MITSUBISHI ELECTRIC
Changes for the Better

for a greener tomorrow eco Changes

Mitsubishi Servo System Controllers

SERVO SYSTEM CONTROLLER

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

SSCNET III/H compatible Stand-Alone Motion Controller

Q170MSCPU/Q170MSCPU-S1

Pursuing Ease of use

SSCNET III/H compatible Simple Motion module

QD77MS16/QD77MS4/QD77MS2

CC-Link IE Field Network Simple Motion Module

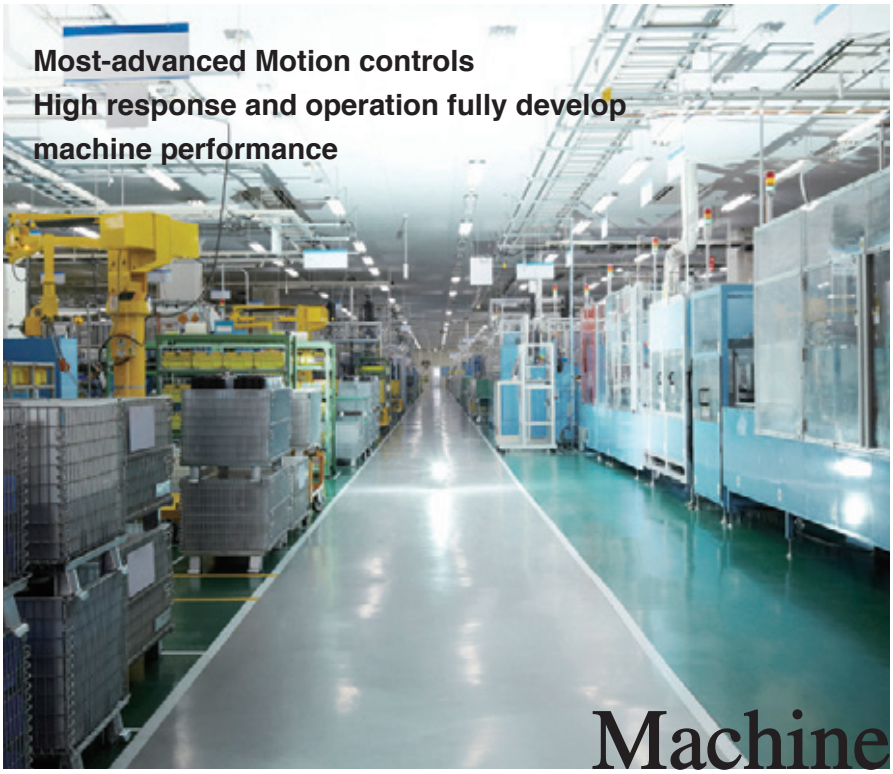
QD77GF16

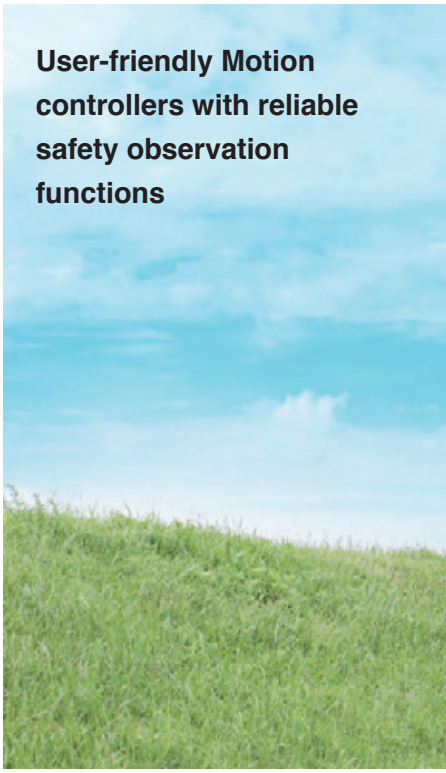
the environment

New-generation Motion Controller Debut

The servo system controllers have advanced to be safer for people, and more flexible for various applications with our reliable technology. Now, the “Q17nDSCPU/Q170MSCPU” Motion controller and the “QD77MS/QD77GF” Simple Motion module have been released. We are proudly offering these new products, which not only having excellent functions but also are user and environmentally friendly. With a safety-compliant system, various functions for energy conservation, and high functionality, our Motion controllers lead the future of Motion control.

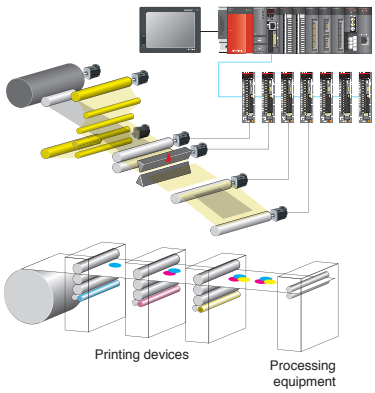
Harmony with machine, man, and the environment.

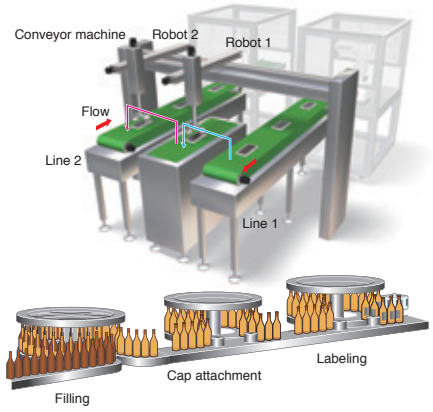




Expanding the applications

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





Reliable Safety observation function

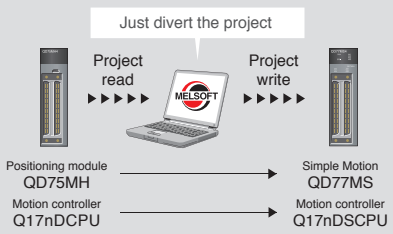
Ensuring safety in the production site is an absolute requirement; therefore devices must comply with international safety standards. Q17nDSCPU is provided with functions which achieve Performance Level d (PLd) as standard.

User-friendly engineering environment

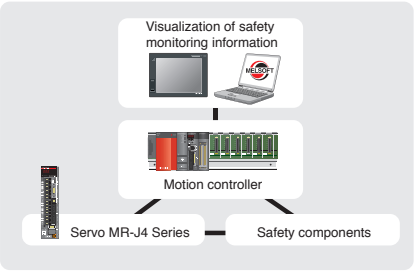
Pursuing Ease of use. The powerful functions are aimed at creating a more user-friendly engineering environment with the enhanced design and debugging efficiency, reduced downtime, and data protection, etc.

Highly compatible Motion controller with prior models

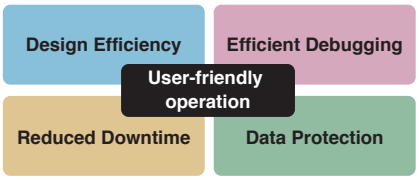
The Motion Controller and the Simple Motion module are highly compatible with the previous servo amplifiers and Motion Controllers, so the existing projects and programs can continue to be used.



New approach for future Motion controls.

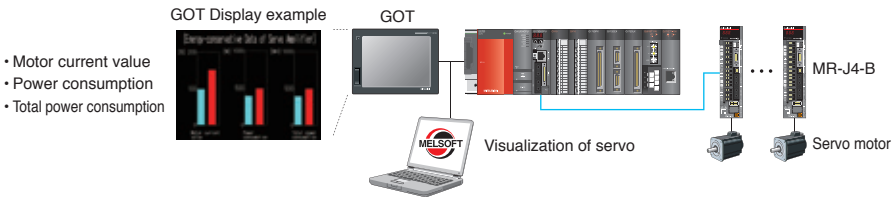


Safety components : Safety relay,
CC-Link Safety compatible products,
Contactor SD-Q Series



Servo Visualization

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



Reduced wiring and space saving

The servo system controller used with MR-J4 series can 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 Motion controller and QD77MS Simple Motion module are able to divert the projects from Q17nDSCPU Motion controller and QD75MH 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 MR-J3-B SSCNET III compatible servo amplifier. Therefore just replace Q17nDCPU Motion controller and QD75MH positioning modules with these new models. MR-J4-B SSCNET III/H compatible servo amplifier can also be used with MR-J3-B SSCNET III compatible servo amplifier in a same system. You can continue to use the previous servo amplifiers.

A complete system lineup to meet your production and manufacturing

Responding to expanding applications such as semiconductor and 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

Graphic Operation Terminal

GOT1000 series

Personal Computer

SOFTWARE

MELSOFT

iQ Platform

CONTROLLER

Motion controller

iQ Platform Programmable controller

SSCNET III/H compatible
Motion Controller

Q173DSCPU
Q172DSCPU

Stand-Alone Motion controller

NEW

SSCNET III/H compatible
Stand-Alone
Motion controller

Q170MSCPU
Q170MSCPU-S1

NETWORK

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

SERVO AMPLIFIER

MR-J4-B

SSCNET III/H compatible
servo amplifier

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

SSCNET III/H compatible
2-axis servo amplifier

MR-J4W2-B

SSCNET III/H compatible
3-axis servo amplifier

MR-J4W3-B

SERVO MOTOR

Rotary servo motor

Small capacity,
low inertia

HG-KR series

Capacity: 50 to 750 W

Small capacity,
ultra-low inertia

HG-MR series

Capacity: 50 to 750 W

Medium capacity,
medium inertia

HG-SR series

Capacity: 0.5 to 7 kW

NEW

Medium/large capacity,
low inertia

HG-JR series

Capacity: 0.5 to 22 kW

NEW

Medium capacity,
ultra-low inertia

HG-RR series

Capacity: 1 to 5 kW

NEW

Medium capacity,
flat type

HG-UR series

Capacity: 0.75 to 5 kW

SOLUTION

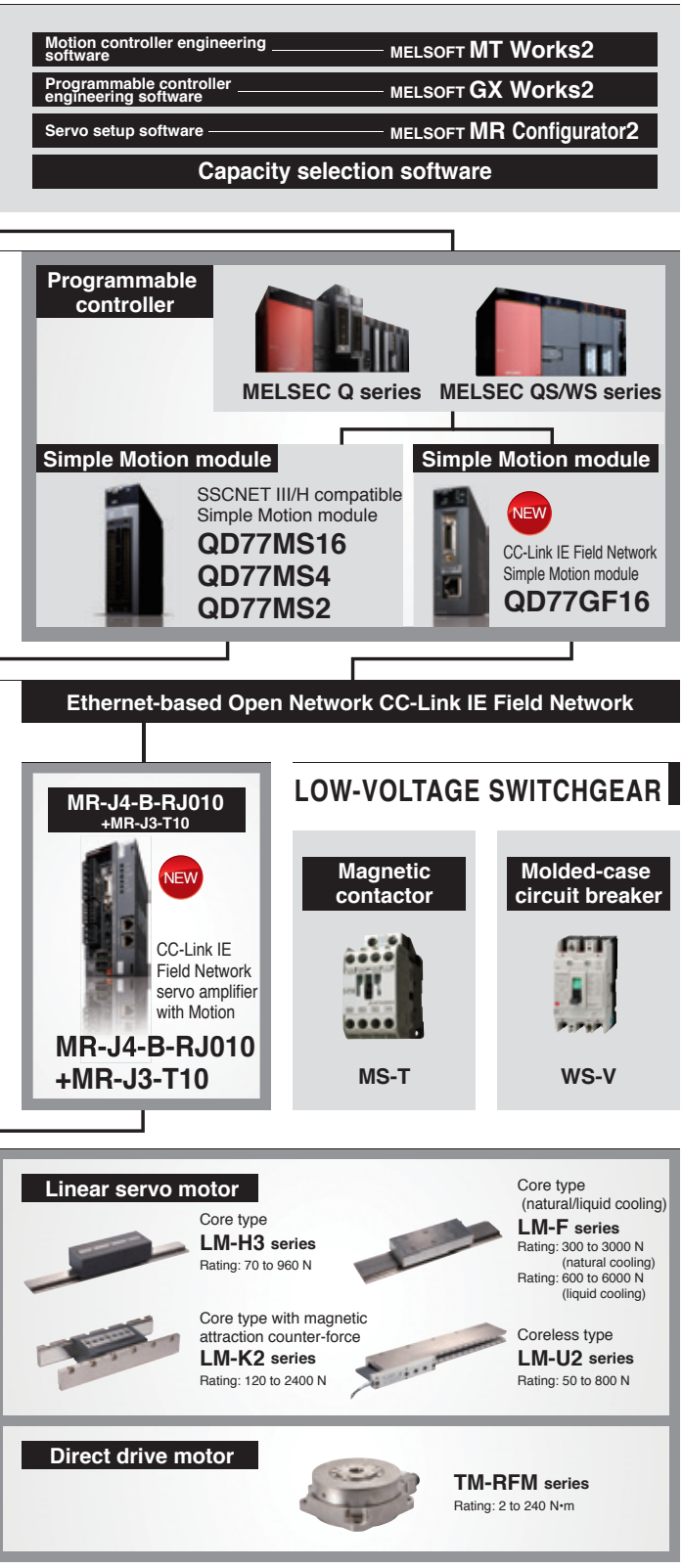
e-F@ctory

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

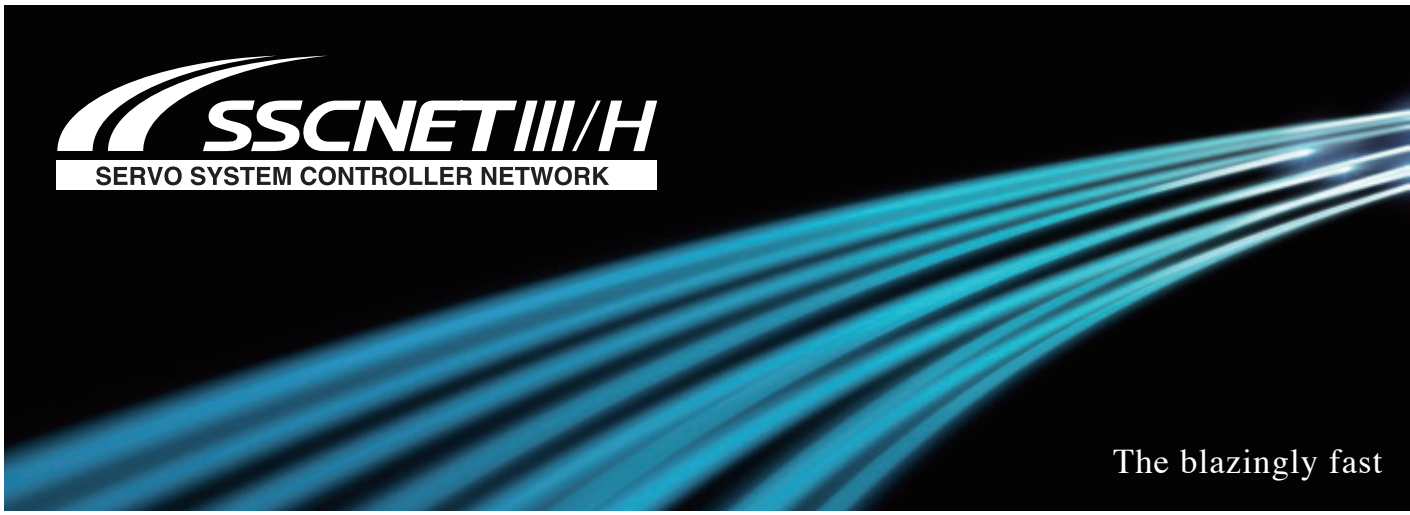
needs

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



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



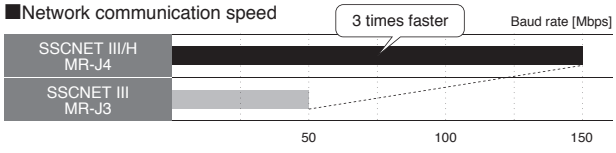
MELSERVO-J4 | High-response system achieved with SSCNET III/H

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.

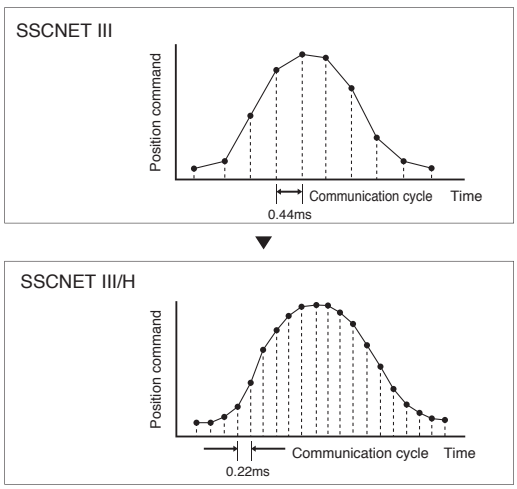
■Network communication speed



Cycle times as fast as 0.22 ms

Industry-leading levels

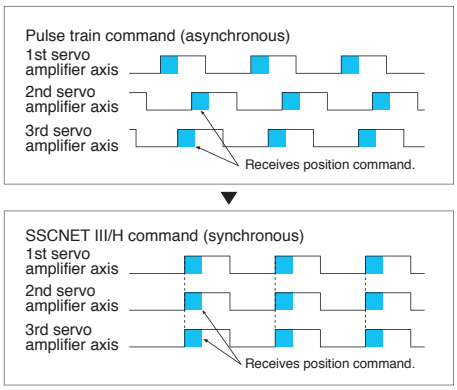
Smooth control of machine is possible using high-speed serial communication with cycle times of 0.22 ms.



