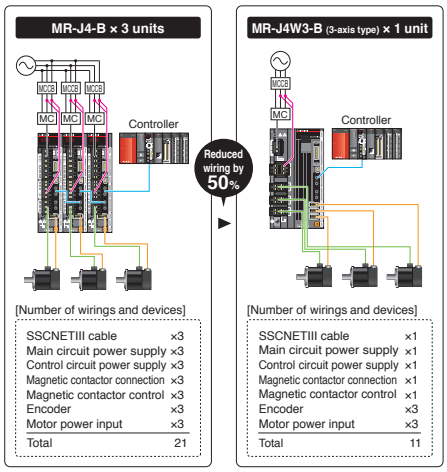


* This is when two units of 100W, 200W, 400W, and 750W each are used.
* Based on Mitsubishi Electric research as of August 2012.

Reduced wiring by approx. 50% with 3-axis type

In 3-axis servo amplifier MR-J4W3-B, the three axes use the same connections for main and control circuit power, peripheral equipment, control signal wire, etc. Thus, the number of wirings and devices is greatly reduced.

[Comparison of the number of wirings and devices]



[Number of wirings and devices]

SSCNETIII cable	×3
Main circuit power supply	×3
Control circuit power supply	×3
Magnetic contactor connection	×3
Magnetic contactor control	×3
Encoder	×3
Motor power input	×3
Total	21

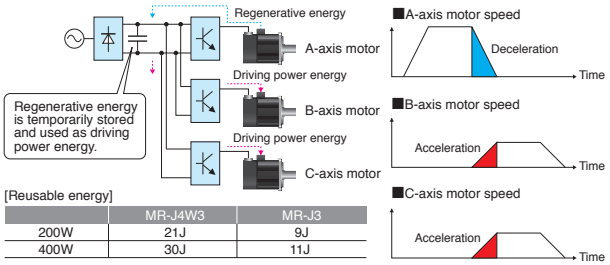
[Number of wirings and devices]

SSCNETIII cable	×1
Main circuit power supply	×1
Control circuit power supply	×1
Magnetic contactor connection	×1
Magnetic contactor control	×1
Encoder	×3
Motor power input	×3
Total	11

Supporting energy-conservative machine using regenerative energy

The regenerative energy of an axis is used as driving power energy for the other axes, contributing to energy-conservation of machine. Reusable regenerative energy stored in the capacitor is increased in MR-J4W_ as compared to the prior model. Regenerative option is no longer required.

* Regenerative resistor may be required depending on the conditions.



[Reusable energy]

	MR-J4W3	MR-J3
200W	21J	9J
400W	30J	11J

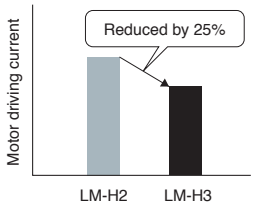
Energy-conservation achieved by LM-H3 linear servo motor series

NEW

Reduced motor driving power

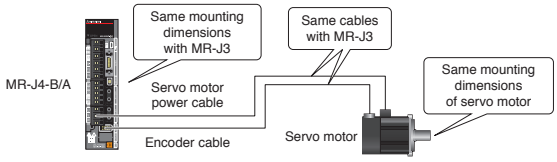
LM-H3 series achieves reduction of motor driving power due to optimized magnet form and new magnetic design by 25%*. Conservation of power is achieved for machine. As compared to the prior model, the motor coil is lighter by approximately 12%*. The energy required to drive the moving part is reduced.

* For 720 N rated linear servo motor.



●MR-J4-B/A has the same mounting dimensions* with MR-J3-B/A. HG rotary servo motor series has the same mounting dimensions and uses the same cables for the power, the encoder, and the electromagnetic brake as HF series.

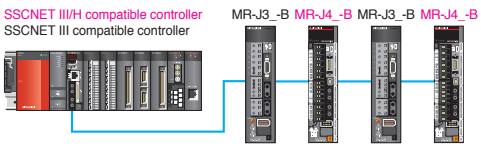
* Mounting dimensions are smaller for 5kW servo motor.



●SSCNET III/H /SSCNET III compatible products can be used together.

* When using SSCNET III/H compatible and SSCNET III compatible products together, the communication speed is 50 Mbps, and the function and performance are equivalent to when using MR-J3.

●Parameters of MR-J3-B are converted to those of MR-J4-B, using the parameter converter function of MELSOFT MT Works2.



Motion controller specifications

Control specifications

Item		Specifications		
		Q173DSCPU	Q172DSCPU	
Number of control axes		32 axes (Up to 16 axes/ system)	16 axes	NEW
Operation cycle (Operation cycle setting)		0.2ms, 0.4ms, 0.8ms, 1.7ms, 3.5ms, 7.1ms		
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, Constant speed control, Position follow-up control, Speed control with fixed position stop, Speed switching control, High-speed oscillation control, Synchronous control (SV22), Speed-torque control		
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)		
Program capacity (Dedicated instruction)	Servo program	16k steps		
Number of positioning points		3200 points (Positioning data can be set indirectly)		
Peripheral interface		PERIPHERAL I/F, Via PLC CPU (USB, RS-232, Ethernet)		
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 (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) Possible to connect 1 module (Internal I/F use) (Note-5)		NEW
Speed-torque control		Speed control without positioning loops, Torque control, Tightening & Press-fit control		NEW
Synchronous encoder operation function		Possible to connect 12 modules (SV22 use)		
M-code output function		M-code output function provided, M-code completion wait function provided		
Limit switch output function		Number of output points 64 points, Watch data: Motion control data, Word device		
ROM operation function		Provided		Upgraded
External input signal		Q172DLX (FLS, RLS, STOP, DOG) , External input signals (FLS, RLS, DOG) of servo amplifier or bit device		Upgraded
High-speed reading function		8 points (Via Input module, Via tracking of Q172DEX/Q173DPX), 4 points (Via Q17nDSCPU's Internal I/F)		
Mark detection function		Continuous Detection mode, Specified Number of Detections mode, Ring Buffer mode		NEW
	Mark detection signal	4 points (Via Q17nDSCPU's Internal I/F), Bit device, Q172DLX (DOG)		NEW
	Mark detection setting	32		
Torque limit value change function		Positive direction torque limit value, Negative direction torque limit value		Upgraded
Target position change function		Provided		NEW
Servo parameter change function		Provided		NEW
Servo amplifier control mode switching function		Gain switching function, PI-PID control, Control loop changing (semi closed loop control, fully closed loop control)		Upgraded
Optional data monitor function		6 setting/axes (MR-J4-B's SSCNET III/H use)		Upgraded
Forced stop function		Motion controller forced stop (EMI terminal, System setting), Forced stop terminal of servo amplifier		
Number of input/output points		Total 256 points (Q17nDSCPU's Internal I/F 4 points + I/O module)		
Clock function		Provided		
Security function		Password registration, Password for every Motion SFC programs, Software security key function		NEW
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 (Note-4)		Upgraded
Amplifier-less operation function		Provided		
Absolute position system		Made compatible by setting battery to servo amplifier. (Possible to select the absolute data method or incremental method for each axis)		
Number of SSCNETIII/H systems (Note-1)		2 systems	1 system	
Number of Motion related modules		Q172DLX 4 modules usable Q172DEX 6 modules usable (Note-2) Q173DPX 4 modules usable (Note-3)	Q172DLX 4 modules usable Q172DEX 6 modules usable (Note-2) Q173DPX 4 modules usable (Note-3)	

(Note-1): The SSCNETIII 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): When using the incremental synchronous (SV22 use), you can use the number of modules in the specification.
When connecting the manual pulse generator, you can use only 1 module.
(Note-4): 8CH word data and 8CH bit data can be displayed in real time.
(Note-5): When the manual pulse generator is used with the Q17nDSCPU's internal I/F, do not set the Q173DPX in the System Settings.