Deterministic and synchronized communication

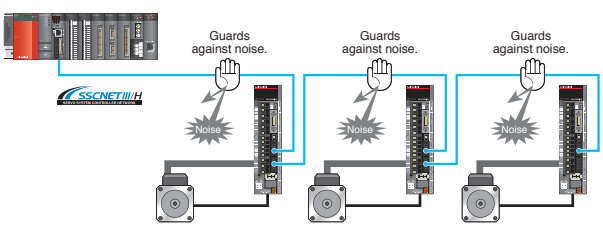
Complete deterministic and synchronized communication is achieved with SSCNET III/H, offering technical advantages in machines such as printing and food processing machines that require synchronous accuracy.

■Timing of servo amplifier processing



No transmission collision

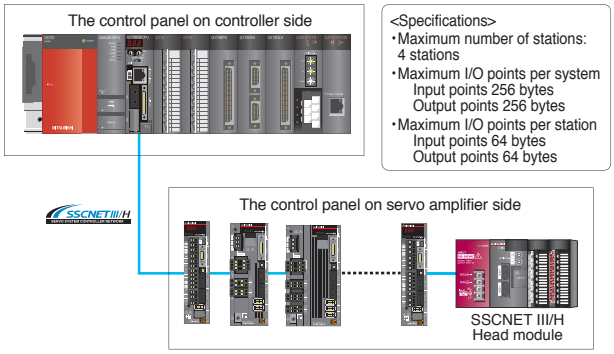
The fiber-optic cables thoroughly shut out noise that enters from the power cable or external devices. Noise immunity is dramatically improved as compared to metal cables.



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

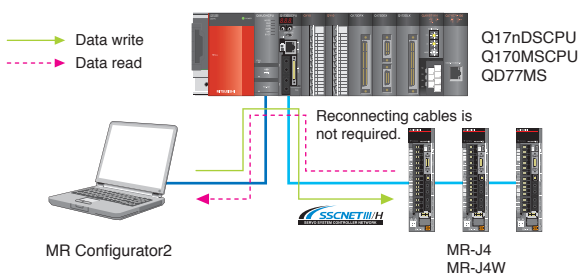
Dramatically reduced wiring

Using the SSCNET III/H Head module enables establishing the connection from the controller to various modules, such as I/O, analog, and high-speed counter via the SSCNET III/H network. Therefore, the wires can be drastically reduced by receiving I/O and analog I/O signals directly from the control panel on servo amplifier side.



Central control with network

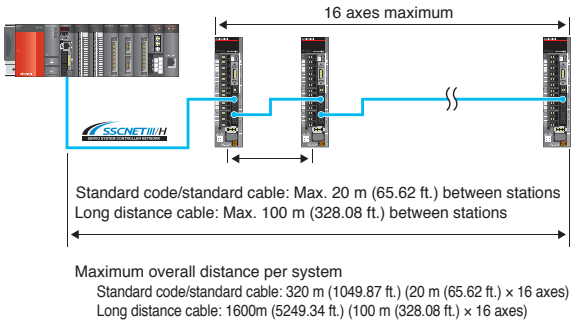
Large amounts of servo data are exchanged in real-time between the controller and the servo amplifier.
Using MR Configurator2 on a personal computer that is connected to the Motion controller or the Simple Motion module helps consolidate information such as parameter settings and monitoring for the multiple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



Long distance wiring up to 1600 m (5249.34 ft.) Enhanced performance

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

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



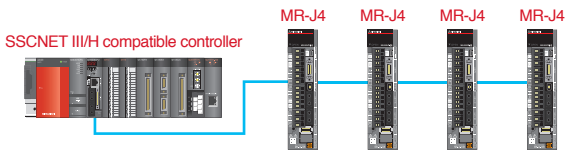
Maximum overall distance per system
Standard code/standard cable: 320 m (1049.87 ft.) (20 m (65.62 ft.) × 16 axes)
Long distance cable: 1600m (5249.34 ft.) (100 m (328.08 ft.) × 16 axes)

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

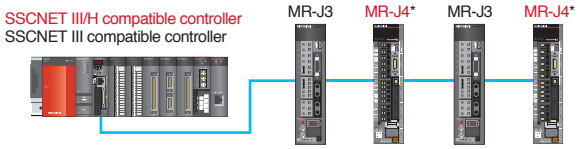
SSCNET III/H and SSCNET III compatible controllers support the use of SSCNET III/H and SSCNET III compatible servo amplifiers together in a same system.

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

■Communication speed: 150Mbps



■Communication speed: 50 Mbps



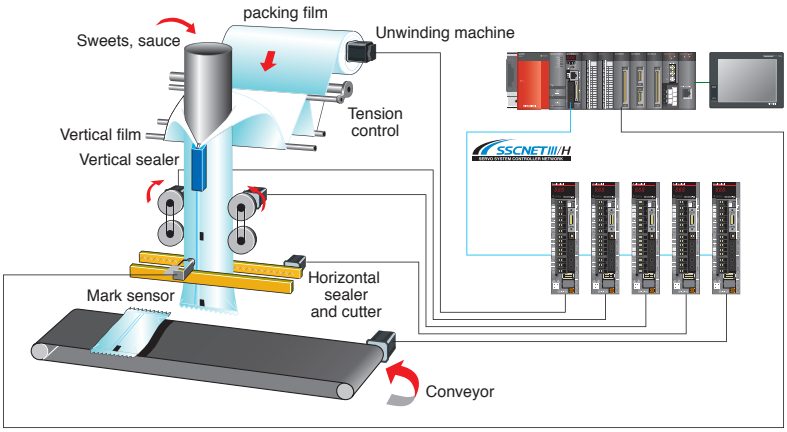
Q17nDSCPU & QD77MS solutions for advanced Motion control

Solutions

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

Q17nDSCPU QD77MS
Q170MSCPU QD77GF

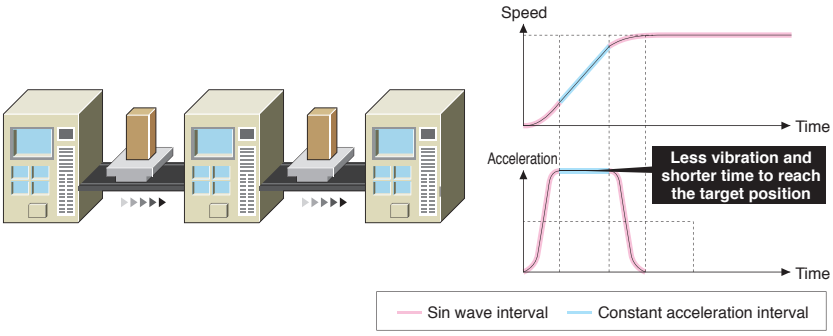
When the machine packs materials, each process is synchronized by using synchronous control and cam control. The packing film is cut using the registration mark as a reference with the mark detection function.



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

Q17nDSCPU
Q170MSCPU

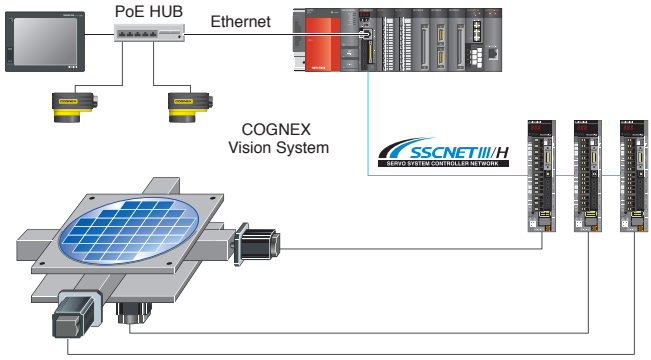
Vibration is minimized and a short tact time is achieved with the advanced S-curve acceleration/deceleration function by setting the smooth acceleration period (Sin wave interval) and maximum acceleration period (Constant acceleration interval).



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

Q17nDSCPU
Q170MSCPU

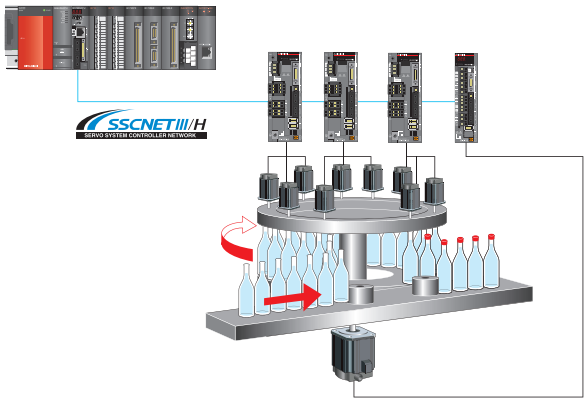
COGNEX Vision System is connected to the built-in PERIPHRAL I/F of the Motion CPU with Ethernet. Alignment time is reduced with the target position change function which uses the workpiece position data from the vision system for high-speed Motion control.



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

Q17nDSCPU QD77MS
Q170MSCPU QD77GF

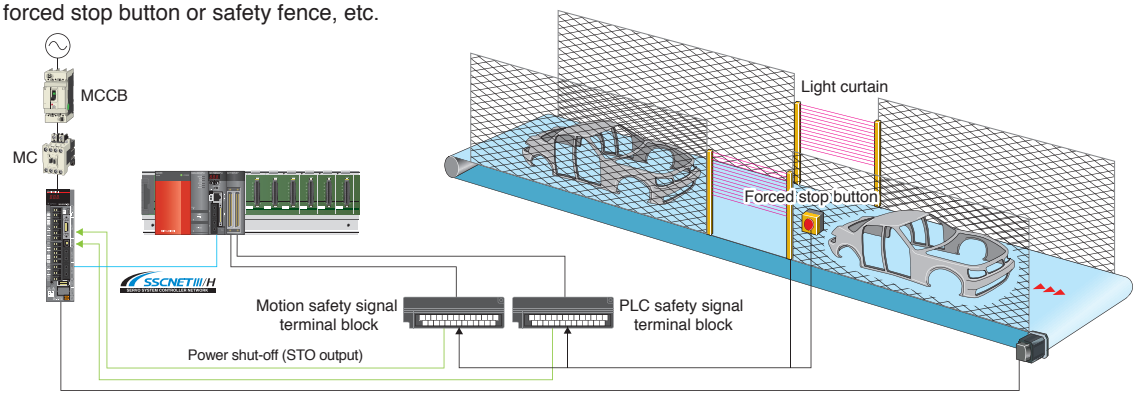
Control mode is able to be switched, such as from position control to torque control or vice verse is also possible. Tightening & Press-fit control, which switches from position control to torque control without stopping the movement during positioning, is also available. The absolute position is stored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

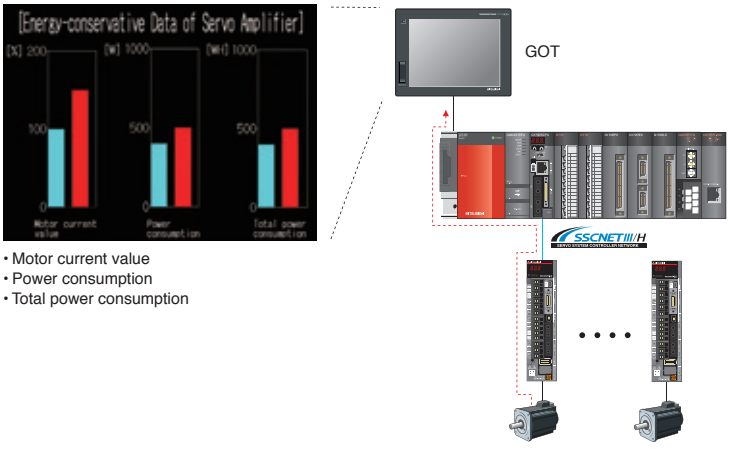


CASE6 Servo visualization (Optional data monitor function)

Q17nDSCPU QD77MS
Q170MSCPU QD77GF

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

Lineup

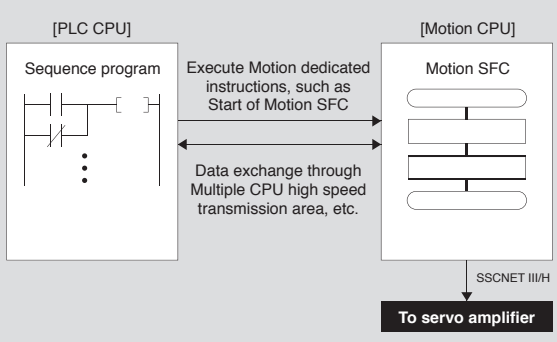
Features of the Motion Controllers and the Simple Motion Modules

Most-advanced Motion controller

SSCNET III/H compatible Motion controller

Q173DSCPU
Q172DSCPU
Q170MSCPU
Q170MSCPU-S1

The Motion controller is a CPU module used with the PLC CPU for Motion control. Using Motion SFC program, the Motion controller separately controls I/O modules, etc., from PLC CPUs; therefore high speed control is achieved.
The Q170MSCPU is a CPU module integrating Motion controller functions, PLC CPU functions, and power supply all in one.



Advanced control but simple to use just like the positioning module

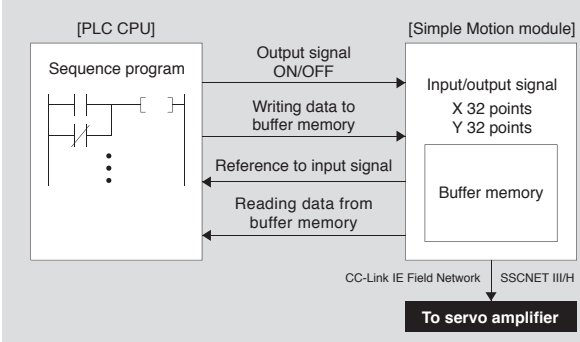
SSCNET III/H compatible Simple Motion module

QD77MS16
QD77MS4
QD77MS2

CC-Link IE Field Network Simple Motion Module

QD77GF16

The Simple Motion module is an intelligent function module performing positioning control following the PLC CPU's instructions. Synchronous control that was unavailable with the previous positioning module is now available with these new Simple Motion modules, while being simple to use 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	Q170MSCPU(-S1) NEW	QD77MS16	QD77MS4/QD77MS2	QD77GF16 NEW
Module type	CPU module			Intelligent Function Module		
Servo amplifier interface	SSCNET III/H			SSCNET III/H		CC-Link IE Field Network
	2 systems	1 system		1 system		
Servo amplifier type	MR-J4-B			MR-J4-B		MR-J4-B-RJ010+ MR-J3-T10
Number of control axes	Up to 32 axes	Up to 16 axes		Up to 16 axes	Up to 4/2 axes	Up to 16 axes
Operation cycle	0.22 ms or more			0.88ms / 1.77ms	0.88ms	0.88ms / 1.77ms
PLC CPU (Note-6)	MELSEC-Q series		Q03UD/Q06UDH or equivalent	MELSEC-Q series		
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 Tightening & Press-fit control Advanced synchronous control	Speed control Synchronous control	Torque control Cam control	Position control Tightening & Press-fit control (Note-4) Synchronous control	Speed control (Note-5)	Torque control (Note-4) Cam control
Positioning control	Linear interpolation Helical interpolation High-speed oscillation control	Circular interpolation Position follow-up control Speed/position switching control	Trajectory control Speed control with fixed position stop	Linear interpolation	Circular interpolation Speed/position switching control (INC)	Trajectory control Speed/position switching control (ABS) Position/speed switching control
Acceleration/ deceleration control	Trapezoidal acceleration/ deceleration	S-curve acceleration/deceleration	Advanced S-curve acceleration/deceleration	Trapezoidal acceleration/ deceleration	S-curve acceleration/deceleration	
Manual control	JOG operation JOG operation simultaneous start	Manual pulse generator operation		JOG operation	Manual pulse generator operation Inching operation	
Functions to change the control details	Current value change Speed change	Target position change	Torque limit value change Acceleration/deceleration time change	Current value change Speed change	Target position change Override	Torque limit value change Acceleration/deceleration time change
Home position return type	Proximity dog type 1 Count type 1 Data set type 1 Stopper type 1 Dogless origin signal reference method	Proximity dog type 2 Count type 2 Data set type 2 Stopper type 2	Scale home position signal detection type Count type 3 Dog cradle type Limit switch combined type	Proximity dog type Count type 1 Data set type	Count type 2	Scale home position signal detection type
Sub functions	Forced stop Absolute position system Optional data monitor M-code output Safety observation (Note-3) High-speed reading	Hardware stroke limit Amplifier-less operation Mark detection Error history Vision system Limit switch output	Software stroke limit Unlimited length feed ROM operation Digital oscilloscope Software security key Cam auto-generation	Forced stop Absolute position system Optional data monitor (Note-4) M-code output	Hardware stroke limit Amplifier-less operation Mark detection Error collection	Software stroke limit Unlimited length feed Flash ROM backup Digital oscilloscope Cam auto-generation

(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.
(Note-3) : The safety observation function is available with the Q173DSCPU/Q172DSCPU.
(Note-4) : Available only with the QD77MS.
(Note-5) : The QD77GF can perform only speed control with position loop, while QD77MS can perform speed control.
(Note-6) : Refer to the specification pages in this catalog for the applicable CPUs.