Motion SFC performance

Item				Specifications
				Q173DSCPU / Q172DSCPU
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) / 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
	Descriptive expression	Operation control program		Calculation expression, Bit conditional expression and branches, Repetition process Upgraded
		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
	Executed task	Normal task		Executed in Motion main cycle
		Event task (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)			8192 points
	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 (Note-1)

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

Advanced Synchronous Control

Synchronous Control

Item		Available Setting Points	
		Q172DSCPU	Q173DSCPU
Input axis	Servo input axis	16 axes/module	32 axes/module
	Command generation axis	16 axes/module	32 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	
Auxiliary shaft composite gear		1 /output axis	
Speed change gear		2 /output axis	
Output axis		16 axes/module	32 axes/module

Cam

Item			Specification
Memory capacity	Storage area for cam data		256k bytes
	Working area for cam data		1024k bytes
Number of registration			Up to 256 program items (according to memory capacity, cam resolution and number of coordinates)
Comment			Up to 32 characters (half-byte) 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 function			Cam generated automatically for rotary cutter

Mechanical system program (SV22)

Item			Specifications			
			Q173DSCPU		Q172DSCPU	
Control unit	Drive module	Virtual servomotor	PLS			
		Synchronous encoder				
	Output module	Roller	mm, inch			
		Ball screw				
		Rotary table	Fixed as “degree”			
		Cam	mm, inch, degree, PLS Upgraded			
Mechanical system program	Drive module	Virtual servomotor	32	Total 44	16	Total 28
		Synchronous encoder	12		12	
	Virtual axis	Virtual main shaft	32	Total 64	16	Total 32
		Virtual auxiliary input axis	32		16	
	Transmission module	Gear (Note-1)	64		32	
		Clutch (Note-1)	64		32	
		Speed change gear (Note-1)	64		32	
		Differential gear (Note-1)	32		16	
		Differential gear (Connect to the virtual main shaft) (Note-2)	32		16	
	Output module	Roller	32	Total 32	16	Total 16
		Ball screw	32		16	
		Rotary table	32		16	
		Cam	32		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.

Motion CPU module Q173DSCPU / Q172DSCPU

Item			Q173DSCPU	Q172DSCPU
Number of control axes			Up to 32 axes	Up to 16 axes
Servo amplifier connection system			Connection by SSCNET III/H (2 systems)	Connection by SSCNET III/H (1 system)
Transmission Distance [m(ft.)]			Connection by SSCNET III/H: 100 (328.08) Connection by SSCNET III: 50 (164.04)	
Peripheral I/F			PERIPHERAL I/F, Via PLC CPU (USB/RS-232/Ethernet)	
Manual pulse generator operation function			Possible to connect 3 modules	
Synchronous encoder operation function			Possible to connect 12 modules (Note-1) (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)	
			Up to 1 module per CPU (Only manual pulse generator use)	
	Q173DSXY		Up to 3 modules	
	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)	
	Rated input voltage		24VDC	
	Rated input current		Approx. 5mA	
	Operating voltage range		21.6 to 26.4VDC (24VDC ±10%, ripple ratio 5% or less)	
	ON voltage/current		17.5VDC or more/3.5mA or more	
	OFF voltage/current		5VDC or more/0.9mA or more	
	Input resistance		Approx. 5.6kΩ	
	Response time	OFF to ON	1ms or less	
		ON to OFF		
Interface between manual pulse generator/ incremental synchronous encoder	Signal input form		Phase A/ Phase B (magnification by 4)	
	Input frequency		1Mpps (After magnification by 4, up to 4Mpps) (Differential-output type) 200kpps (After magnification by 4, up to 800kpps) (voltage-output/Open-collector type)	
PLC extensions			Up to 7 base units	
5VDC internal current consumption [A]			1.75	1.44
Mass [kg]			0.38	
Exterior dimensions [mm(inch)]			120.5 (4.74)(H) × 27.4 (1.08)(W) × 120.3 (4.74)(D)	

(Note-1): Manual pulse generator and synchronous encoder are included.

Safety signal module Q173DSXY

Item		Specifications
Input signals	Number of input points	32 points × 2 systems (32 PLC CPU control points + 32 Motion CPU control points; 20 safety input points × 2 systems; 12 feedback input points for outputs × 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 / ON current	20VDC or more/3mA or more
	Input OFF voltage / OFF current	5VDC or less/1.7mA or less
	Input response time	PLC CPU control I/O: 10ms (digital filter's default value) Motion CPU control I/O: 15ms (CR filter)
	Input common format	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 (12 PLC CPU control points + 12 Motion CPU control points)
	Output isolation format	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 format	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 (Note-1)	Safety functions	STO, SS1, SS2, SOS, SLS, SBC, SSM (IEC61800-5-2 : 2007) and Safety I/Os
	Safety performance	EN ISO 13849-1 Category3 PL d, EN 61800-5-2/IEC 61800 Part 1-7 : 1998/2000, EN 62061 SIL CL 2
	Mean time to dangerous failure (MTTFd)	169 years or more
	Diagnostic converge (DCavq)	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
Terminal block converter module		FA-LTB40P (manufactured by Mitsubishi Electric Engineering)
		A6TBXY36
Connection cable		FA-CBL_FMV-M (provided with FA-LTB40P as a set), AC50TB (provided with A6TBXY36 as a set)
Number of installed modules		Up to 3 modules (number of input points: 60 points × 2 systems; 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): The safety function is structured by using the PLC CPU modules QnUD (E)(H) CPU and Q173DSXY.
QnUD (E)(H) CPU : Q03UDCPU, Q03UDECPU, Q04UDHCPU, Q04UDEHCPU, Q06UDHCPU, Q06UDEHCPU, Q10UDHCPU, Q10UDEHCPU, Q13UDHCPU, Q13UDEHCPU, Q20UDHCPU, Q20UDEHCPU, Q26UDHCPU, Q26UDEHCPU, Q50UDEHCPU, Q100UDEHCPU

Servo external signals interface module Q172DLX

Item			Specifications
External input signal (FLS, RLS, STOP, DOG)	Number of input points		Servo external control signals : 32 points, 8 axes
	Input method		Positive Common/ Negative Common Shared Type (Photocoupler)
	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	1ms (OFF to ON, ON to OFF)
		DOG	0.4ms, 0.6ms, 1ms (OFF to ON, ON to OFF) CPU parameter setting, default 0.4ms
Number of I/O occupying points			32 points (I/O allocation: Intelligent, 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 synchronous encoder 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	50m
Tracking enable input	Number of input points	2 points
	Input method	Positive Common/ Negative Common Shared Type (Photocoupler)
	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) CPU parameter setting, default 0.4ms
Number of I/O occupying points		32 points (I/O allocation: Intelligent, 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.

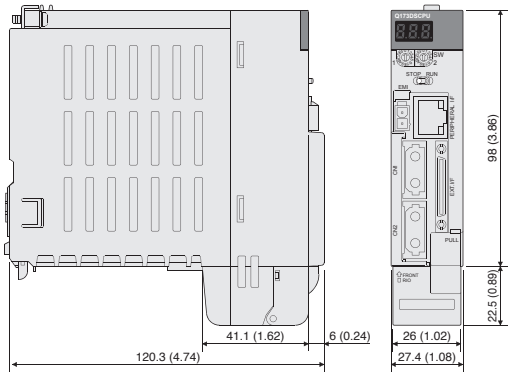
Manual pulse generator interface module Q173DPX

Item			Specifications
Manual pulse generator/ incremental synchronous encoder input	Number of modules		3 per module
	Voltage-output/ 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), (Recommended product: MR-HDP01) Differential-output type (26C31 or equivalent)
	Maximum cable length		Voltage-output type: 10m (32.79ft.) Differential-output type: 30m (98.36ft.)
Tracking enable input	Number of input points		3 points
	Input method		Positive Common/ Negative Common Shared Type (Photocoupler)
	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) CPU parameter setting, default 0.4ms
Number of I/O occupying points			32 points (I/O allocation: Intelligent, 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.

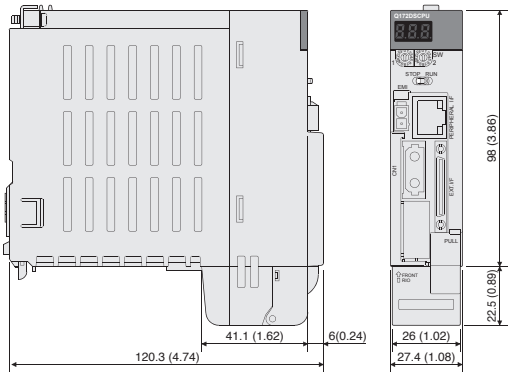
Exterior Dimensions

Motion CPU module Q173DSCPU



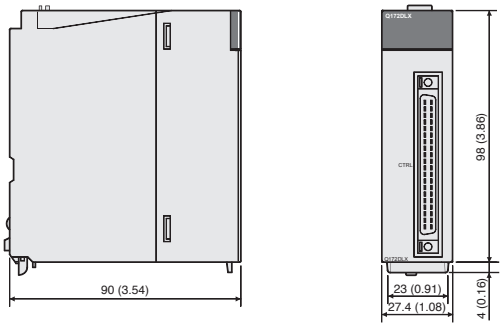
[Unit : mm (inch)]

Motion CPU module Q172DSCPU



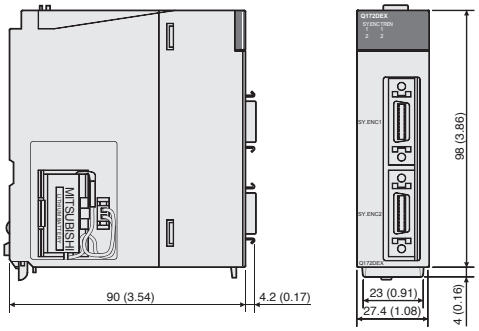
[Unit : mm (inch)]

Servo external signals interface module Q172DLX



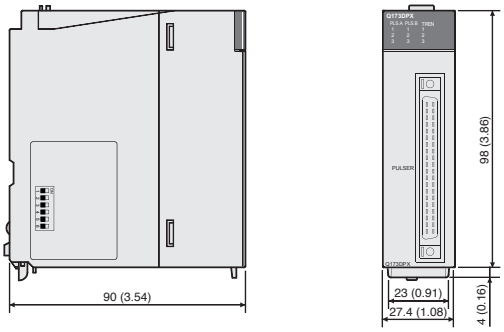
[Unit : mm (inch)]

Synchronous encoder interface module Q172DEX



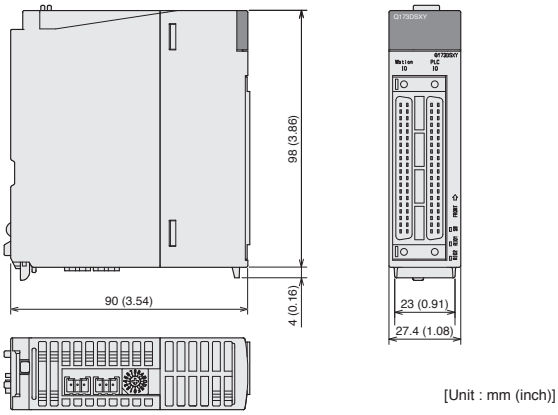
[Unit : mm (inch)]

Manual pulse generator interface module Q173DPX



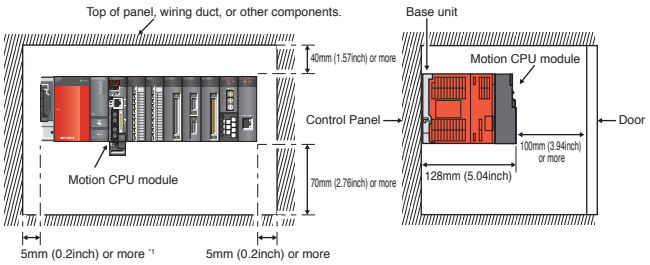
[Unit : mm (inch)]

Safety signal module Q173DSXY



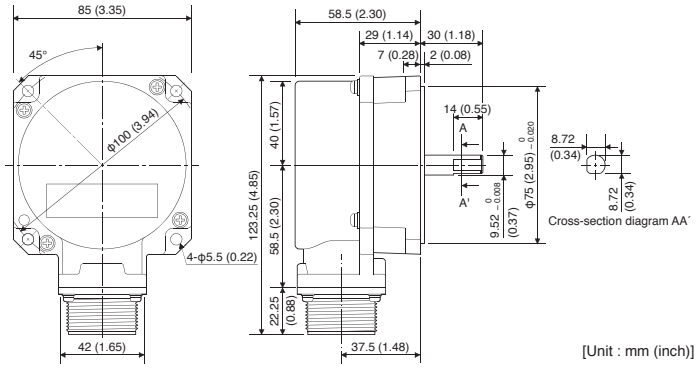
[Unit : mm (inch)]

Mounting



*1 When the extension cable is connected without removing the adjacent module: 20mm (0.79inch) or more.
Note) The main base unit cannot be mounted with the DIN rail when using the Motion CPU module.

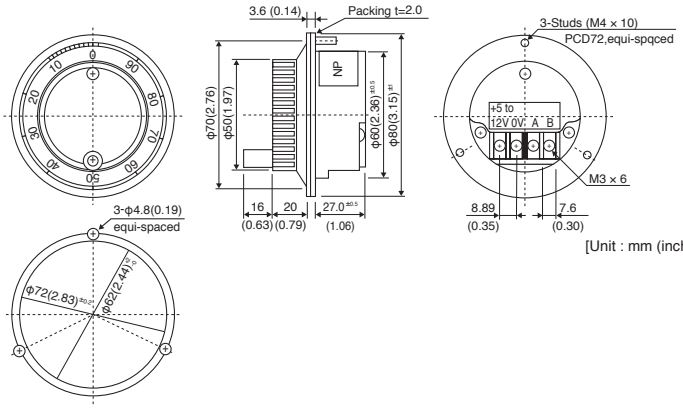
Serial absolute synchronous encoder Q171ENC-W8



[Unit : mm (inch)]

Item	Specifications
Resolution	4,194,304PLS/rev
Direction of increasing addresses	CCW (viewed from end of shaft)
Protective construction	Dustproof/Waterproof (IP67: Except for the shaft-through portion)
Permitted axial loads	Radial load: Up to 19.6N
	Thrust load: Up to 9.8N
Permitted speed	3600r/min
Permitted angular acceleration	40000rad/s²
Ambient temperature	-5 to 55°C (23 to 131°F)
5VDC consumption current	0.25A
Mass	0.6kg

Manual pulse generator MR-HDP01

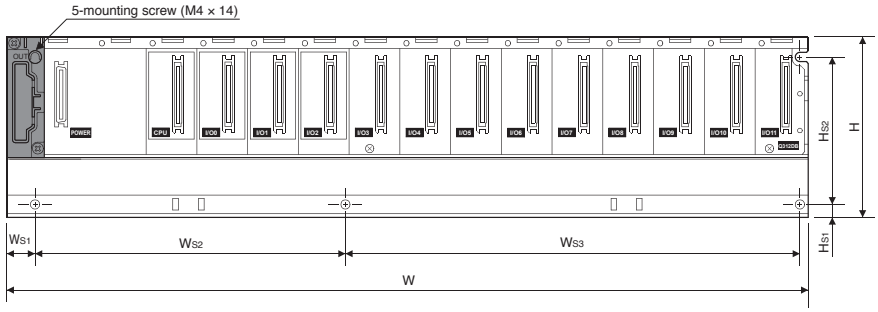


[Unit : mm (inch)]

Item	Specifications
Pulse resolution	25PLS/rev (100PLS/rev after magnification by 4)
Phase A/Phase B Output voltage	Input voltage : -1V or more (Note)
Output method	Output voltage
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
	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 5V power supply.