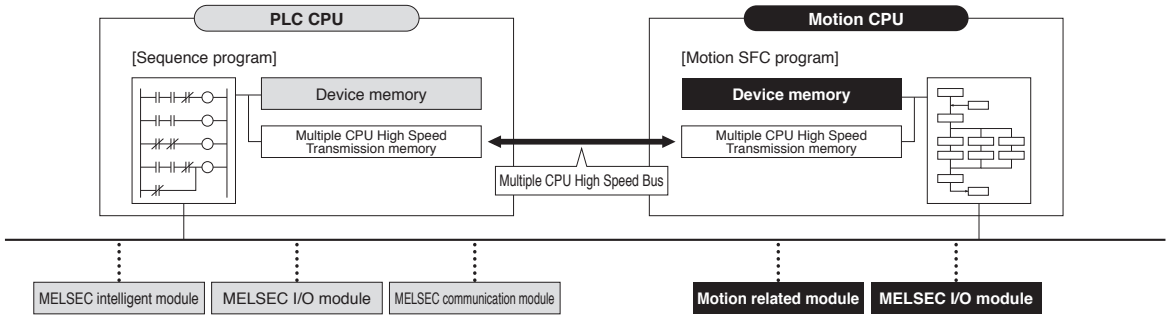
Reduced wiring, basic performance, Multiple CPU control for all customer needs

Multiple CPU control by PLC CPU and Motion CPU

Q17nDSCPU
Q170MSCPU

Loads are dispersed by distributing tasks such as servo control to Motion CPU, and machine control and information control to PLC CPU.
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.

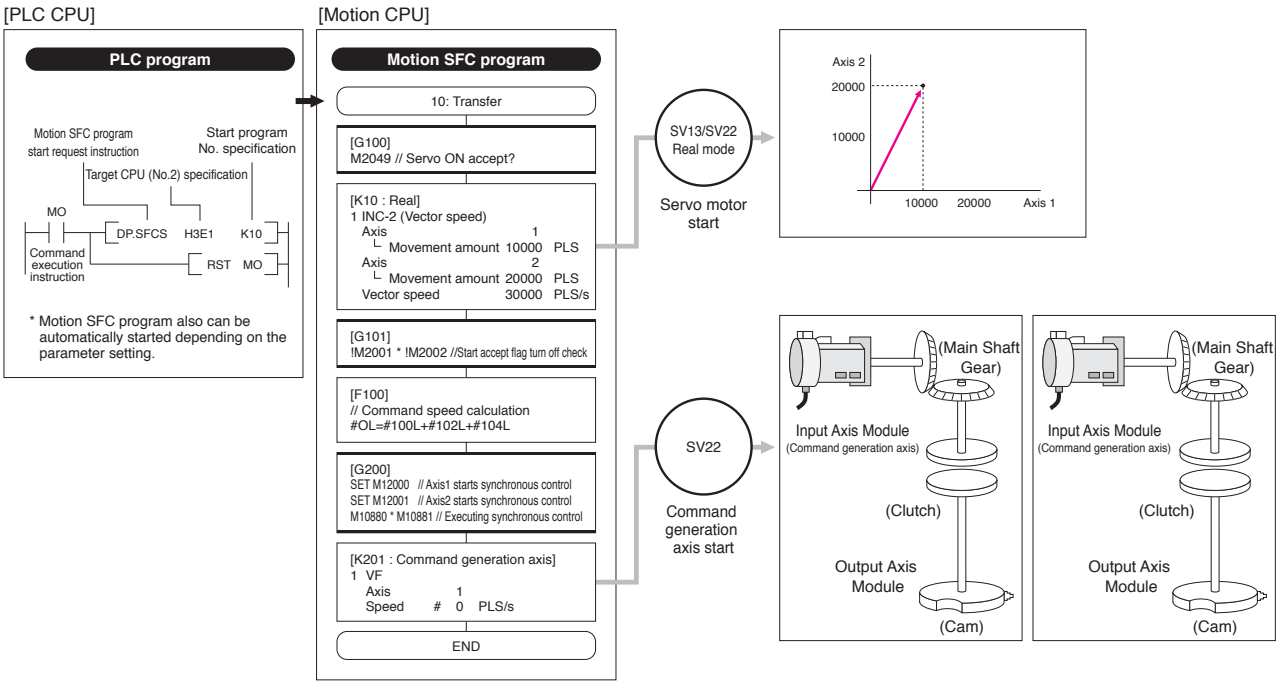


[Sequence program]
- Ladder description is suitable for scan process (Importance focused on condition control)
- Sequence control (Compatible with multiple I/O points, multiple operations)
- System stop processing at error detection

[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
Q170MSCPU



Q173DSCPU/Q172DSCPU

Faster response time enabling shorter tact time

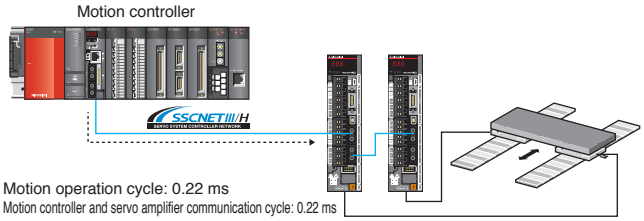
Operation Cycle of 0.22 ms/4 axes

Q17nDSCPU
Q170MSCPU

The Motion operation cycle of 0.22 ms/4 axes is achieved 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) achieves the shorter operation cycle and smooth motion.

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



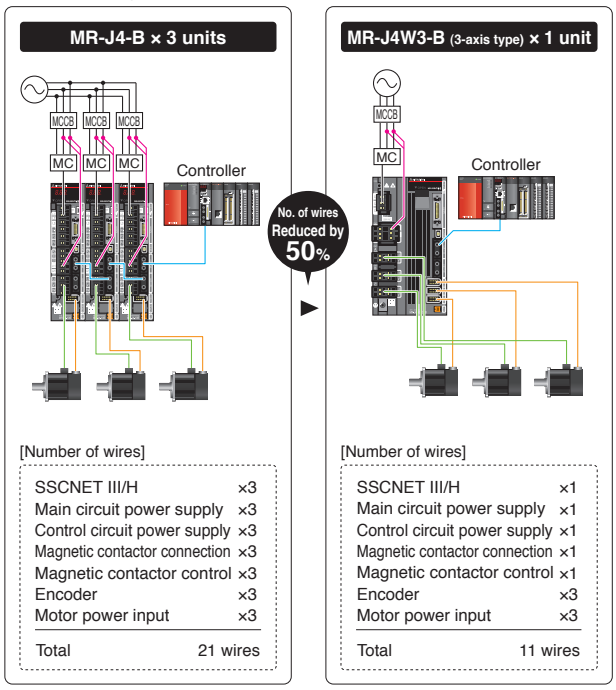
Motion controller with MR-J4 series greatly reduces wiring

Reduced wiring, space saving

Q17nDSCPU
Q170MSCPU
QD77MS
QD77GF

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

[Reduced wiring]



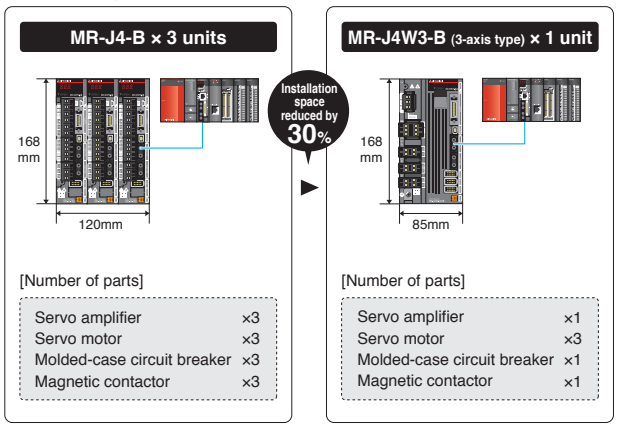
[Number of wires]

SSCNET III/H	×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]

SSCNET III/H	×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]

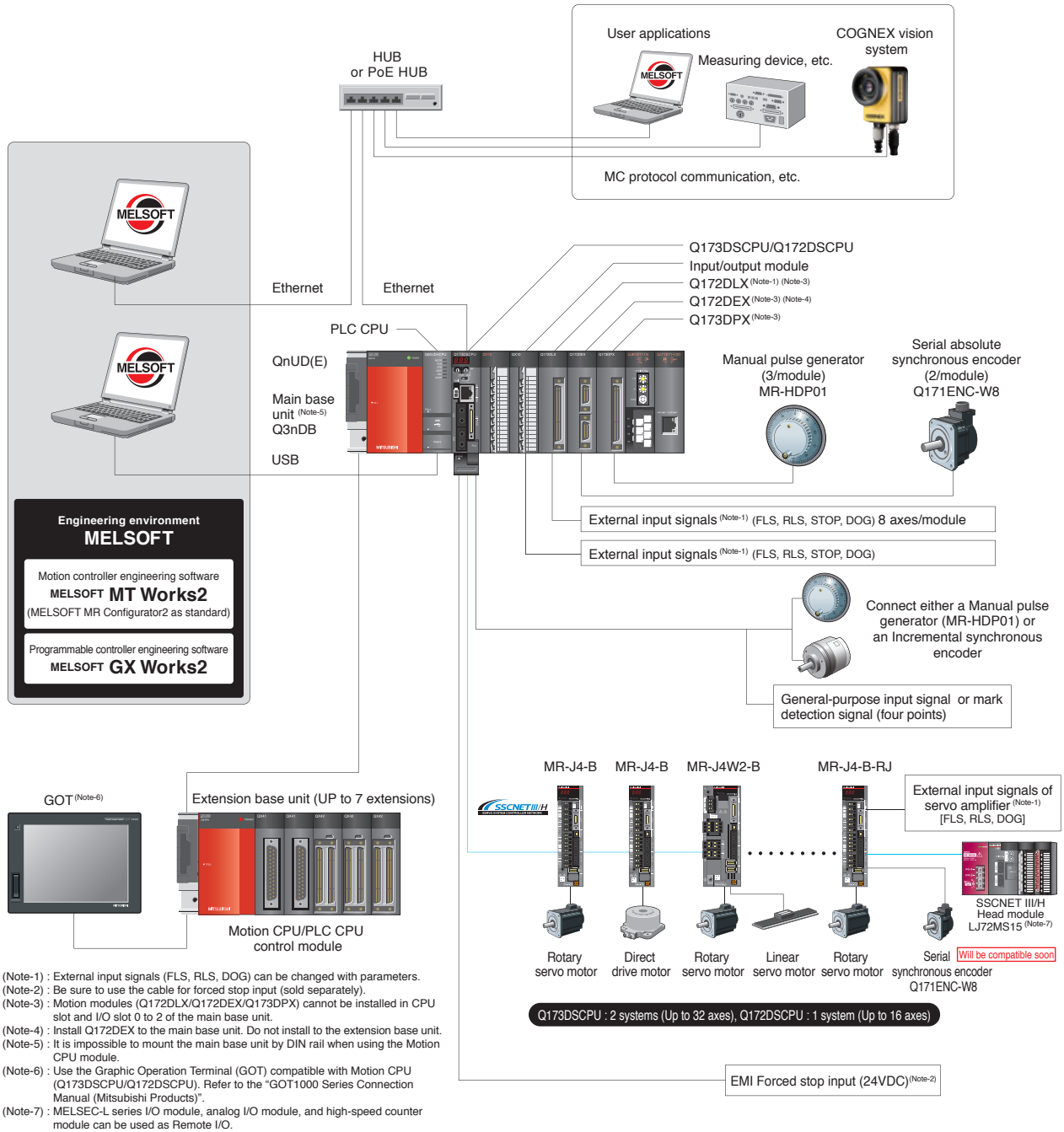
Servo amplifier	×1
Servo motor	×3
Molded-case circuit breaker	×1
Magnetic contactor	×1

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) : External input 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)".
(Note-7) : MELSEC-L series I/O module, analog I/O module, and high-speed counter module can be used as Remote I/O.

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

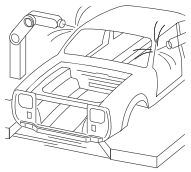
Q17nDSCPU
Q170MSCPU

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

<Automatic machinery use SV22>

<Conveyor assembly use SV13>

- Electronic component assembly
- Inserter
- Feeder
- Molder
- Conveying equipment
- Paint applicator
- Chip mounting
- Wafer slicer
- Loader and Unloader
- Bonding machine
- X-Y table

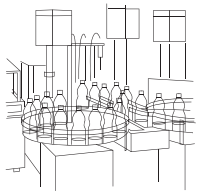


- Circular interpolation
- Constant-speed control
- Fixed-pitch feed
- Speed control with fixed position stop
- Speed switching control
- Speed control
- Speed/position switching control
- Linear interpolation (1 to 4 axes)
- Teaching
- Speed-torque control