Base unit



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

[Unit : mm (inch)]

Motion controller module configuration equipment

<Motion dedicated equipments>

Part name	Model name	Description			Standards
Motion CPU module	Q173DSCPU	Up to 32 axes control, Operation cycle 0.22 ms or more (Attachment battery (Q6BAT))			CE, UL
	Q172DSCPU	Up to 16 axes control, Operation cycle 0.22 ms or more (Attachment battery (Q6BAT))			CE, UL
Cable for forced stop input (Note-1)	Q170DEMICBL05M	Forced stop input (Be sure to order with Motion CPU modules)		0.5m (1.64ft.)	—
	Q170DEMICBL1M			1m (3.28ft.)	—
	Q170DEMICBL3M			3m (9.84ft.)	—
	Q170DEMICBL5M			5m (16.40ft.)	—
	Q170DEMICBL10M			10m (32.81ft.)	—
	Q170DEMICBL15M			15m (49.21ft.)	—
	Q170DEMICBL20M			20m (65.62ft.)	—
	Q170DEMICBL25M			25m (82.02ft)	—
	Q170DEMICBL30M			30m (98.43ft.)	—
Connector for forced stop input cable	Q170DEMICON	Connector for forced stop input cable (Be sure to order when you make the forced stop input cable)			—
SSCNET III cable (Note-3)	MR-J3BUS_M	Q17nDSCPU⇔MR-J4-B MR-J4-B⇔MR-J4-B	Standard cord for inside panel	0.15m (0.49ft.), 0.3m (0.98ft.), 0.5m (1.64ft.), 1m (3,28ft.), 3m (9.84ft.)	—
	MR-J3BUS_M-A		Standard cable for outside panel	5m (16.40ft.), 10m (32.81ft.), 20m (65.62ft.)	—
	MR-J3BUS_M-B (Note-2)		Long distance cable	30m (98.43ft.), 40m (131.23ft.), 50m (164.04ft.)	—
Servo external signals interface module	Q172DLX	Servo external signal input 8 axes (FLS, RLS, STOP, DOG×8)			CE, UL
Synchronous encoder interface module	Q172DEX	Serial absolute synchronous encoder Q171ENC-W8 interface×2, Tracking input 2 points, with A6BAT			CE, UL
Manual pulse generator interface module	Q173DPX	Manual pulse generator MR-HDP01/ Incremental synchronous encoder interface ×3, Tracking input 3 points			CE, UL
Safety signal module	Q173DSXY	Attachment RIO cable (Q173DSXYCBL01M)			CE, UL
Serial absolute synchronous encoder	Q171ENC-W8	Resolution: 4,194,304PLS/rev, Permitted speed: 3600r/min			CE, UL
Serial absolute synchronous encoder cable	Q170ENCCBL_M	Serial absolute synchronous encoder Q171ENC-W8⇔Q172DEX		2m (6.56ft.)	—
				5m (16.40ft.)	—
				10m (32.81ft.)	—
				20m (65.62ft.)	—
				30m (98.43ft.)	—
				50m (164.04ft.)	—
Internal I/F connector set	Q170DSIOCON	Incremental synchronous encoder/ Mark detection signal interface connector set			—
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 (program, parameter, absolute position data, latch data)			—
	A6BAT	For data backup of Q171ENC-W8			—
Manual pulse generator	MR-HDP01	Pulse resolution: 25PLS/rev (100PLS/rev after magnification by 4) 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): Please contact your nearest Mitsubishi sales representative for 100m (328.08ft.) or shorter of long distance cable or ultra-long bending life cable.
(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 equipments>

Part name	Model name	Standards
PLC CPU module	Q03UDCPU, Q03UDECPU, Q04UDHCPU, Q04UDEHCPU, Q06UDHCPU, Q06UDEHCPU, Q10UDHCPU, Q10UDEHCPU, Q13UDHCPU, Q13UDEHCPU, Q20UDHCPU, Q20UDEHCPU, Q26UDHCPU, Q26UDEHCPU, Q50UDEHCPU, Q100UDEHCPU	CE, UL
C Controller CPU modile	Q12DCCPU-V	CE, UL
Main base unit	Q35DB, Q38DB, Q312DB	CE, UL
Extension base unit	Q63B, Q65B, Q68B, Q612B, Q52B, Q55B	CE, UL
Extension cable	QC05B, QC06B, QC12B, QC30B, QC50B, QC100B	—
Power supply module (Note-1)	Q61P, Q62P, Q63P, Q64PN, Q61P-D	CE, UL
Input/output module	Input module, Output module, Input/Output composite module	CE, UL
Analogue module	Q68ADV, Q62AD-DGH, Q66AD-DG, Q68ADI, Q64AD, Q64AD-GH, Q68AD-G, Q68DAVN, Q68DAIN, Q62DAN, Q62DA-FG, Q64DAN, Q66DA-G	CE, UL
Interrupt module	QI60	CE, UL

(Note-1): Use the power supply module within the range of power supply capacity.

List of Motion controller module software

<Operating system software> (Note-1)

Application	Model name	
	Q173DSCPU	Q172DSCPU
Conveyor assembly use SV13	SW8DNC-SV13QJ	SW8DNC-SV13QL
Automatic machinery use SV22	SW8DNC-SV22QJ	SW8DNC-SV22QL

Product	Model name	Description
Operating system software set for Q173DSCPU/Q172DSCPU	SW8DNC-SV1322QJLSET	SW8DNC-SV13QJ, SW8DNC-SV13QL SW8DNC-SV22QJ, SW8DNC-SV22QL

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

<Engineering environment MELSOFT series>

Product	Model name	Description	Application version
MELSOFT MT Works2	SW1DNC-MTW2-E	Conveyor assembly use SV13 Automatic machinery use SV22	1.39R or later
	SW1DNC-MTW2-EAZ	Additional license product (1 license)	1.39R or later
MELSOFT GX Works2	SW1DNC-GXW2-E	Sequence program creation	1.77F or later
MELSOFT IQ Works (Note-1)	SW1DNC-IQWK-E	License product (1 license in CD-ROM)	—
	SW1DND-IQWK-E	License product (1 license in DVD-ROM)	—

(Note-1): This product includes the following software.
- System Management Software [MELSOFT Navigator]
- Programmable Controller Engineering Software [MELSOFT GX Works2]
- Motion Controller Engineering Environment Software [MELSOFT MT Works2]
- Servo Setup Software [MELSOFT MR Configurator2]
- GOT1000 Screen Design Software [MELSOFT GT Works3]
- Robot Total Engineering Support Software [MELSOFT RT ToolBox2 mini]

<MELSOFT operating environment> IBM PC/AT with which Windows® 7/ Windows Vista®/ Windows® XP/ Windows® 2000 English version operated normally.

Item	Description
OS	Microsoft® Windows® 7 (64bit/32bit) (Enterprise, Ultimate, Professional, Home Premium, Starter) Microsoft® Windows Vista® (32bit) (Enterprise, Ultimate, Business, Home Premium, Home Basic) Microsoft® Windows® XP Service Pack2 or later (32bit) (Professional, Home Edition) Microsoft® Windows® 2000 Professional Service Pack4
CPU	Desktop: Recommended Intel® Celeron® 2.8 GHz or more Laptop: Recommended Intel® Pentium® M 1.7 GHz or more
Required memory	For 32-bit edition: Recommended 1GB or more For 64-bit edition: Recommended 2GB or more
Available hard disk capacity	When installing MT Developer2: HDD available capacity is 1GB or more. When operating MT Developer2: Virtual memory available capacity is 512MB or more.
Optical drive	CD-ROM supported disk drive
Monitor	Resolution 1024 × 768 pixels or higher