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
```

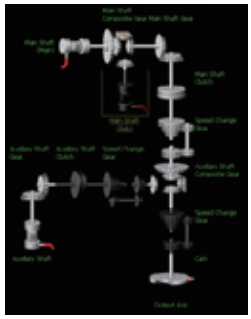
- Press feeder
- Food processing
- Food packaging
- Winding machine
- Spinning machine
- Textile machine
- Knitter
- Printing machine
- Book binder
- Tire molder
- Paper-making machine



- 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.

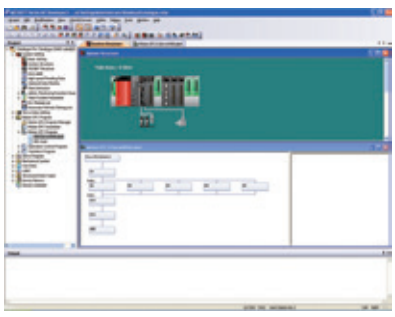
Engineering environment MELSOFT

Q17nDSCPU
Q170MSCPU

MELSOFT MT Works2

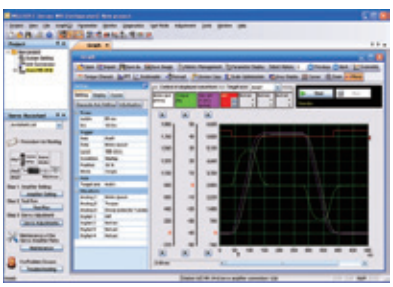
[MELSOFT MT Developer2]

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



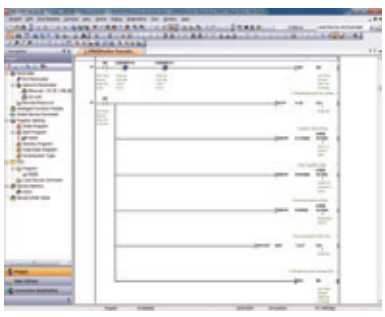
[MELSOFT MR Configurator2]

Parameter setting, adjustment and monitoring of servo amplifiers are available. This software is included with MT Works2, running in the collaboration with the MT Developer2.



MELSOFT GX Works2

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



High functionality for advanced Motion controls

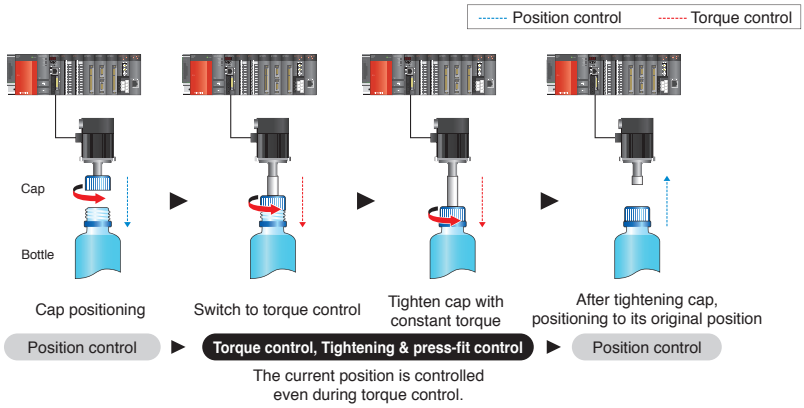
Switch to various controls as you want

Speed-torque control (Tightening & press-fit control)

NEW Tightening & Press-fit control Patent pending

Q17nDSCPU
Q170MSCPU

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 the movement once to ensure safety. “Tightening & press-fit control” which starts during the movement. The current position is stored during both torque control and speed control. Therefore positioning on the absolute position coordinates is possible even after switching back to position control.



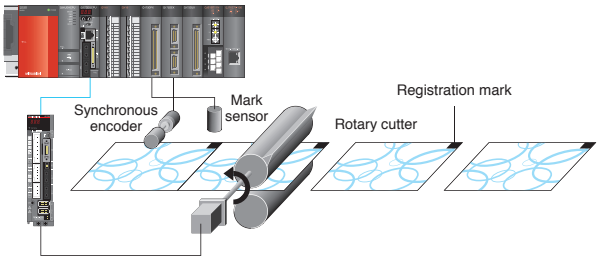
Registration mark detection

Mark detection function

Q17nDSCPU
Q170MSCPU

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

[Position compensation during registration mark detection]

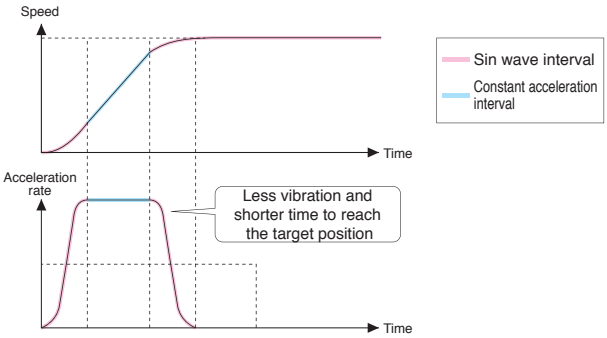


Smooth and faster acceleration

Advanced S-curve acceleration/deceleration

Q17nDSCPU
Q170MSCPU

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 total acceleration time can be reduced without losing smoothness and high response.

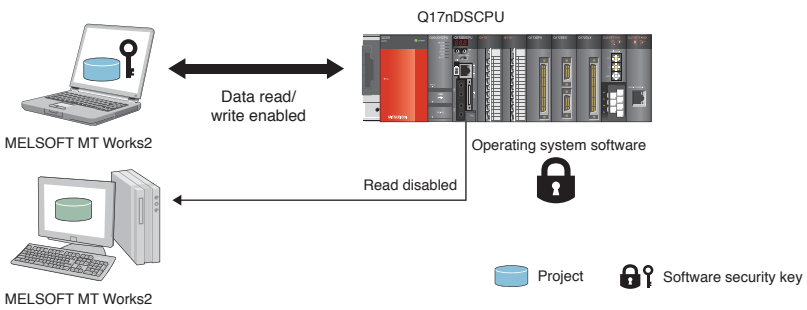


Software security key function

NEW

Q17nDSCPU
Q170MSCPU

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



Wide variety of functions for Motion controller

Various Basic Functions

Q17nDSCPU
Q170MSCPU

Servo external input signals

Upgraded

The servo external input signals (FLS, RLS, DOG) can be 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 flexible to use.

Internal Input signal (4-point)

NEW

The Motion CPU has the 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, a retry function and shift function etc. are widely 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 operation. When compensating the position fluctuation using the data from the vision sensor, etc., the positioning operation to the final compensated position is completed without restarting the positioning.

Optional data monitor function

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 can be individually changed during control operation through the Motion SFC program and etc., without connecting to MELSOFT MR Configurator2.

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

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

PERIPHERAL I/F (Ethernet)

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

4 million pulse synchronous encoder

NEW

The "Q171ENC-W8" 4 million (22-bit) pulse synchronous encoder equipped as standard greatly improves the synchronous operation accuracy. (16 times higher resolution than conventional model.) High-accuracy control is achieved when used with MR-J4-B (standard 4 million (22-bit) pulses resolution).
(Note): The Q170MSCPU(-S1) will be compatible soon.

Limit switch output function

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

Speed control with fixed position stop

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

Digital oscilloscope function

Upgraded

With the digital oscilloscope function of MELSOFT MT Works2, data collection which is synchronized to 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 (fully 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.

Multiple CPU synchronous control

NEW

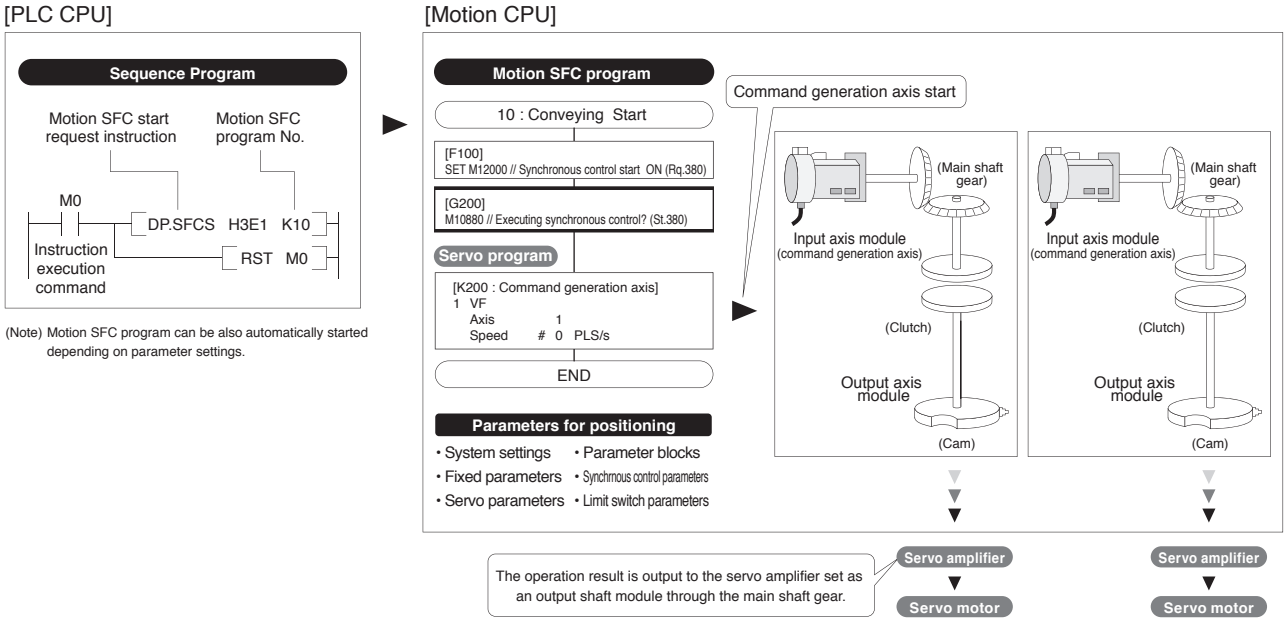
Up to 96 axes can be synchronized by use of three Motion controllers. This control is available with the “Q173DSCPU and Q172DSCPU”.

Advanced Synchronous Control NEW

Q17nDSCPU
Q170MSCPU

"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.

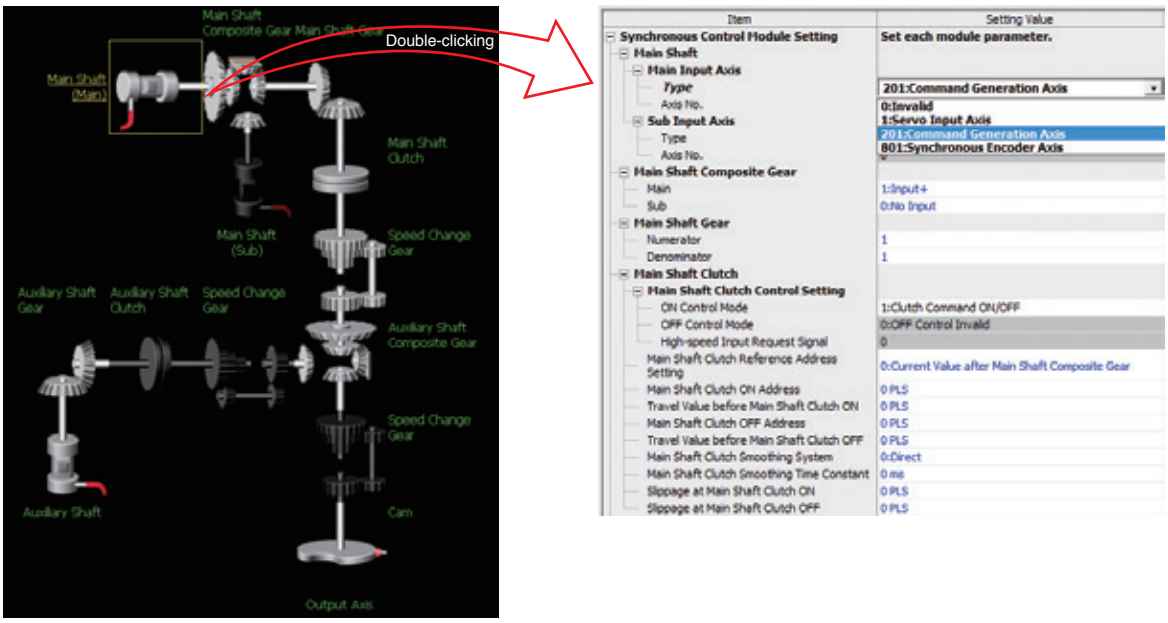
Control flow



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

Synchronous Control Parameters

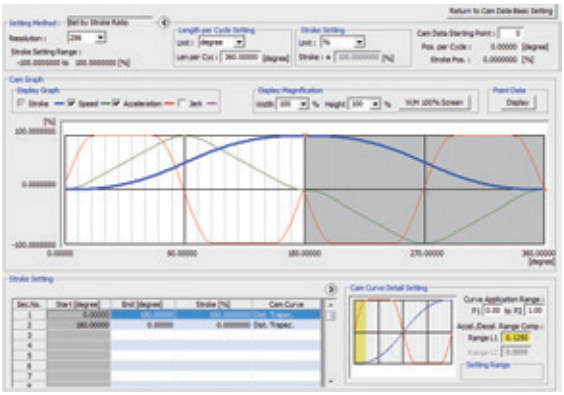
- ●Synchronous control is easily executed by setting parameters.
- ●The movement amount of the main shaft can be transmitted to output axes via the clutch.
- ●"Command generation axis" is not considered as a control axis; therefore the output axes can be set using all of the available control axes.



Electronic cam

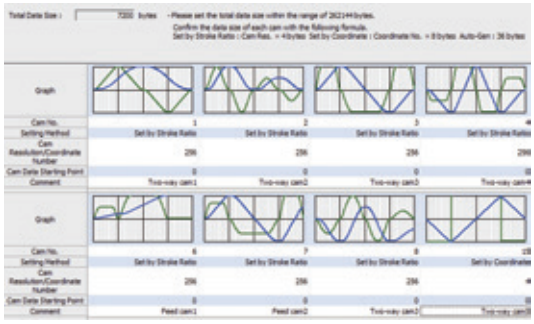
A wide variety of cam patterns can be easily created.

[Cam Data Creation Screen]



- 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.

[Cam Data List]

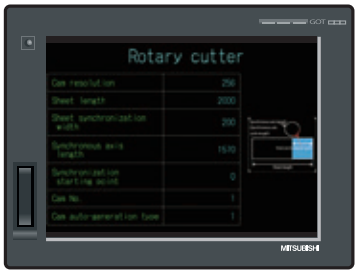


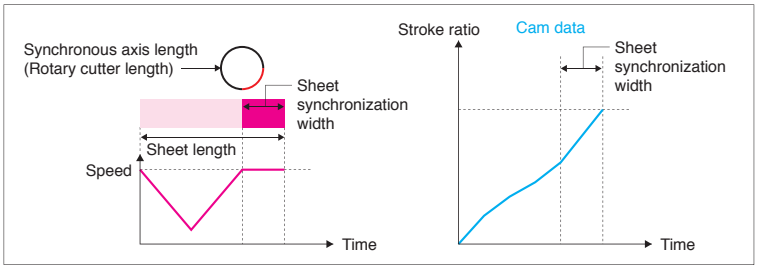
- The created cam data is easily checked with the thumbnail display.
- The screen for cam data creation will open by double-clicking the cam data to be edited.

Cam auto-generation function

The cam auto-generation function can automatically create cam data which is synchronized to 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
Q170MSCPU

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
Q170MSCPU

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

- Motion SFC format program is suitable for the event process and controlling 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 judgment) and K (Motion Control) where they are arranged in a sequential process.

Motion SFC description

Flowchart description are easy to read and understand

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

A logical layered structure program

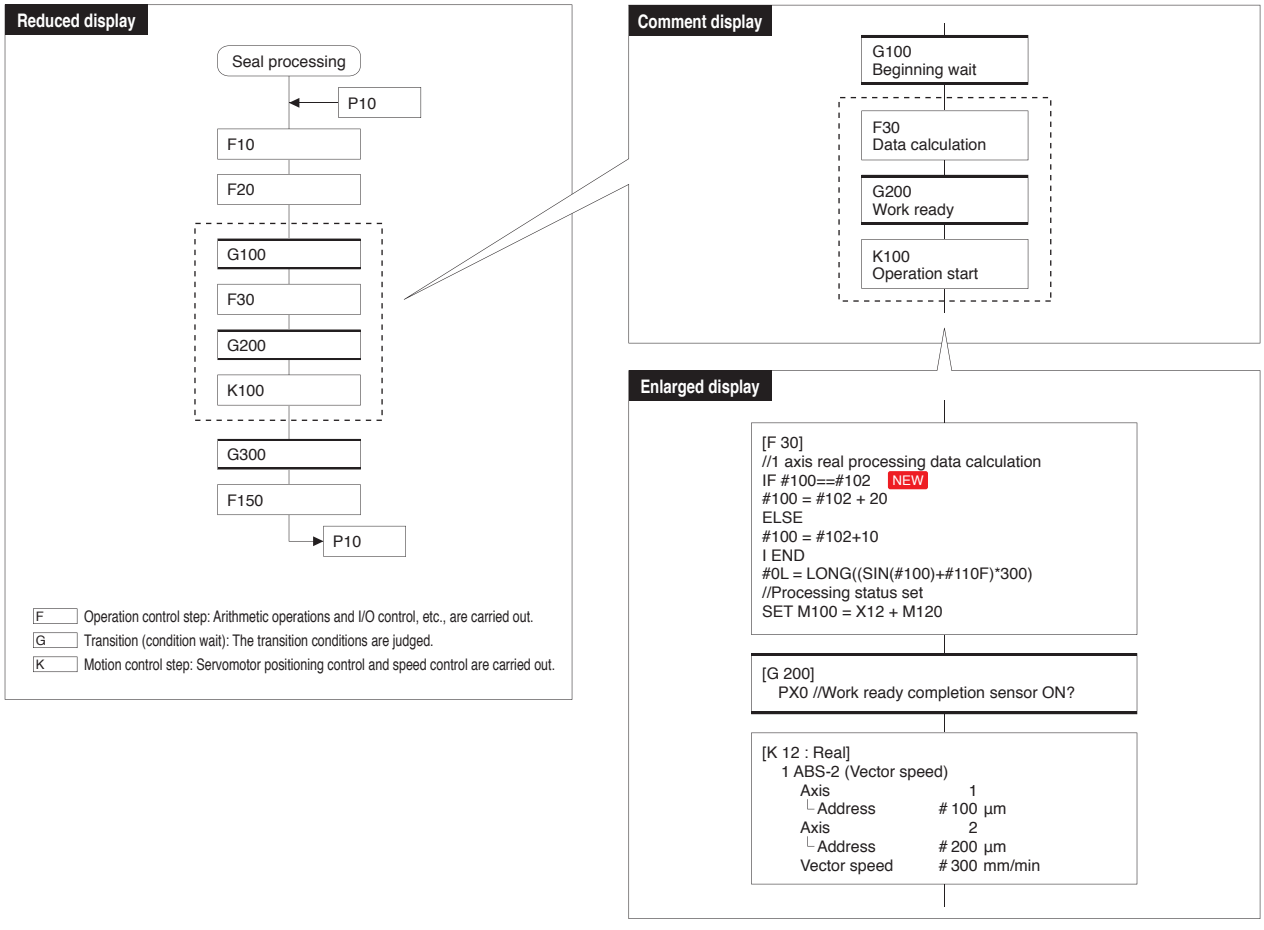
- Operation commands are easily described by creating comments.
- Operation commands are detailed in a step by step format in a layered structure program.

Controlling sequential machine operation using the Motion CPU

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

Enhanced operation functions

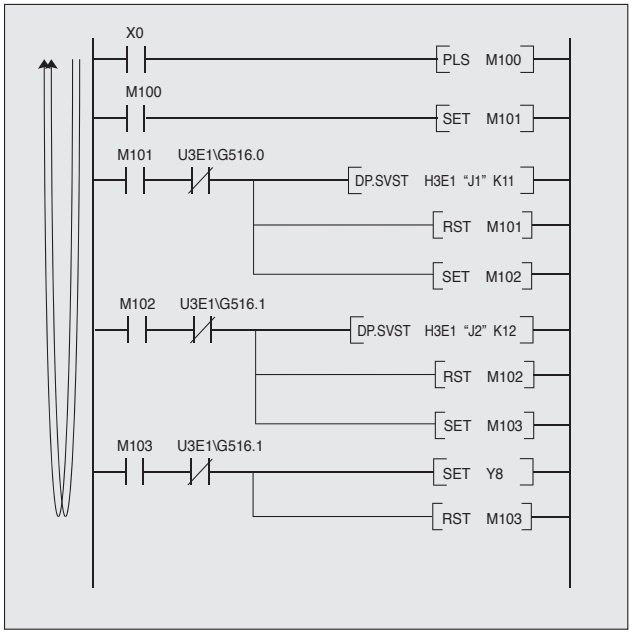
- Commands are able to be described with arithmetic and logic operation expressions.
- Compatible with 64-bit floating-point operations.
- Arithmetic functions include trigonometric functions, square root, natural logarithm, etc.
- The conditional branch (IF ELSE IEND), selective branch (SELECT CASE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



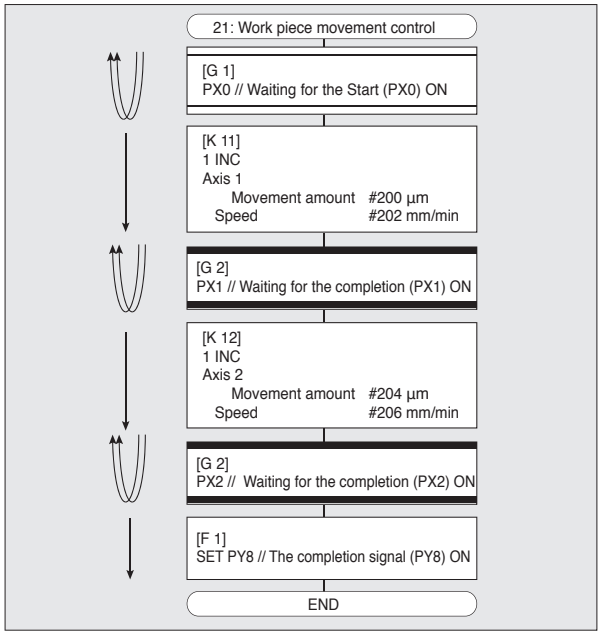
Motion SFC scanning method

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



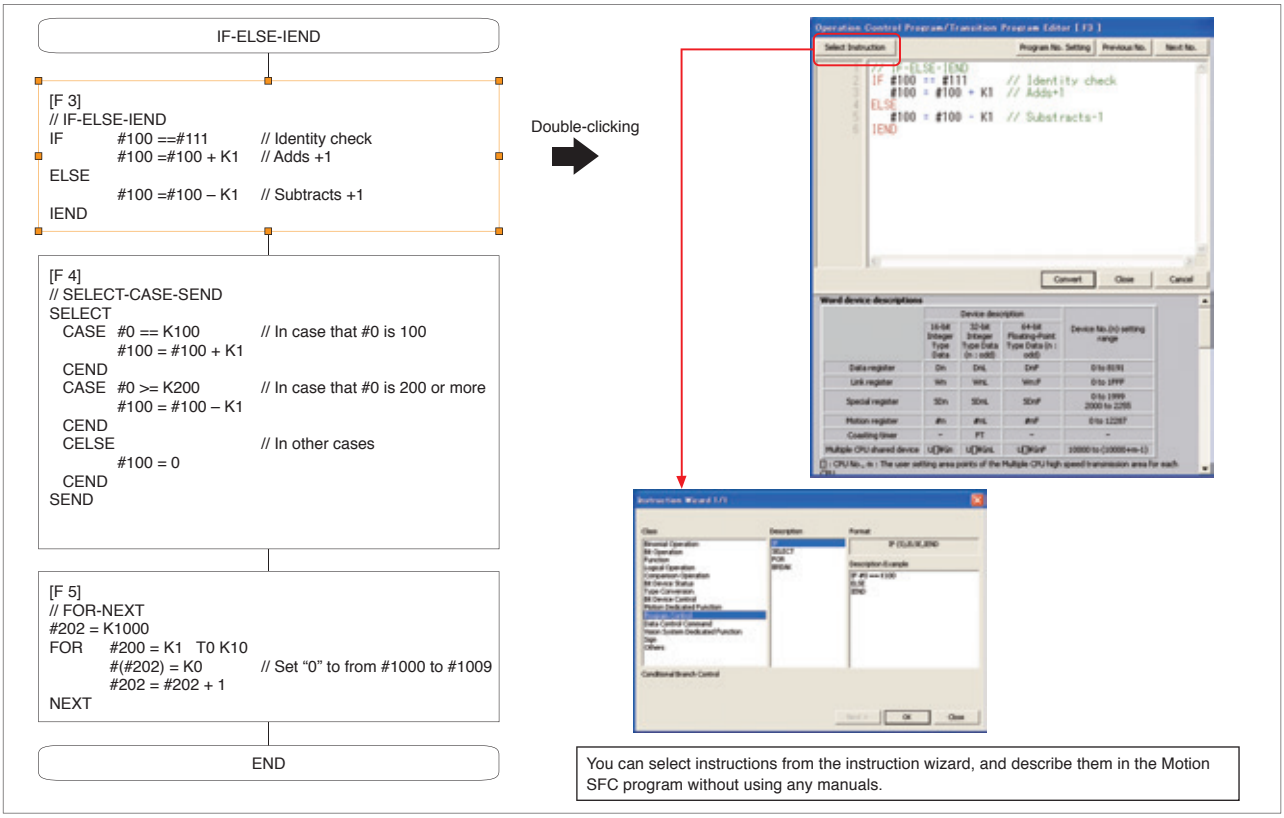
Scanning only active steps following the transition conditions in Motion SFC program.



Program control instruction and editing

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

[Motion SFC program edit example]



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

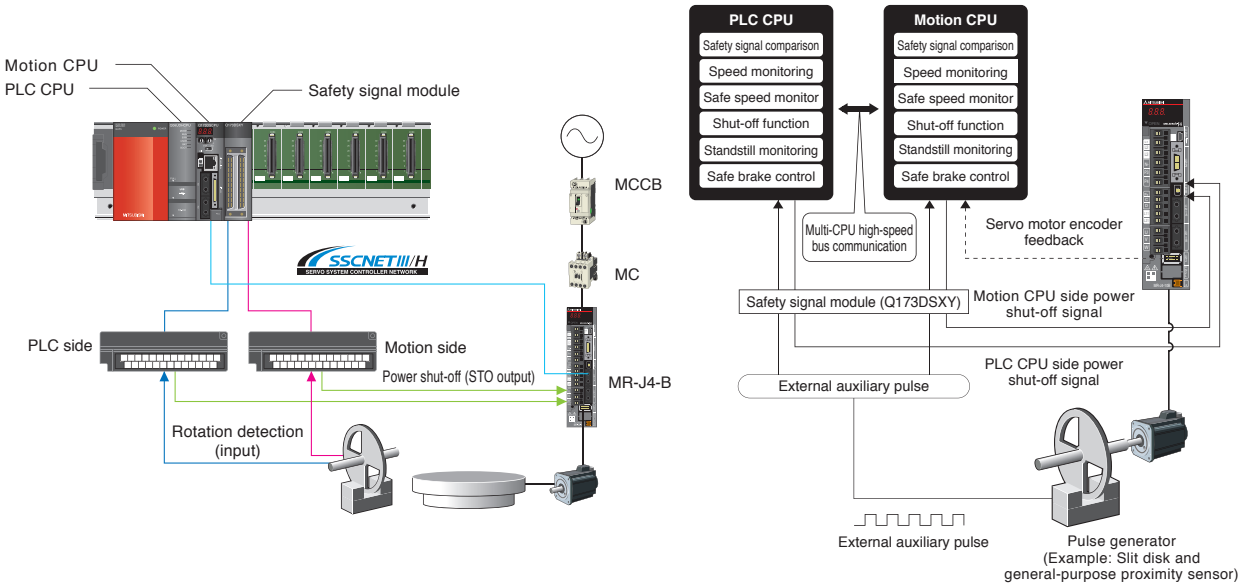
Safety System NEW

Q17nDSCPU

The safety system is compliant with “EN ISO13849-1:2008 Category 3 PLd” and “EN62061 SIL CL2” (these standards are harmonized with European Machine Directives). Stopping functions(STO, SS1, SS2) and other functions (SOS, SSM, SBC, SLS) according to IEC61800-5-2 are equipped as standard as well as the safety signal comparison function, which confirms the status of the input/output signals by the Motion CPU and the PLC CPU. The operating conditions for these functions are freely programmed by the PLC CPU and Motion CPU ladder circuits.

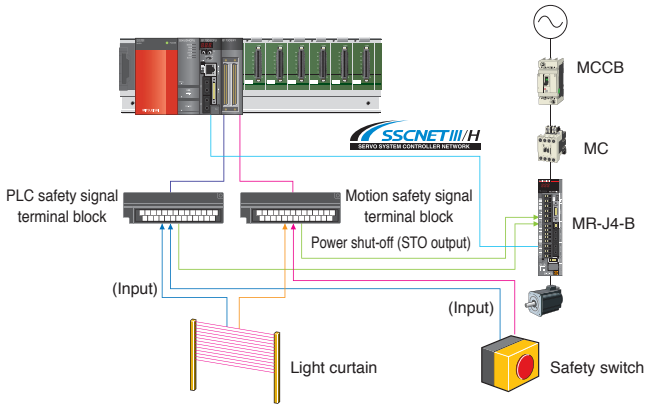
Speed monitoring function

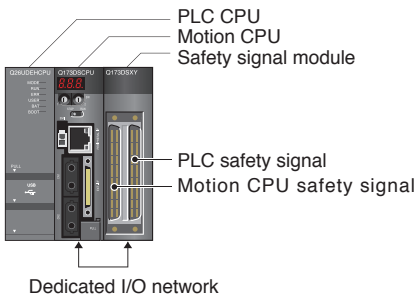
The motor speed is monitored not to exceed the "Safety Speed" by the Motion CPU and the PLC CPU.



Safety signal comparison function

The safety input 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 modules 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

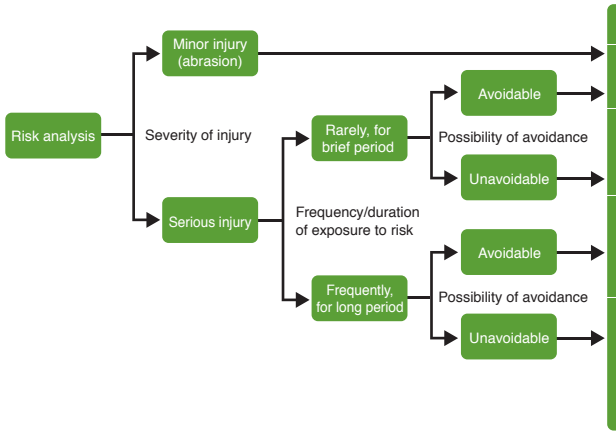
(Note-1): Power shut-off signal turns: ON when safety signal comparison function status is normal. OFF when error is detected.
(Note-2): All output signal points at the 2nd and 3rd modules can be used as user safety signals.

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

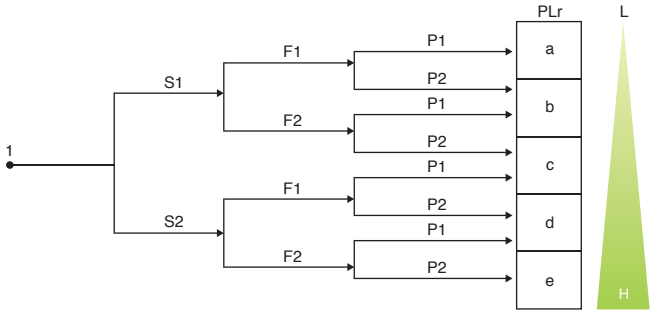
Category	Requirement summary	System behaviour
B	• Shall realize the intended functions of safety- related parts of the machine control system.	• The occurrence of a fault can lead to the loss of the safety function.
1	• Shall meet the requirements of Category B. • Shall use well-examined reliable components 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 functional safety



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

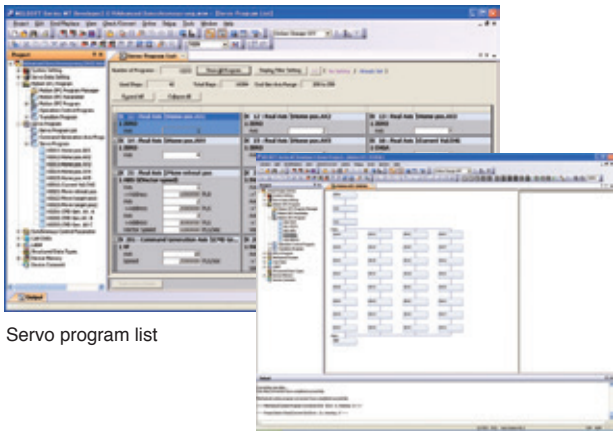
Motion controller engineering software **MELSOFT MT Works2**

Programming

Q17nDSCPU
Q170MSCPU

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.

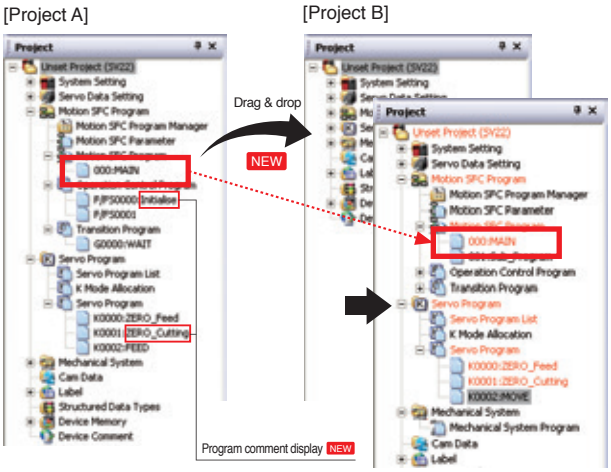


Servo program list

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.

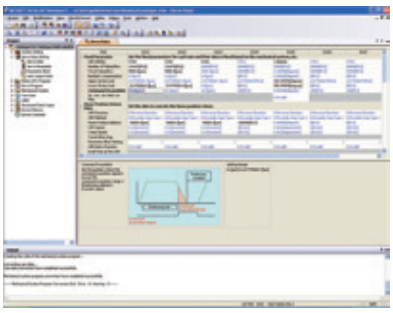


System design

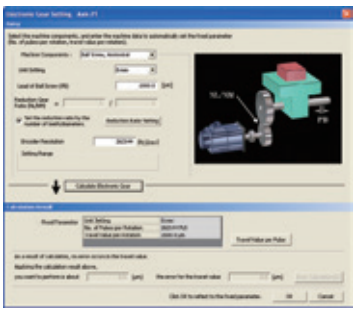
Q17nDSCPU
Q170MSCPU

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

System Structure



Servo Data



Electronic Gear Setting

Setup and adjustment

Q17nDSCPU
Q170MSCPU

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.

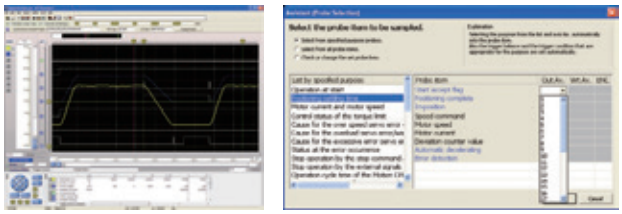
- Motion SFC program monitor
- Mechanical program monitor
- Current value monitor, positioning monitor, scroll monitor, error history monitor
- Device monitor

Monitor

Digital oscilloscope function

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

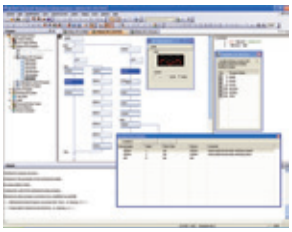
- The assistant function explains all work steps.
- Set often-viewed data easily with the purpose-based probe setting.
- Sample 16CH word and 16CH bit data. Of which, 8CH words and 8CH bits can be displayed in real time. NEW



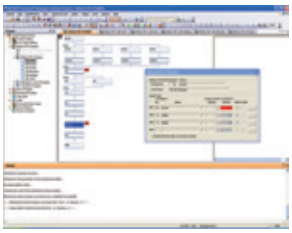
Digital oscilloscope

Various test operation functions

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



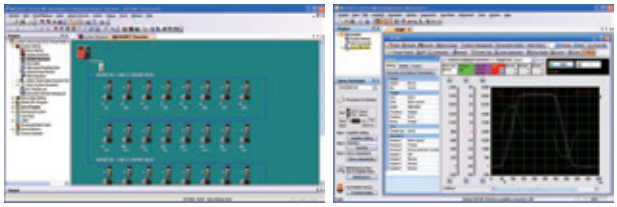
Simulator



Test

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
Q170MSCPU

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 unauthorized access.

System Configuration

Q170MSCPU

The Q170MSCPU(-S1) integrates Motion CPU functions (equivalent to Q172DSCPU) and PLC CPU functions (equivalent to Q03UDCPU or Q06UDHCPU) all in one module. Therefore, this module can flexibly be applied to various machines by offering a wide variety of functions for synchronized operation and interfaces as standard.

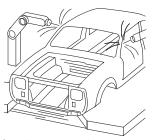
- Up to 16 axes can be controlled.
- Wide variety of controls can be performed with this module, such as position control, speed control, torque control, and advanced synchronous control, etc.
- Incremental synchronous encoder I/F and Mark detection signal I/F are also integrated into this module.
- PLC capacity is increased to 60k steps, and up to 7 PLC extension base units can be used.
- This module can be connected directly to COGNEX Vision system with Ethernet.
- The MELSEC-L series I/O modules, analog I/O module, and high-speed counter module can be used when the SSCNETIII/H head module the LJ72MS15 is connected in the system.
- This module is compatible with “SSCNET III/H” New-generation Servo System Network. Communication speed is increased to 150Mbps full duplex (equivalent to 300 Mbps half duplex), three times faster than the conventional speed. System response is dramatically improved.

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

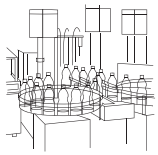
<Automatic machinery use SV22>

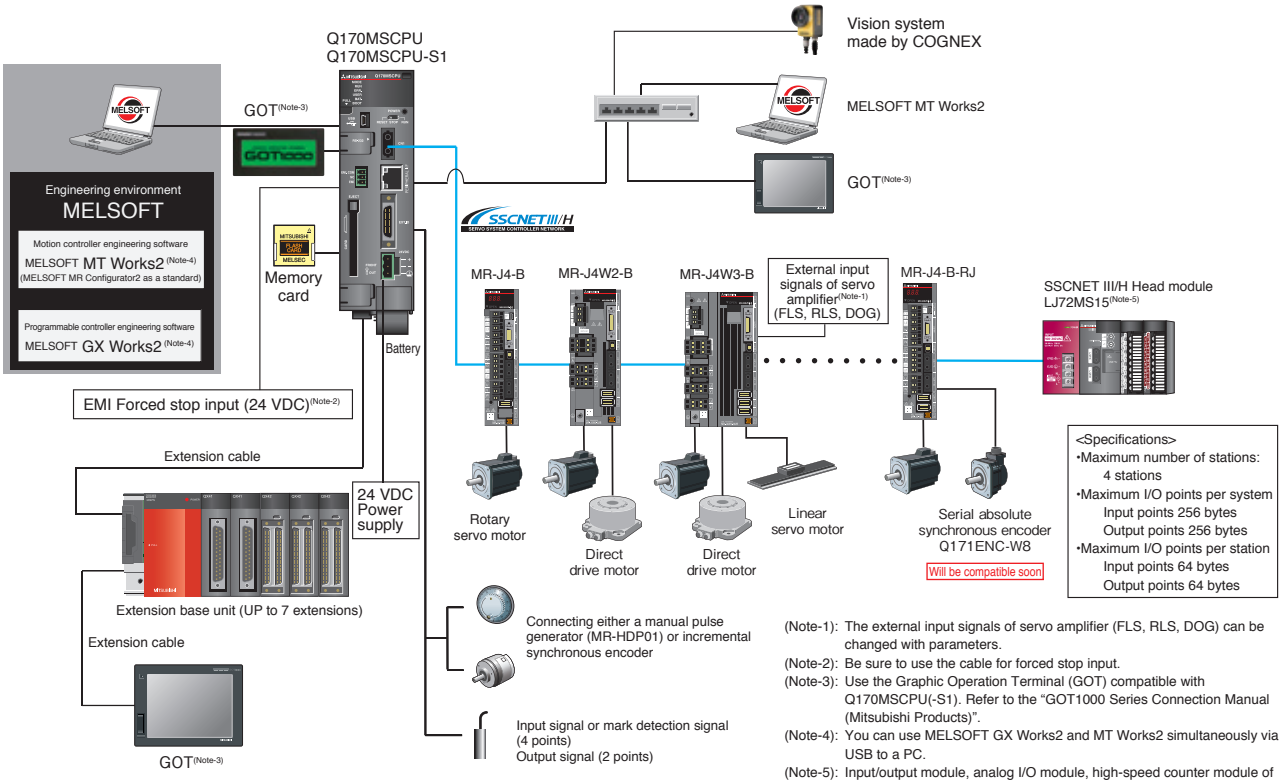
<Conveyor assembly use SV13>

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



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





(Note-1): The external input signals of servo amplifier (FLS, RLS, DOG) can be changed with parameters.
(Note-2): Be sure to use the cable for forced stop input.
(Note-3): Use the Graphic Operation Terminal (GOT) compatible with Q170MSCPU(-S1). Refer to the “GOT1000 Series Connection Manual (Mitsubishi Products)”.