Simple Motion module specifications

Control Specification

Item			Specifications		
			QD77MS16	QD77MS4	QD77MS2 (Note-3)
Number of control axes			16 axes NEW	4 axes	2 axes
Operation cycle			0.88 ms/ 1.77 ms (Note-1)	0.88 ms	0.88 ms
Interpolation function			Linear interpolation (Up to 4 axes), Circular interpolation (2 axes)		
Control system			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-pattern acceleration/deceleration		
Compensation function			Backlash compensation, Electronic gear, Near pass function		
Synchronous control			External encoder, Cam, Phase Compensation, Cam auto-generation function NEW		
Control unit			mm, inch, degree, PLS		
Positioning data			600 data (positioning data No. 1 to 600)/axis (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	Machine OPR control		Near-point dog method, Count method 1, Count method 2, Data set method, Scale origin signal detection method Upgraded		
	Fast OPR control		Provided		
	Sub functions		OPR retry, OP shift		
Positioning control	Position control	Linear control	1-axis linear control, 2-axis linear interpolation control, 3-axis linear interpolation control, 4-axis linear interpolation control (Note-4) (Composite speed, Reference axis speed)		
		Fixed-feed control	1-axis fixed-feed control, 2-axis fixed-feed control, 3-axis fixed-feed control, 4-axis fixed-feed control		
		2-axis circular interpolation control	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		
	Other control	Current value changing	Changing to a new current value using the positioning data , Changing to a new current value using the start No.		
		NOP instruction	Provided		
		JUMP instruction	Unconditional JUMP, Conditional JUMP		
		LOOP, LEND	Provided		
High-level positioning control			Block start, Condition start, Wait start, Simultaneous start, Repeated start		
Manual control	JOG operation		Provided		
	Inching operation		Provided		
	Manual pulse generator operation		Possible to connect 1 module (Incremental) Unit magnification (1 to 10000 times)		
Expansion control	Speed-torque control		Speed control without positioning loops, Torque control without positioning loops, Tightening & Press-fit control NEW		
Absolute position system			Made compatible by setting battery to servo amplifier		
Synchronous encoder interface			Up to 4 channel (internal interface , servo amplifier, via the PLC CPU interface)		
	Internal interface		1 channel (Incremental)		
Functions that limit control	Speed limit function		Speed limit value, JOG speed limit value		
	Torque limit function		Torque limit value_same setting, torque limit value_individual setting		
	Forced stop function		Valid/Invalid setting		
	Software stroke limit function		Movable range check with current feed value, movable range check with machine feed value		
	Hardware stroke limit function		Provided		
Functions that change control details	Speed change function		Provided		
	Override function		Provided		
	Acceleration/deceleration time change function		Provided		
	Torque change function		Provided		
	Target position change function		Target position address and target position speed are changeable		
Other functions	M code output function		Provided		
	Step function		Deceleration unit step, Data No. unit step		
	Skip function		Via sequence CPU, Via external command signal		
	Teaching function		Provided		
Mark detection function			Continuous Detection mode, Specified Number of Detections mode, Ring Buffer mode NEW		
	Mark detection signal		4 points		2 points
	Mark detection setting		16	4	
Optional data monitor function			4 points/axis NEW		
Amplifier-less operation function			Provided NEW		
Digital oscilloscope function (Note-2)			Bit data:16 channels, Word data: 16 channels	Bit data: 8 channels, Word data: 4 channels NEW	

(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 is two axes. Use QD77MS4 or QD77MS16 to control three or more axes.
(Note-4): 4-axis linear interpolation control is effective only for the reference axis speed.

Synchronous control

Item		Specifications		
		QD77MS16	QD77MS4	QD77MS2
Input axis	Servo input axis	16 axes/module	4 axes/module	2 axes/module
	Synchronous encoder axis	4 axes/module		
Composite main shaft gear		1 /output axis		
Main shaft input main 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		
Auxiliary shaft composite gear		1 /output axis		
Speed change gear		1 /output axis		
Output axis		16 axes/module	4 axes/module	2 axes/module

Cam

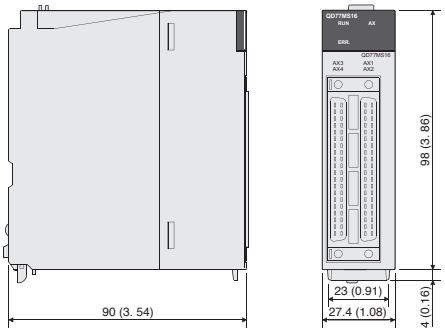
Item			Specifications
Memory capacity	Storage area for cam data		256k bytes
	Working area for cam data		1024k bytes
Number of registration			Max. 256 program items (depending on memory capacity, cam resolution and number of coordinates)
Comment			Max. 32 characters for each cam data
Cam data	Stroke ratio 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 cutter

Module

Item				Specifications		
				QD77MS16	QD77MS4	QD77MS2
Servo amplifier connection system				Connection with SSCNET III/H (1 system)		
Maximum transmission distance between servo amplifiers				Connection with SSCNET III/H: 100m (328.08ft.) Connection with SSCNET III possible: 50m (164.04ft.)		
Peripheral I/F				Via CPU module (USB, RS-232, Ethernet)		
Interface with external devices	Near-point dog signal (DOG) External command signal/ Switching signal (CHG)		Number of input points	4 points		2 points
			Input method	Positive common/ Negative common shared (Photocoupler)		
			Rated input voltage/Rated input 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		
			Response time	1 ms or less		
			Recommended wire size	AWG24 (0.2 mm^2)		
	Forced stop input signal (EMI) Upper limit signal (FLS) Lower limit signal (RLS) Stop signal (STOP)		Number of input points	4 points, 1 point (EMI)		2 points, 1 point (EMI)
			Input method	Positive common/ Negative common shared (Photocoupler)		
			Rated input voltage/Rated input 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		
			OFF voltage/current	7 VDC or less/ 1.0 mA or less		
			Input resistance	Approx 6.8 kΩ		
			Response time	4 ms or less		
			Recommended wire size	AWG24 (0.2 mm^2)		
	Manual pulse generator/ Incremental synchronous encoder signal	Signal input form		Phase A/Phase B (magnification by 4/magnification by 2/magnification by 1), PLS/SIGN		
		Differential-output type	Input frequency	1Mpps (After magnification by 4, up to 4 Mpps)		
			High-voltage	2.0 to 5.25 VDC		
			Low-voltage	0 to 0.8 VDC		
			Differential-voltage	+/ - 0.2VDC		
			Cable length	Maximum 30 m (98.43ft.)		
		Voltage-output/ Open-collector type (5VDC)	Input frequency	200 kpps (After magnification by 4, up to 800 kpps)		
			High-voltage	3.0 to 5.25 VDC		
			Low-voltage	0 to 1.0 VDC		
			Cable length	Maximum 10 m (32.81ft.)		
Number of I/O occupying points				32 points (I/O allocation: Intelligent function module, 32 points)		
Maximum number of modules specification				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)		

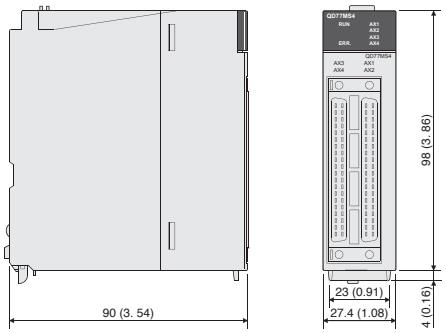
Exterior Dimensions

Simple Motion module QD77MS16



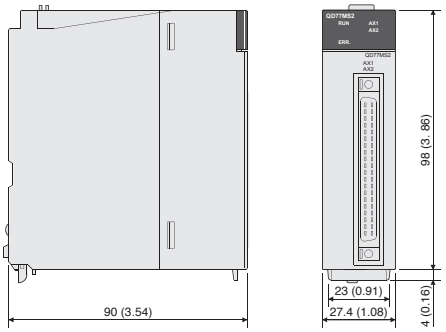
[Unit : mm (inch)]

Simple Motion module QD77MS4



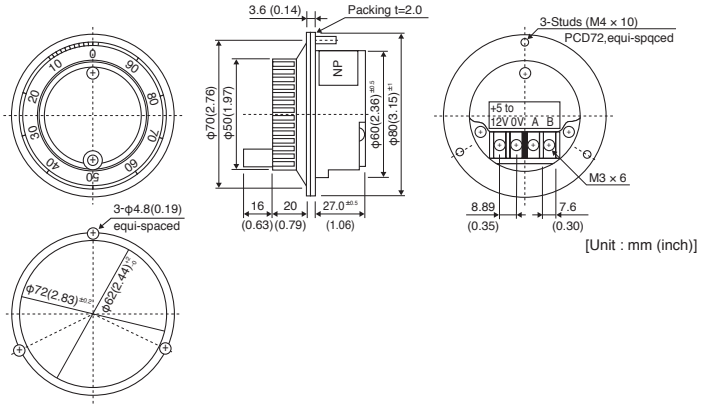
[Unit : mm (inch)]

Simple Motion module QD77MS2



[Unit : mm (inch)]

Manual pulse generator MR-HDP01



[Unit : mm (inch)]

Item	Specifications
Pulse resolution	25PLS/rev (100PLS/rev after magnification by 4)
Phase A/Phase B Output voltage	Input voltage : -1V or more (Note)
Output method	Output voltage
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
	Thrust load: Up to 9.8N
Maximum rotation speed	600r/min (Instantaneous maximum), 200r/min (Normal rotation)
Ambient temperature	-10 to 60 °C
5VDC consumption current	0.06A
Mass	0.4kg