(Note-4): You can use MELSOFT GX Works2 and MT Works2 simultaneously via USB to a PC.
(Note-5): Input/output module, analog I/O module, high-speed counter module of MELSEC L series can be used.

Q170MSCPU/Q170MSCPU-S1

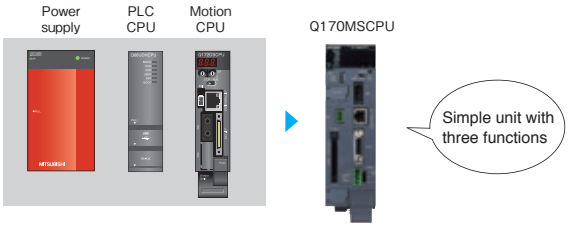
Features

Q170MSCPU

NO more model selection worries!

Power supply, PLC, and Motion Controller All in One !

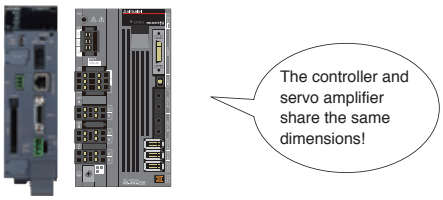
The compact Q170MSCPU integrates a power supply, PLC, and Motion controller and features built-in incremental synchronous encoder and mark detection signal interfaces. No need to worry over which model to choose - this unit provides all main functions!



Panel and equipment size can be reduced!

Better space-saving when combined with 2-axis/3-axis servo amplifier

The Q170MSCPU is a compact 52 (2.05)(W) × 186 (7.32)(H) × 135 (5.31)(D) mm (inch). Combining the controller with Mitsubishi's 2-axis/3-axis servo amplifier saves even more space.

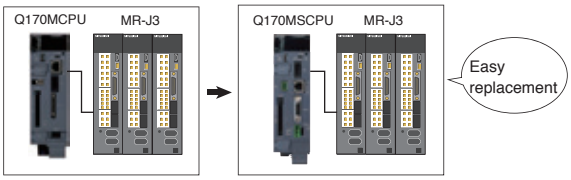


System expansion with minimum design cost!

Using program resources efficiently

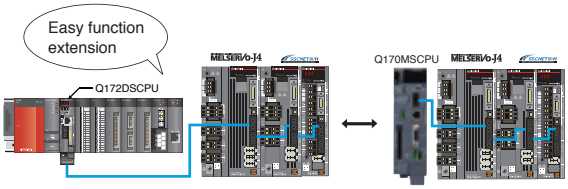
Replacement from Q170MCPU

The MELSERVO-J3 series amplifiers can be connected to the Q170MSCPU, and the existing program of the Q170MCPU can also continue to be used with the Q170MSCPU. The built-in interface connector is located in front of the module for the manual pulse signal and incremental synchronous encoder signal.



Compatibility with the Q172DSCPU/Q173DSCPU Motion controller

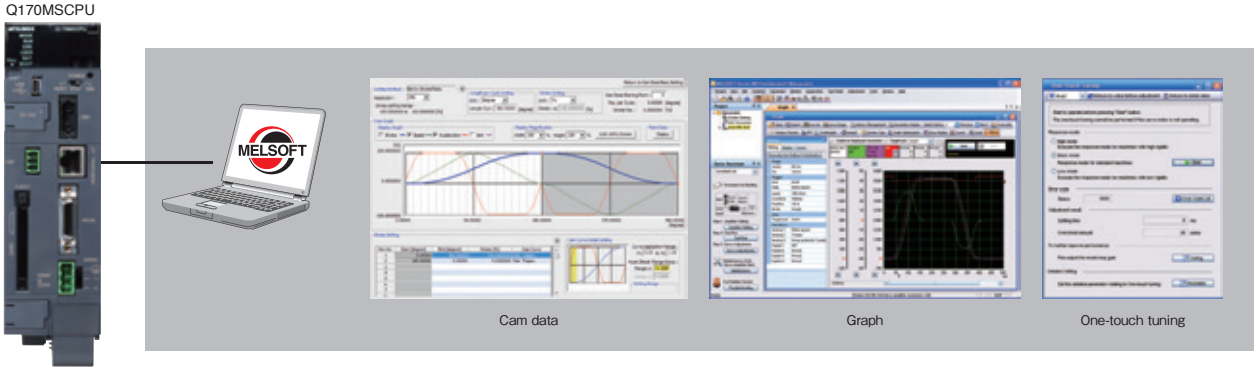
The Q172DSCPU/Q173DSCPU can be replaced with the Q170MSCPU depending on the system scale. The parameters and programs can be used just by replacing the CPU and changing the type of the operating system.



Speedy startup! Effortless debugging!

Easy parameter setting

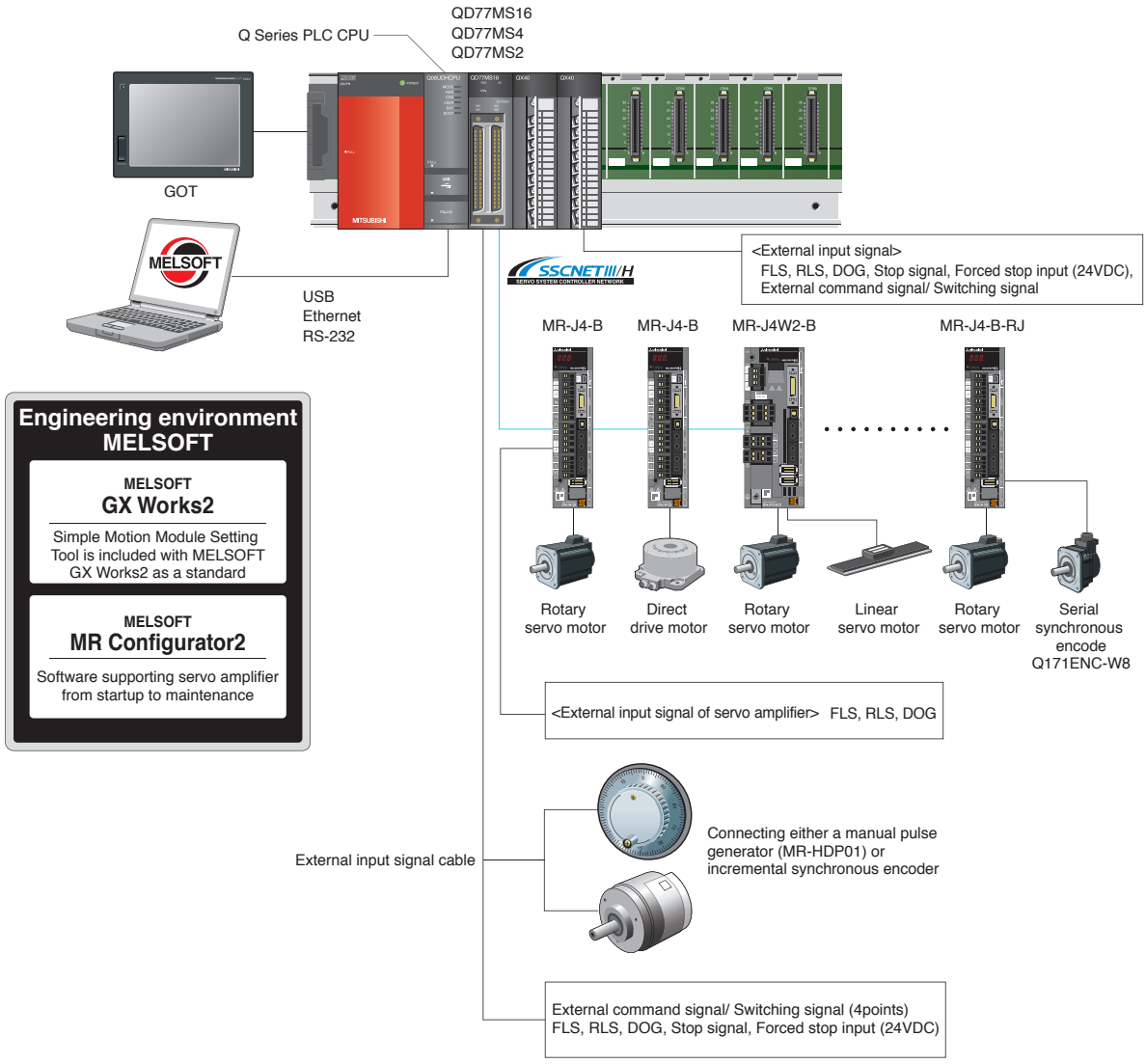
The Q170MSCPU features both high functionality and "Ease of Use".
The various advanced functions are utilized for designing and debugging efficiency, downtime reduction, and data protection.



System Configuration

QD77MS

The maximum number of control axes: up to 16 axes (QD77MS16), up to 4 axes (QD77MS4), up to 2 axes (QD77MS2).
QD75MH project can be diverted to QD77MS.

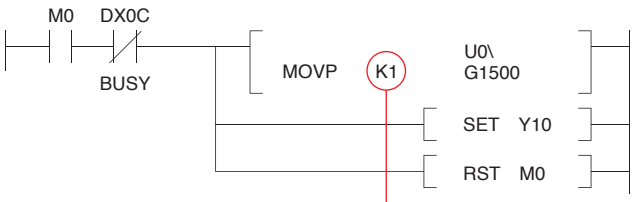


Control flow

QD77MS
QD77GF

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

PLC CPU



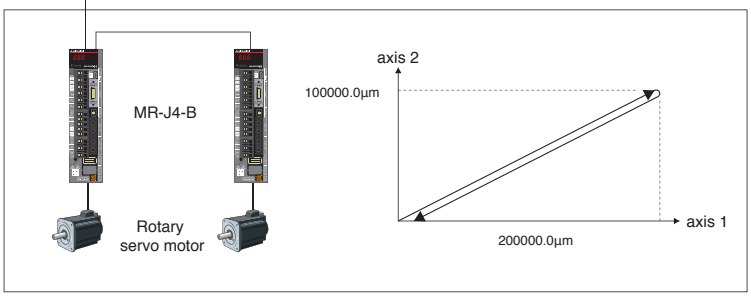
Simple Motion module

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

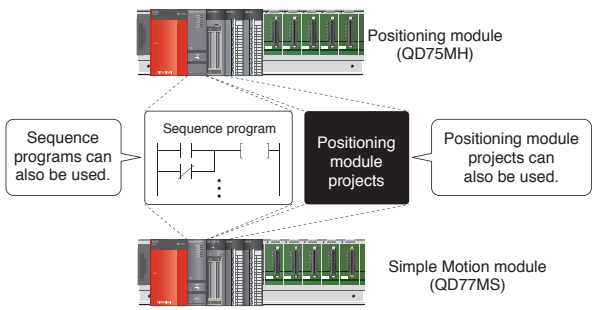
No.	Operation pattern	Control system	Axis to be interpolated	Acceleration time No.	Deceleration time No.	Positioning address	Arc address	Command speed
1						100000.0 μm	0.0 μm	0.00 mm/min
	<Positioning Comment>							
2						-100000.0 μm	0.0 μm	0.00 mm/min
	<Positioning Comment>							



High compatibility with the previous models

QD77MS

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



High functionality with our cutting-edge technology

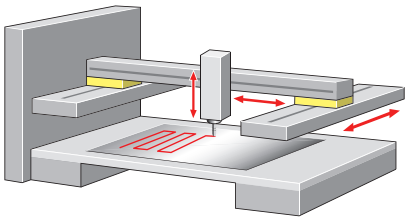
Positioning control

QD77MS
QD77GF

- Various machines can be extensively controlled by various control methods such as linear interpolation control, 2-axis circular interpolation control, fixed-pitch 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.

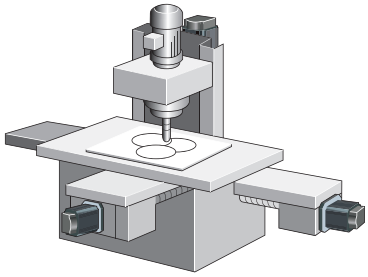
Sealing

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



X-Y table

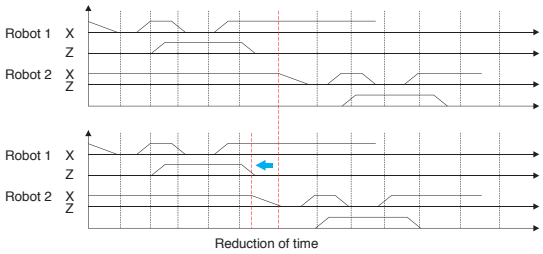
- 2-axis linear interpolation
- 2-axis circular interpolation
- 3-axis linear interpolation
- Continuous trajectory control

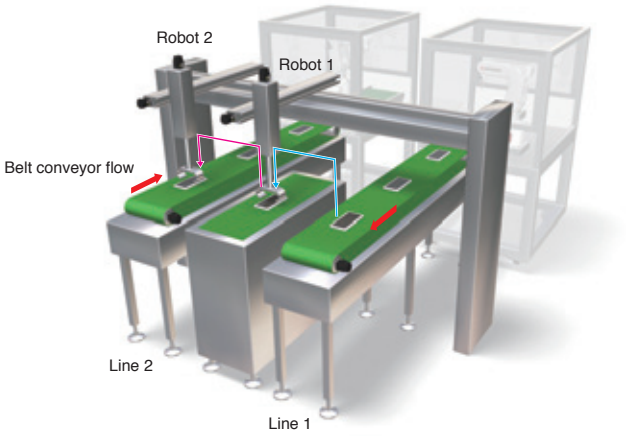


Synchronous/Cam control NEW

QD77MS
QD77GF

The workpiece handled from line 1 is transferred to the relay point by robot 1. After robot 1 returns to its original position, the workpiece at the relay point is moved to line 2 by robot 2. Robot 1 and robot 2 need to check 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.



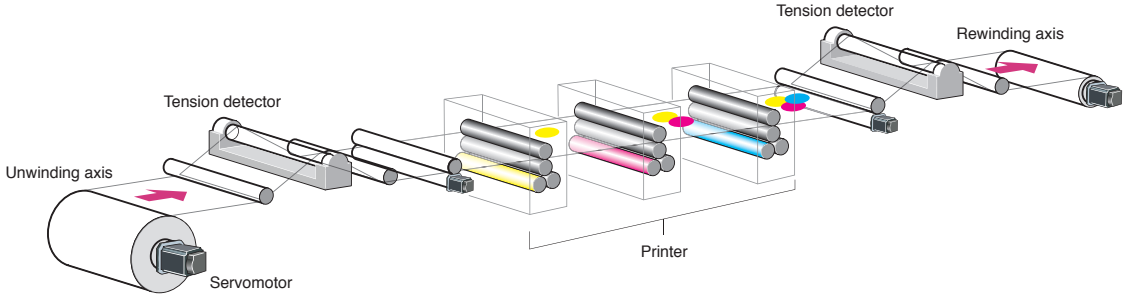


Speed-torque control (Tightening & Press-fit control) NEW

Tightening & Press-fit control Patent pending

QD77MS

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

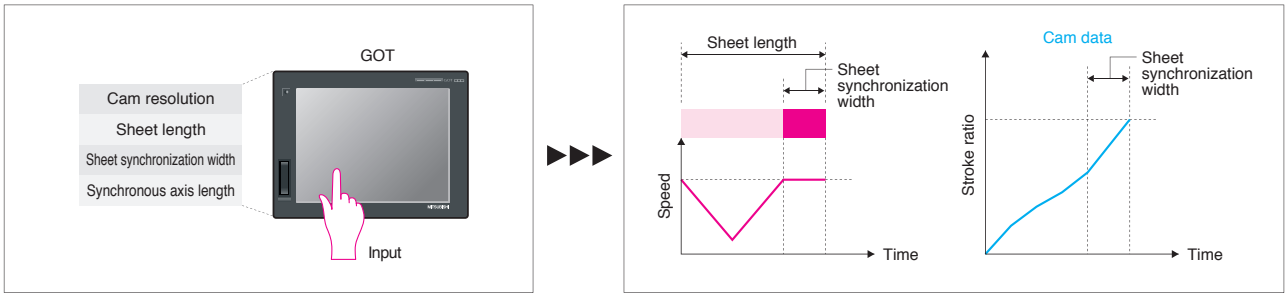


Simple cam profile creation

Cam auto-generation function NEW

QD77MS
QD77GF

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

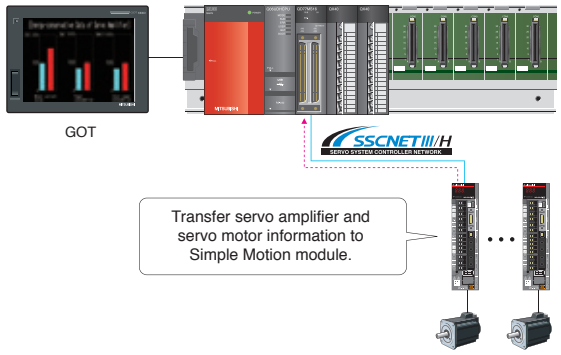
Optional data monitor function NEW

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.

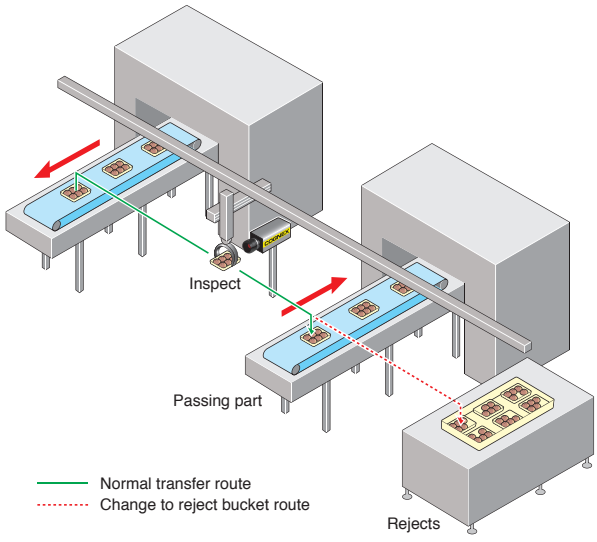


Flexible to change the target position

Target position change function

QD77MS
QD77GF

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.



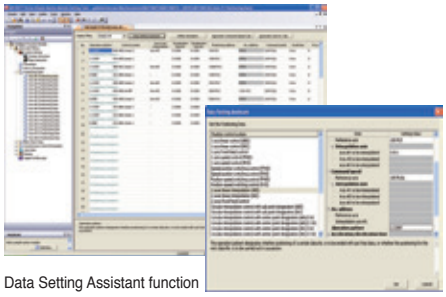
Simple Operation for Ease of Use

Positioning data

QD77MS
QD77GF

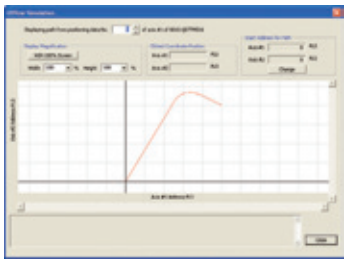
Positioning control is executed with the data table method.

- 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



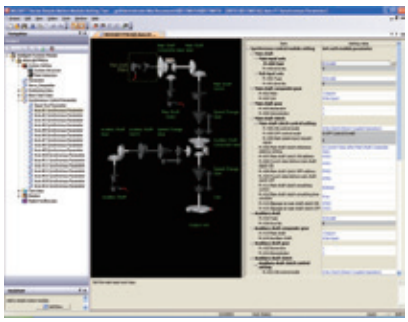
Offline Simulation

Synchronous control data

QD77MS
QD77GF

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

- The Synchronous control is easily performed with parameter settings. There is no need to create complicated programs.
- You can select a start or stop of Synchronous control for individual axis. The synchronous control axis and positioning control axis can exist together in a program.
- The movement amount of main shaft is transmitted to the output axis via the clutch.



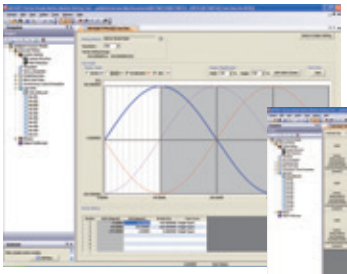
Synchronous Control Parameter Settings

Cam control data

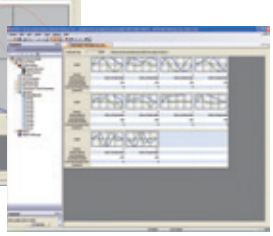
QD77MS
QD77GF

Cam data is easily created for various patterns.

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



Cam Data

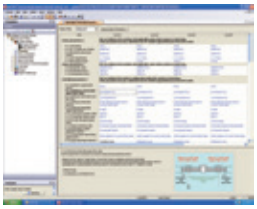


Cam Data List

Parameter settings

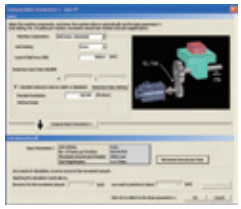
QD77MS
QD77GF

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



Parameter Settings

System Structure Setting



Electronic Gear Settings

Installation

QD77MS
QD77GF

Digital oscilloscope function

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

Digital Oscilloscope

Monitor and test functions

- System installation and operation check are easily completed 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.

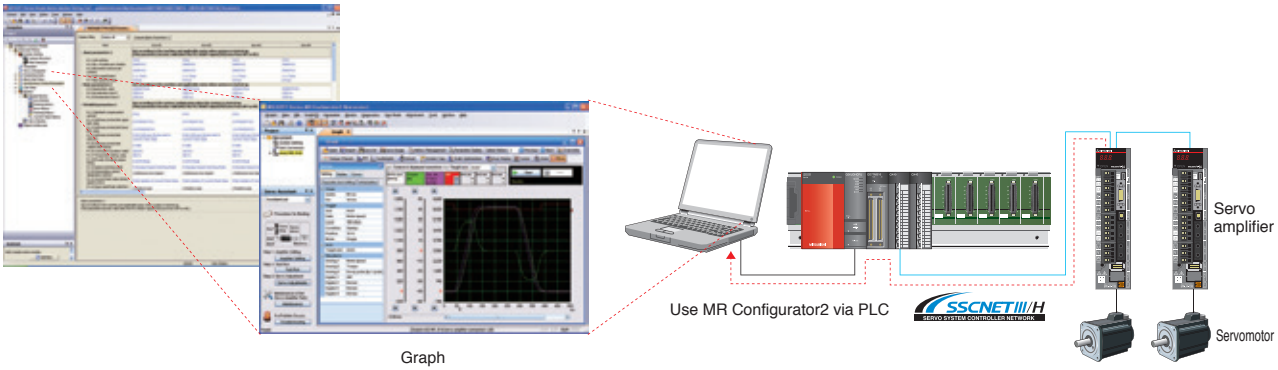
Axis Monitor

Positioning Test

Adjustment of servo amplifier parameters

QD77MS
QD77GF

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.

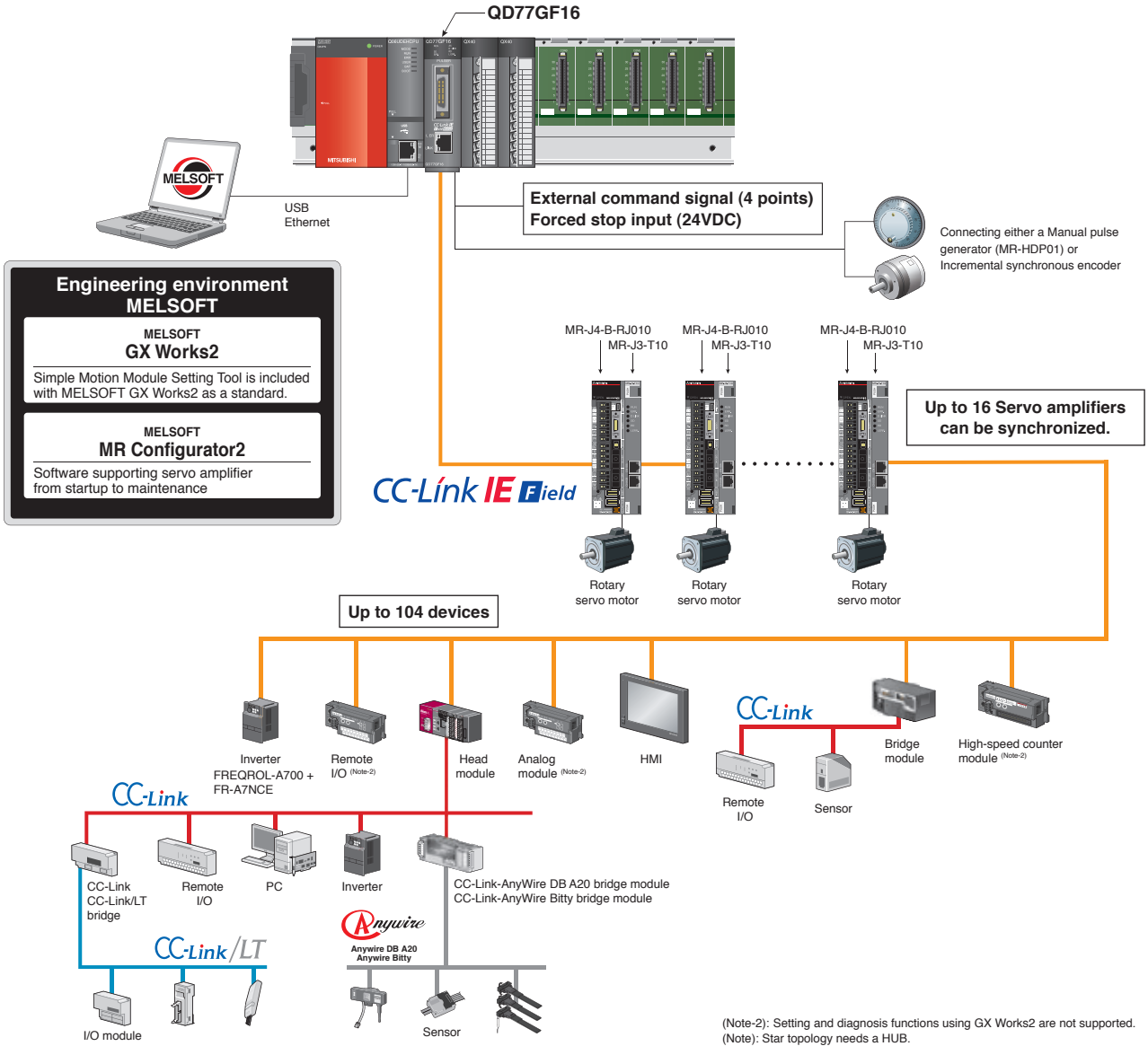


Graph

System configuration

QD77GF

●Starting from the sequence program, positioning/synchronous/cam control are easily performed with simple parameter settings.
●QD77GF16 can be used as the master station of CC-Link IE Field Network. (equivalent to QJ71GF11-T2) (Note-1)
●Within one network, QD77GF16 can communicate with servo amplifiers and field devices (Remote I/O, Sensor, etc.).
(Note-1): QD77GF can be used only as a master station. Line and star topologies are available. Up to 104 slave devices can be connected in one network.



(Note-2): Setting and diagnosis functions using GX Works2 are not supported.
(Note): Star topology needs a HUB.

highly accurate synchronous operation for Motion control | QD77GF16

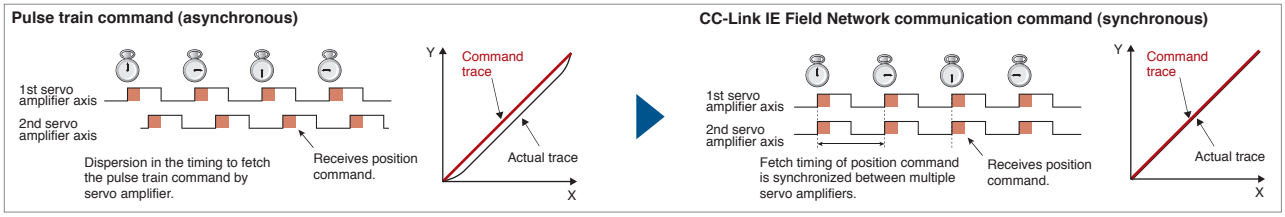
CC-Link IE Field Motion

High-response system achieved with CC-Link IE Field Network

QD77GF

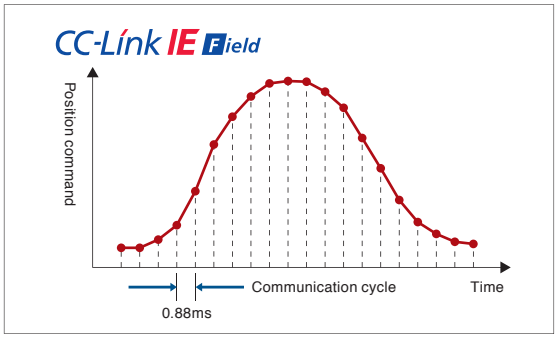
Deterministic and synchronized communication

Synchronous control and interpolation functions are achieved with the synchronized communication of CC-Link IE Field Network, being applied to machines which need synchronous control such as food machineries and processing machines.



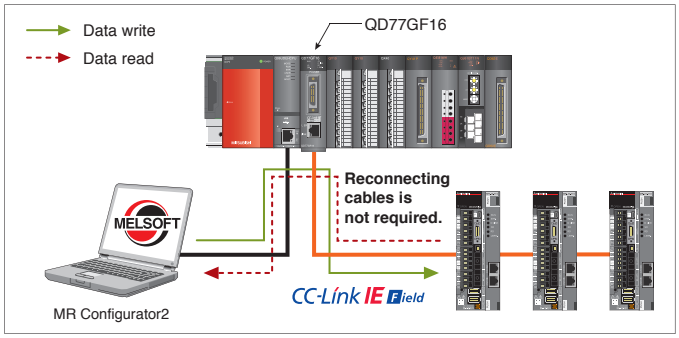
Faster cycle times

Smooth control of machine is possible using high-speed communication with cycle times of 0.88 ms.



Central control with network

Large amounts of servo data are exchanged in real-time between the controller and the servo amplifier. Using MR Configurator2 on a personal computer that is connected to the Simple Motion module QD77GF helps consolidate information such as parameter settings and monitoring for the multiple servo amplifiers.

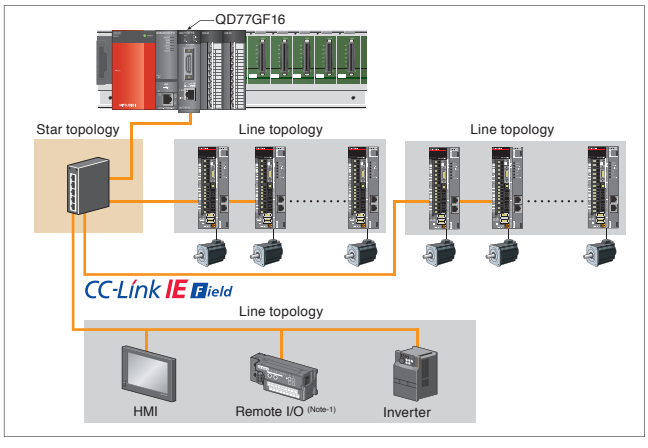


Flexible network topology

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

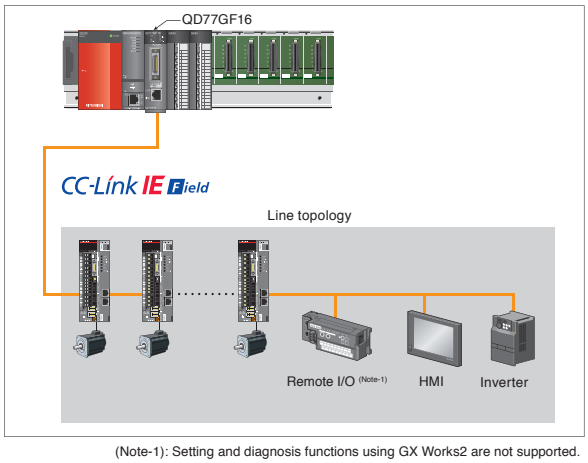
Line/star mixed topologies

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



Line topology

The simple Motion modules (Master station) can be connected to slave devices without using a HUB, which reduces cost.



(Note-1): Setting and diagnosis functions using GX Works2 are not supported.

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.

* MR-J4-B-RJ010 servo amplifiers are compatible only with rotary servo motors.

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

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

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

NEW

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

SERVO MOTOR

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

Rotary servo motor

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

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

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

NEW

Medium/large capacity, low inertia
HG-JR series
Capacity: 0.5 to 22 kW

NEW

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

NEW

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

Linear servo motor

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

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

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

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

Direct drive motor

TM-RFM series
Rating: 2 to 240 N•m

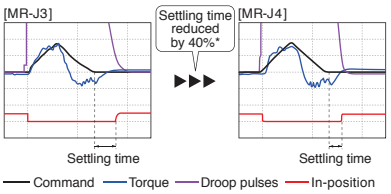
Industry-leading level of servo amplifier basic performance

Industry-leading levels

Our original servo control architecture is evolved from the conventional two-degrees-of-freedom model adaptive control and applied to the dedicated execution engine. **Speed frequency response is increased to 2.5 kHz, 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)**, enabling high-speed and high-accuracy operation.
The performance of the high-end machine is utilized to the fullest.

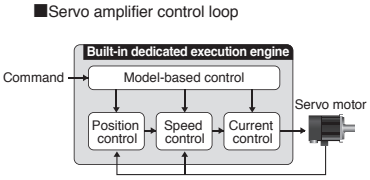
* Based on Mitsubishi Electric research as of May 2013.

[Settling time comparison with the prior model]



* The result is based on our evaluation condition.

[Dedicated execution engine]

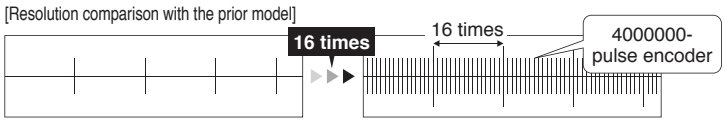


Improving machine performance with high-performance motors

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]



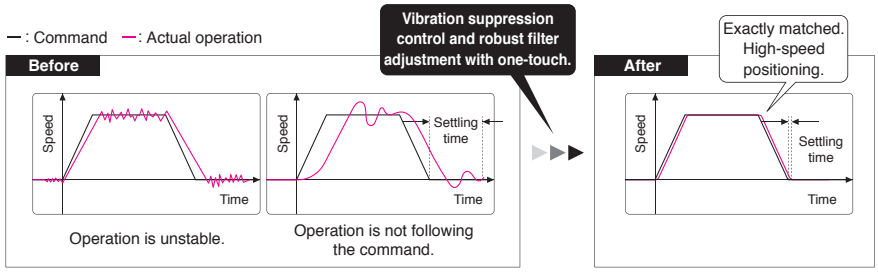
MR-J3 series 18 bits = 262,144 pulses/rev **MR-J4 series 22 bits = 4,194,304 pulses/rev**

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.

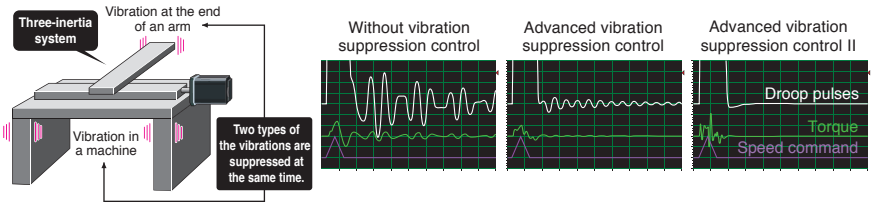
* The advanced vibration suppression control II automatically adjusts one frequency.



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 on MR Configurator2. This function is effective in suppressing vibration at the end of an arm and in reducing residual vibration in a machine.



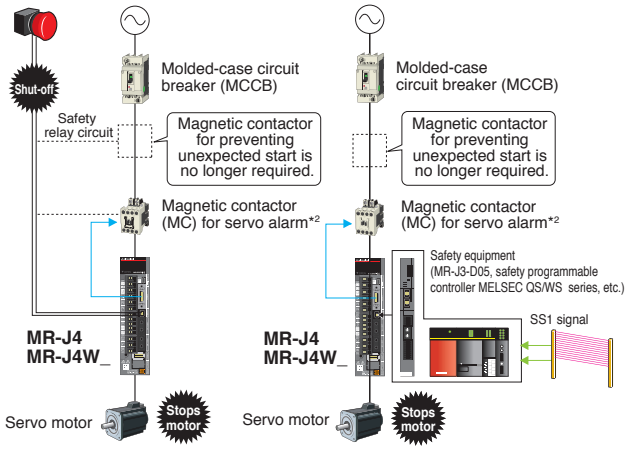
Functions according to IEC/EN 61800-5-2

MELSERVO-J4 series servo amplifiers have integrated STO (Safe torque off) and SS1[*1] (Safe stop 1) functions as standard. 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, safety programmable controller MELSEC QS/WS series, etc.) or Motion controller safety signal module (Q173DSXY) is required.
*2. STO is not the electrical safety protection function but the function to turn off the output torque by shutting off the power supply inside the servo amplifier. For MR-J4 series servo amplifier, magnetic contactors are not required to meet the STO requirements. However, install a magnetic contactor to prevent the short circuit of servo amplifier or electric shock.

[Shut-off by STO function] [Shut-off by STO and SS1 functions]



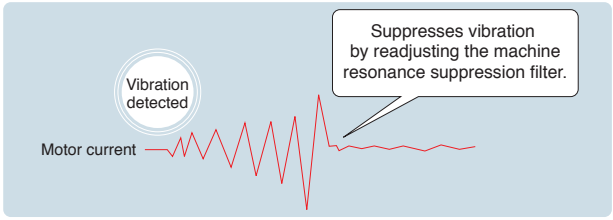
Tough drive function

Enhanced functions

Detect changes in the operating environment and adjust the servo control automatically.

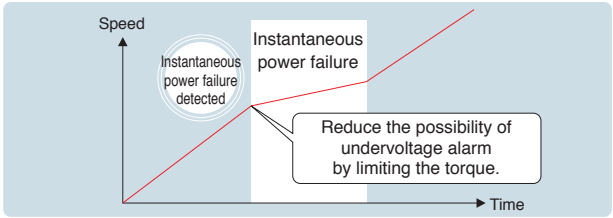
Vibration tough drive

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



Instantaneous power failure tough drive

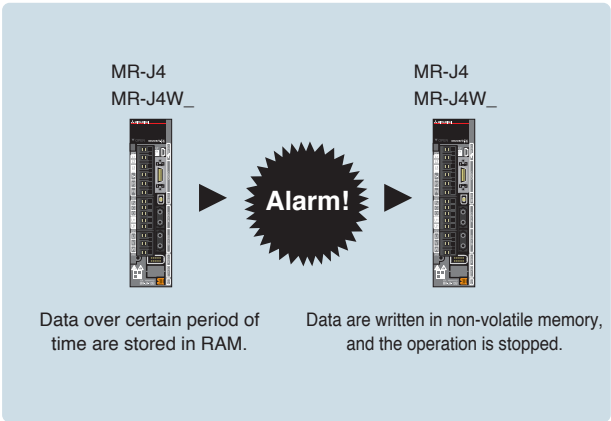
The possibility of undervoltage alarm is reduced by limiting the torque when instantaneous power failure is detected in the main circuit power supply.