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

Simple Motion module configuration equipment

<Simple Motion dedicated module>

Part name	Model name	Description			Standards
MELSEC-Q Series Simple Motion Module (Note-3)	QD77MS16	Up to 16 axes control			CE, UL
	QD77MS4	Up to 4 axes control			CE, UL
	QD77MS2	Up to 2 axes control			CE, UL
SSCNETIII cable (Note-2)	MR-J3BUS_M	· QD77MS⇔MR-J4-B · MR-J4-B⇔MR-J4-B	Standard code for inside panel	0.15m (0.49ft.), 0.3m (0.98ft.), 0.5m (1.64ft.), 1m (3.28ft.), 3m (9.84ft)	—
	MR-J3BUS_M-A		Standard code for outside panel	5m (16.40ft.), 10m (32.81ft.), 20m (65.62ft.)	—
	MR-J3BUS_M-B (Note-1)		Long distance cable	30m (98.43ft.), 40m (131.23ft.), 50m (164.04ft.)	—
Manual pulse generator	MR-HDP01	Pulse resolution: 25PLS/rev (100PLS/rev after magnification by 4), Permitted speed: 200r/min (Normal rotation)			—

(Note-1): Please contact your nearest Mitsubishi sales representative for 100m (328.08ft.) or shorter of long distance cable or ultra-long bending life cable.
(Note-2): "_" 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 (164.0 and 4ft.))
(Note-3): You need to order the connectors, A6CON1, A6CON2, and A6CON4 separately.

List of Simple Motion module software

<MELSEC-Q series engineering environment>

Product	Model name	Description	Application version
MELSOFT GX Works2	SW1DNC-GXW2-E	Sequence program creation, QD77MS setting	1.77F or later
MELSOFT MR Configurator2	SW1DNC-MRC2-E	Servo amplifier MR-J4 series setting and adjustment	1.09K or later

< Operating environment> IBM PC/AT with which Windows® 7/ Windows Vista®/ Windows® XP/ Windows® 2000 English version operated normally.

Item	Description
OS	Microsoft® Windows® 7 (64bit/32bit) (Enterprise, Ultimate, Professional, Home Premium, Starter) Microsoft® Windows Vista® (32bit) (Enterprise, Ultimate, Business, Home Premium, Home Basic) Microsoft® Windows® XP Service Pack2 or later (32bit) (Professional, Home Edition) Microsoft® Windows® 2000 Professional Service Pack4
CPU	Recommended Intel® Core™2 Duo Processor 2GHz or more
Required memory	Recommended 1GB or more
Available hard disk capacity	When installing MT Works2: HDD available capacity is 2.5GB or more. When operating MT Works2: Virtual memory available capacity is 512MB or more.
Optical drive	CD-ROM supported disk drive
Monitor	Resolution 1024 × 768 pixels or higher

A global support network for MELSERVO users

Global FA Center

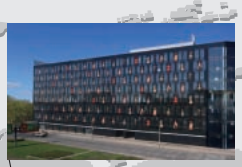
Across the globe, FA Centers provide customers with local assistance for purchasing Mitsubishi Electric products and with after-sales service. To enable national branch offices and local representatives to work together in responding to local needs, we have developed a service network throughout the world. We provide repairs, on-site engineering support, and sales of replacement parts. We also provide various services from technical consulting services by our expert engineers to practical training for equipment operations.

Krakowska, Poland
European FA Center (Poland)

Hatfield, UK
UK FA Center

Ratingen, Germany
German FA Center/
Europe Development Center

Praha, Czech Republic
Czech Republic FA Center



St.Petersburg, Russia
Russian FA Center

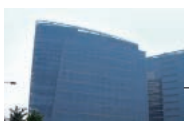
Gurgaon, India
India FA Center

Bangkok, Thailand
Thailand FA Center

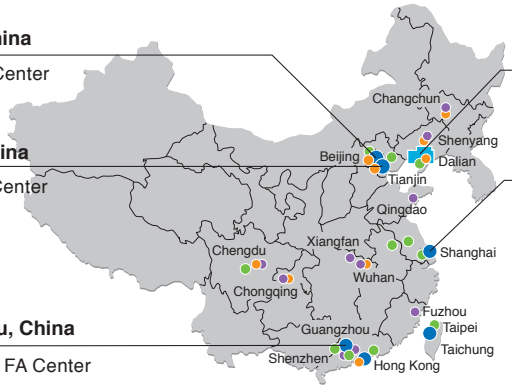
China (including Hong Kong District)

Beijing, China
Beijing FA Center

Tianjin, China
Tianjin FA Center



Guangzhou, China
Guangzhou FA Center



Dalian, China
China Local Factory
Mitsubishi Electric Dalian Industrial Products Co., Ltd.

Shanghai, China
Shanghai FA Center

Conformity with global standards

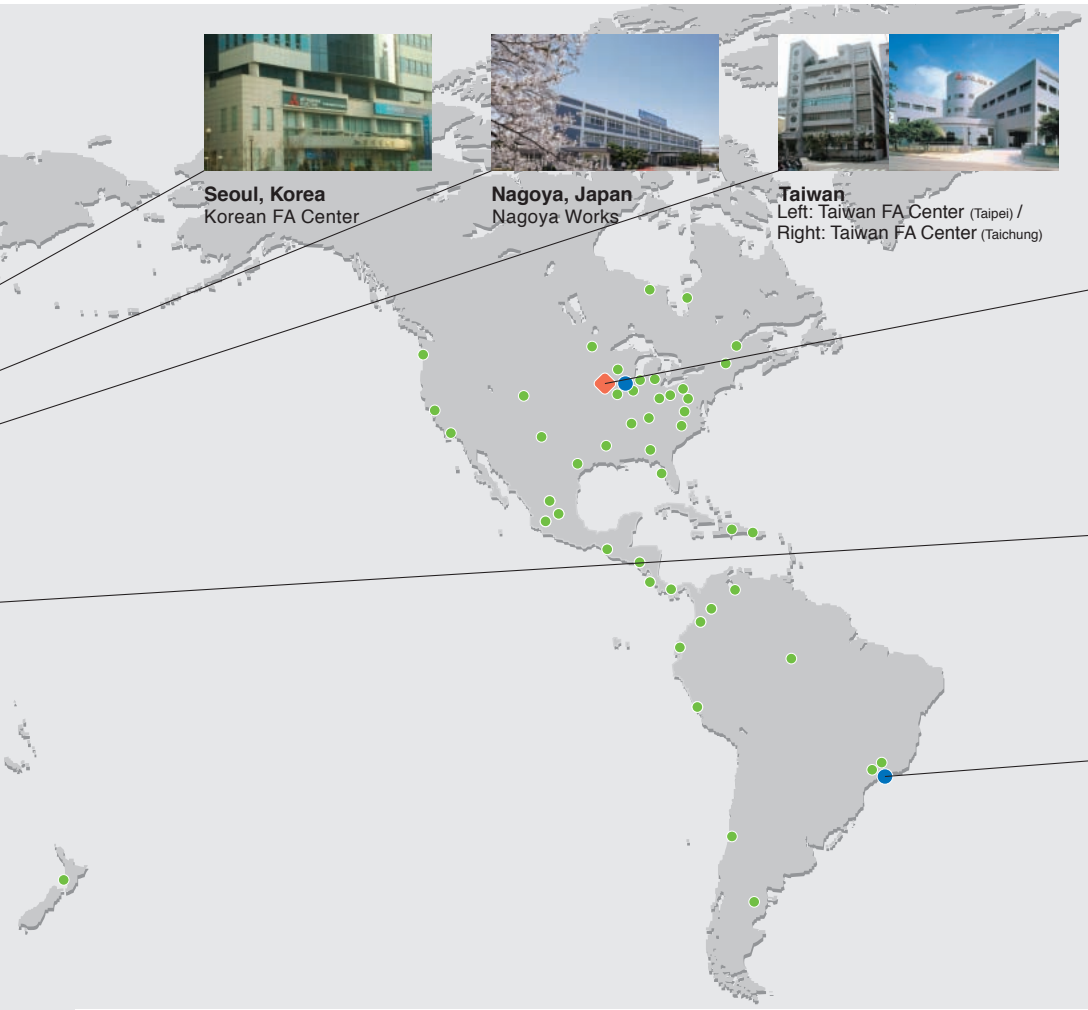
Complies with EN, UL and CSA (c-UL) standards.

CE c UL us LISTED

Servo system controllers conform to global standards.

* This product is not subject to China Compulsory Certification (CCC).
* cULus mark is attached to Mitsubishi Servo System Controllers and cTUVus mark to MELSERVO-J4W series.
* Refer to "Servo Amplifier Instruction Manual" and "EMC Installation Guidelines" when your system needs to meet the EMC directive.

● Global FA Center ● FA Center Satellite (China) ● Mechatronics Service Base (China) ● Mitsubishi Sales Offices
■ Production Facility ◆ Development Center



Seoul, Korea
Korean FA Center

Nagoya, Japan
Nagoya Works

Taiwan
Left: Taiwan FA Center (Taipei) /
Right: Taiwan FA Center (Taichung)

Chicago IL, USA
North American FA Center/
North American Development Center

Singapore
ASEAN FA Center

Sao Paulo SP, Brazil
Brazil FA Center

Regions	Global FA Center	Tel/Fax
China	Shanghai FA Center	Tel: 86-21-2322-3030/Fax: 86-21-2322-3000 (9611#)
	Beijing FA Center	Tel: 86-10-6518-8830/Fax: 86-10-6518-3907
	Tianjin FA Center	Tel: 86-22-2813-1015/Fax: 86-22-2813-1017
	Guangzhou FA Center	Tel: 86-20-8923-6730/Fax: 86-20-8923-6715
Taiwan	Taiwan FA Center	Tel: 886-2-2299-9917/Fax: 886-2-2299-9963
Korea	Korean FA Center	Tel: 82-2-3660-9630/Fax: 82-2-3663-0475
Thailand	Thailand FA Center	Tel: 66-2906-3238/Fax: 66-2906-3239

Regions	Global FA Center	Tel/Fax
ASEAN/ India	ASEAN FA Center	Tel: 65-6470-2480/Fax: 65-6476-7439
	India FA Center	Tel: 91-124-463-0300/Fax: 91-124-463-0399
North/ Central/ South America	North American FA Center	Tel: 1-847-478-2100/Fax: 1-847-478-2253
	Brazil FA Center	Tel: 55-11-4689-3000/Fax: 55-11-4689-3016
Europe	European FA Center	Tel: 48-12-630-47-00/Fax: 48-12-630-47-01
	German FA Center	Tel: 49-2102-486-0/Fax: 49-2102-486-1120
	UK FA Center	Tel: 44-1707-28-8780/Fax: 44-1707-27-8695
	Czech Republic FA Center	Tel: 420-251-551-470/Fax: 420-251-551-471
	Russian FA Center	Tel: 7-812-633-3497/Fax: 7-812-633-3499

Complies with Restriction of Hazardous Substances Directive (RoHS).

Human and environment-friendly Mitsubishi servo system controllers are compliant with RoHS Directive.

About RoHS directive
RoHS Directive requires member nations to guarantee that new electrical and electronic equipment sold in the market after July 1, 2006 do not contain lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants. <G> mark indicating RoHS Directive compliance is printed on the package.

* Refer to "Servo Amplifier Instruction Manual" and "EMC Installation Guidelines" when your system needs to meet the EMC directive.

Our optional cables and connectors comply with "Measures for Administration of the Pollution Control of Electronic Information Products" (Chinese RoHS).

As a recognized leader in factory automation,
Mitsubishi Electric is committed to maintaining a world-class level
of customer satisfaction in every area of development, production, and service.

Unrivalled engineering quality and craftsmanship backed by over 80 years of proven expertise

For more than 80 years from the start of operations in 1924, Mitsubishi Electric Nagoya Works has manufactured various universal devices including motors, programmable controllers and inverters. The history of AC servo production at Nagoya Works spans over 30 years. We have expanded our production system based on the technology and tradition amassed during this time, and have incorporated world-class research and development to create high-performance, high-quality products that can be supplied for a long time.

Production system

To guarantee the high quality and performance of MELSERVO, Mitsubishi Electric has built a cooperative system of three facilities - Shinshiro Factory, a branch factory of Nagoya Works; Mitsubishi Electric Dalian Industrial Products Co., Ltd., a manufacturing base; and Nagoya Works at the core. Mitsubishi Electric responds to various needs throughout the world by uniting technologies and know-hows of these facilities. Mitsubishi Electric's FA energy solutions, "e&eco-F@ctory", are at work in the servo motor factory at the Nagoya Works. They are being used to boost capacity utilization and product quality, and reduce energy consumption.

Development system

To spread advanced servo systems to the world as quickly as possible, Mitsubishi Electric has established FA-related development centers at its Nagoya Works, and in North America and Europe. Furthermore, we have established strong connections between our Advanced Technology R&D Center, which pushes technology development beyond the limits of FA, and Information Technology R&D Center. We are moving forward with the development of new products that reflect the latest technological directions and customer input.

Mitsubishi Electric Nagoya Works

FA Development Center

e&eco-F@ctory implementation

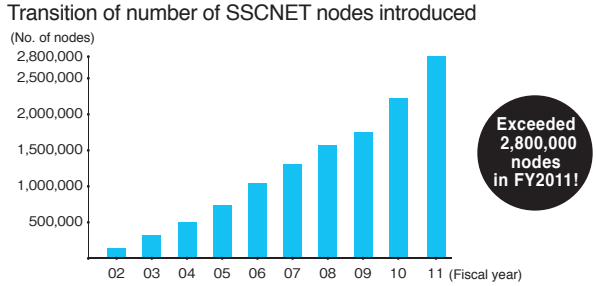
EDC (Europe Development Center)

Promoting the popularity of SSCNET in Japan and around the world

SSCNET Partner Association (SNP)

The SSCNET Partner Association (SNP) carries activities to introduce the advanced servo system controller network "SSCNET III" and compatible products to many users. In cooperation with partner corporations, SNP widely promotes the performance attainable with SSCNET. In recent years, SNP holds partner meetings in Japan and overseas such as Taiwan and India. SNP aims to make SSCNET a more global servo system controller network.

Transition of number of SSCNET nodes introduced



About warrantee

Before using the Product, please check our product warrantee conditions below.

1. Period and scope of warrantee

Should a defect or a failure (hereafter referred to as "failure") occurs with the Product due to a reason or a cause attributable to Mitsubishi Electric Corporation (the Manufacturer), the Manufacturer will repair the Product free of charge through your local dealer or supplier.
Should Manufacturer's service engineer need to travel to the site for repair within Japan or overseas, however, the Purchaser shall bear the actual travel expenses. The scope of warrantee shall not cover any readjustment or test operation at the site in relation to replacing the failed Product.

[Warrantee period]

The Manufacturer warrants the Product against a defect or a failure of the Product attributable to the Manufacturer for 36 months from the date of purchase or the date of Product delivery at the purchaser designated site.
Assuming the maximum logistics and/or retail period of six months after shipping the Product from the Manufacturer, the warrantee period shall not exceed 42 months. The warrantee period of the repaired Product shall not be extended beyond the warrantee period of the Product before repair.

[Scope of warrantee]

(1) Unless specified or agreed otherwise, the Purchaser is responsible for the primary failure diagnosis.
The Manufacturer or Manufacturer's service representative or agent may perform the primary failure diagnosis for the Purchaser on a separate contract basis if so requested.
However, the primary failure diagnosis shall be free of charge should the defect or failure so revealed be attributable to the Manufacturer.

(2) The Manufacturer warrants the Product only if the Product is used correctly and properly under the normal operating conditions and environment in accordance with the conditions, precautions and instructions specified in such means as the operation manual, user's manual and caution labels affixed to the Product.

(3) The Manufacturer's warrantee shall not apply in the following events.

① The failure of the Product is attributable to the Purchaser such as incorrect, inadequate or improper storage, handling and operation or to the Purchaser's hardware or software design;
② The failure is caused by any modification to the Product by the Purchaser without Manufacturer's prior consent;
③ Where the Product is incorporated into Purchaser's equipment, the failure of the Product is considered to have been avoidable if the Purchaser's equipment was equipped with the regulatory safety devices or with the functions and/or structures considered to be necessary according to the industry's normal practice;
④ The failure of the Product is considered to have been avoidable if the consumable items specified in the operation manual and other documents were maintained or replaced normally and properly;
⑤ Replacement of consumables such as the battery and fan;
⑥ Any failure of the product due to external causes such as a fire and abnormal power supply or to events beyond control such as natural disasters including an earthquake, lightening, storm or flood;
⑦ Any failure that is unforeseeable by the technical or scientific level of industry at the time of the product delivery, and;
⑧ Any failure due to a cause for which the Manufacturer is not held responsible or the Purchaser acknowledges as such.

2. Repair service availability after cease of production

(1) The Manufacturer may accept the Product for repair on a separate contract basis within seven years after the date when the Manufacturer ceases to produce this particular product. The Manufacturer may announce the cease of production through Manufacturer's sales or service representatives.

(2) The Manufacturer does not provide any parts or spare parts for the Product after the cease of production.

3. Repair services outside Japan

Contact your local FA Center of the Manufacturer for product repair. Repair conditions may differ from one FA Center to another.

4. The Manufacturer is not liable for any loss of opportunity or consequential damage

Regardless of the period or scope of warrantee, the Manufacturer shall in no event be liable for or warrant the Product as to any failure due to a cause not attributable to the Manufacturer, any loss of opportunity or profit to the Purchaser due to failure of the Product of the Manufacturer, any damage, consequential damage, compensation for accident, damage to any product or items other than the Manufacturer's Product regardless of whether foreseeable or not by the Manufacturer, or any replacement by the Purchaser, readjustment or retesting or the like of Purchaser's machines or equipment at the site.

5. Changes in Product specifications

The specifications or technical data specified in the product catalogs, manuals or technical documents may be subject to change without prior notice.

6. Application of Product

(1) The Manufacturer's Motion Controller and Simple Motion Module shall be used or applied on the condition that any failure or defect of the Motion Controller and the Simple Motion Module will not lead to a serious, critical or fatal accident and that a system of backup or fail-safe functions is provided by the Purchaser outside the equipment and the system works in the event of any failure or defect of the Motion Controller and the Simple Motion Module.

(2) The Manufacturer's Motion Controllers and Simple Motion Module are for general purposes and designed and manufactured for use in general industry.
The Motion Controllers and the Simple Motion Module therefore shall not be used for any purposes or applications such as a nuclear power plant or other power plant of an electric company in which a failure may greatly affect the public interest, or any purposes or applications such as for railway companies or public offices where a special quality assurance system is required.
The Motion Controllers and the Simple Motion Module shall not be used for any purposes or applications such as for aviation equipment, medical equipment, railway equipment, fuel or combustion equipment, manned transfer equipment, amusement machines and safety equipment in which a failure is expected to greatly affect human lives or properties.
For such use or application described above however, the Motion Controllers and the Simple Motion Module may be available if the Purchaser agrees that the Products are used or applied within a specific limit and no special quality is required. Consult the representatives of the Manufacturer.

Mitsubishi Electric SSCNET III/H compatible Motion Controller Q173DSCPU/Q172DSCPU Simple Motion Module QD77MS16/QD77MS4/QD77MS2

⚠ Safety Warning

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

Country/Region	Sales office	Tel/Fax
USA	MITSUBISHI ELECTRIC AUTOMATION, INC. 500 Corporate Woods Parkway, Vernon Hills, IL 60061, U.S.A	Tel : +1-847-478-2100 Fax : +1-847-478-2253
Brazil	MELCO-TEC Representacao Comercial e Assessoria Tecnica Ltda. Rua Jussara, 1750 - Bloco B- Sala 01 Jardim Santa Cecília- CEP 06465-070, Barueri, São Paulo, Brazil	Tel : +55-11-4689-3000 Fax : +55-11-4689-3016
Germany	MITSUBISHI ELECTRIC EUROPE B.V. German Branch Gothaer Strasse 8, D-40880 Ratingen, Germany	Tel : +49-2102-486-0 Fax : +49-2102-486-1120
UK	MITSUBISHI ELECTRIC EUROPE B.V. UK Branch Travellers Lane, Hatfield, Hertfordshire, AL10 8XB, UK.	Tel : +44-1707-28-8780 Fax : +44-1707-27-8695
Italy	MITSUBISHI ELECTRIC EUROPE B.V. Italian Branch VIALE COLLEONI 7 - 20864 Agrate Brianza (Milano), Italy	Tel : +39-039-60531 Fax : +39-039-6053-312
Spain	MITSUBISHI ELECTRIC EUROPE, B.V. Spanish Branch Carretera de Rubí 76-80-AC.420, E-08190 Sant Cugat del Vallés (Barcelona), Spain	Tel : +34-935-65-3131 Fax : +34-935-89-1579
France	MITSUBISHI ELECTRIC EUROPE B.V. French Branch 25, Boulevard des Bouvets, F-92741 Nanterre Cedex, France	Tel : +33-1-55-68-55-68 Fax : +33-1-55-68-57-57
Czech Republic	MITSUBISHI ELECTRIC EUROPE B.V. Czech Branch Avenir Business Park, Radicka 751/113e, 158 00 Praha5, Czech Republic	Tel : +420-251-551-470 Fax : +420-251-551-471
Poland	MITSUBISHI ELECTRIC EUROPE B.V. Polish Branch 32-083 Balice ul. Krakowska 50, Poland	Tel : +48-12-630-47-00 Fax : +48-12-630-47-01
Russia	MITSUBISHI ELECTRIC EUROPE B.V. Russian Branch St. Petersburg office Piskarevsky pr. 2, bld 2, lit “Sch”, BC “Benua”, office 720; 195027, St. Petersburg, Russia	Tel : +7-812-633-3497 Fax : +7-812-633-3499
South Africa	CBI-Electric Private Bag 2016, ZA-1600 Isando, South Africa	Tel : +27-11-977-0770 Fax : +27-11-977-0761
China	MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD. No.1386 Hongqiao Road, Mitsubishi Electric Automation Center, Changning District, Shanghai, China	Tel : +86-21-2322-3030 Fax : +86-21-2322-3000
Taiwan	SETSUYO ENTERPRISE CO., LTD. 6F, No.105, Wugong 3rd Road, Wugu District, New Taipei City 24889, Taiwan, R.O.C.	Tel : +886-2-2299-2499 Fax : +886-2-2299-2509
Korea	MITSUBISHI ELECTRIC AUTOMATION KOREA CO., LTD. (Sales) 3F, 1480-6, Gayang-Dong, Gangseo-Gu, Seoul, 157-200, Korea	Tel : +82-2-3660-9510 Fax : +82-2-3664-8372/8335
Singapore	MITSUBISHI ELECTRIC ASIA PTE. LTD -Industrial Division 307 Alexandra Road, Mitsubishi Electric Building, Singapore, 159943	Tel : +65-6473-2308 Fax : +65-6476-7439
Thailand	MITSUBISHI ELECTRIC AUTOMATION (THAILAND) CO., LTD. Bang-Chan Industrial Estate No.111 Soi Serithai 54, T.Kannayao, A.Kannayao, Bangkok 10230, Thailand	Tel : +66-2906-3238 Fax : +66-2906-3239
Indonesia	P. T. Autoteknindo Sumber Makmur Muara Karang Selatan, Block A / Utara No.1 Kav. No. 11, Kawasan Industri Pergudangan, Jakarta- Utara 14440, P.O.Box 5045, Indonesia	Tel : +62-21-663-0833 Fax : +62-21-663-0832
India	MITSUBISHI ELECTRIC INDIA PVT. LTD. Emerald House, EL-3, J Block, M.I.D.C., Bhosari, Pune, 411026, Maharastra State, India	Tel : +91-20-2710-2000 Fax : +91-20-2710-2100
Australia	MITSUBISHI ELECTRIC AUSTRALIA PTY. LTD. 348 Victoria Road PO BOX11, Rydalmere, N.S.W 2116, Australia	Tel : +61-2-9684-7777 Fax : +61-2-9684-7245

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE: TOKYO BUILDING, 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
NAGOYA WORKS: 1-14, YADA-MINAMI 5, HIGASHI-KU, NAGOYA, JAPAN

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