Large capacity drive recorder

Patent pending Enhanced functions

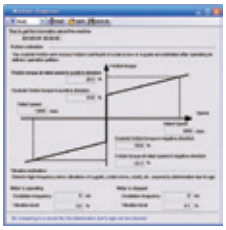
- Servo data such as motor current and position command before and after the alarm occurrence are stored in non-volatile memory of servo amplifier. The data read on MR Configurator2 during restoration are used for cause analysis.
- Check the waveform of 16 alarms in the alarm history ((analog 16 bits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



Machine diagnosis function

Patent pending NEW

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


Machine diagnosis window

Servo setup software

MELSOFT MR Configurator2

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

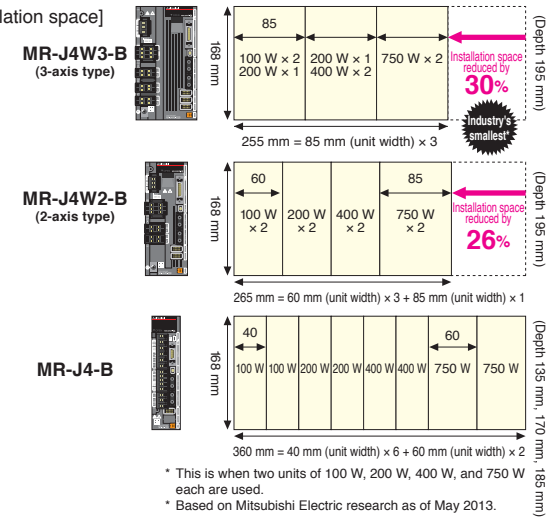

Graph window

The Environment

Space-saving with industry's smallest* 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]

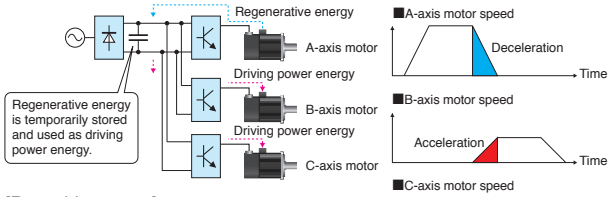


* This is when two units of 100 W, 200 W, 400 W, and 750 W each are used.
* Based on Mitsubishi Electric research as of May 2013.

Supporting energy-conservative machine using regenerative energy

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



[Reusable energy]

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

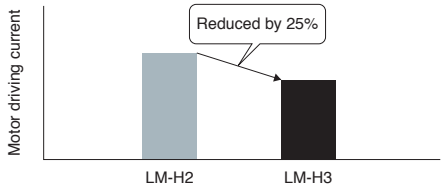
Energy-conservation achieved by LM-H3 linear servo motor series

NEW

Reduced motor driving power

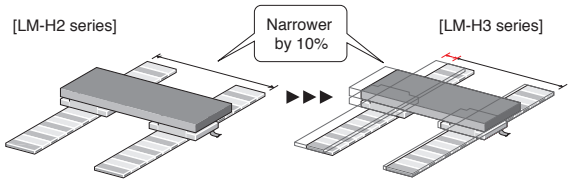
LM-H3 has achieved a reduction of 25% in motor driving current due to a new magnetic design with optimized magnet form, contributing to power conservation for machines. The motor coil is lighter as compared to the prior model, which also contributes to saving energy for driving the moving part.

* For 720 N rated linear servo motor.



Space saving

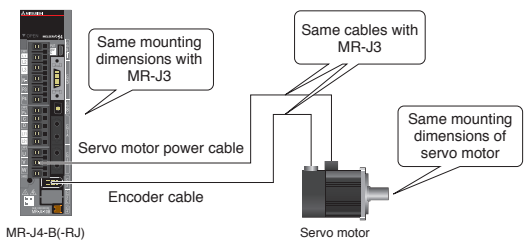
For LM-H3, widths of the motor coil and the magnet are reduced by 10% from the prior model. Increased thrust to current ratio results in using the servo amplifier in smaller capacity, contributing to more compact machine (the reduction of materials).



Heritage

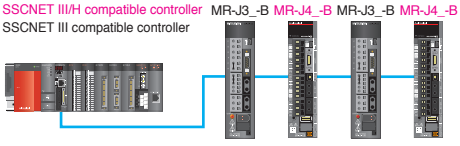
●MR-J4-B(-RJ) has the same mounting dimensions*1 with MR-J3-B. HG rotary servo motor series has the same mounting dimensions and uses the same cables for the power, the encoder*2, and the electromagnetic brake as HF series or HC-RP/HC-UP series.

*1. Mounting dimensions are smaller for 200 V 5 kW, 400 V 3.5 kW, 200 V/400 V 11 kW, and 200 V/400 V 15 kW servo amplifiers.
*2. 200 V/400 V 11 kW and 15 kW of HG-JR series use a different encoder cable from HF-JP series.



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

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



●Parameters are automatically converted by changing MR-J3-B to MR-J4-B with MELSOFT MT Works2. (Available in version 1.42U or later.)

Q17nDSCPU Motion controller specifications

Q17nDSCPU

Motion control

Item		Specifications	
		Q173DSCPU	Q172DSCPU
Number of control axes		Up to 32 axes (Up to 16 axes/system×2)	Up to 16 axes NEW
Operation cycle (Operation cycle setting)		0.22 ms, 0.44 ms, 0.88 ms, 1.77 ms, 3.55 ms, 7.11 ms	
Interpolation function		Linear interpolation (Up to 4 axes), Circular interpolation (2 axes), Helical interpolation (3 axes)	
Control modes		PTP (Point to Point) control, Speed control, Speed-position switching control, Fixed-pitch feed control, Constant speed control, Position follow-up control, Speed control with fixed position stop, Speed switching control, High-speed oscillation control, Synchronous/Cam 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)	
Servo program capacity		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, Dogless home position signal reference type (Home position return re-try function provided, home position shift function provided)	
JOG operation function		Provided	
Manual pulse generator operation function		Possible to connect 3 modules (Q173DPX use) 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	
Multiple CPU synchronous control		Up to 96 axes (Q173DSCPU × 3 use) Upgraded	
Synchronous encoder operation function		Possible to connect 12 modules (SV22 use)	
M-code function		M-code output function provided, M-code completion wait function provided	
Limit switch output function		Number of output points: 64 points (Advanced synchronous control method) NEW 32 points (Virtual mode switching method) Watch data: Motion control data, Word device	
ROM operation function		Provided	
External input signal		Q172DLX (FLS, RLS, STOP, DOG) , External input signals (FLS, RLS, DOG) of servo amplifier, Bit device Upgraded	
High-speed reading function		8 points (Via Input module), Via tracking of Q172DEX/Q173DPX, 4 points (Via Motion CPU Internal I/F)	
Mark detection function		Continuous Detection mode, Specified Number of Detections mode, Ring Buffer mode NEW	
	Mark detection signal	4 points (Via Motion CPU 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		Up to 6 data/axis (MR-J4-B with SSCNET III/H use) Upgraded	
Forced stop		Motion controller forced stop (EMI terminal, System setting), Forced stop terminal of servo amplifier	
Number of input/output points		Total 256 points (Motion CPU Internal I/F (4 points) + I/O module)	
Clock function		Provided	
Security function		Password registration, Password for every Motion SFC program, 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 modules		Q172DLX 4 modules usable Q172DEX 6 modules usable (Note-2) Q173DPX 4 modules usable (Note-3)	Q172DLX 2 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): This is the case when using an incremental synchronous encoder (SV22 used).
When using a manual pulse generator, only one module are allowed to use.
(Note-4): 8CH word data and 8CH bit data can be displayed in real time.
(Note-5): The Q173DPX and internal interface can not be used simultaneously.

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 levels	
	Descriptive expression	Operation control program		Calculation expression, Bit conditional expression and branches, Repetition process Upgraded IF ～ ELSE ～ IEND, SELECT ～ CASE ～ SEND, FOR ～ NEXT	
		Transition program		Calculation expression, Bit conditional expression, Comparison conditional expression	
Execute specification	Number of multi executed programs			Up to 256	
	Number of multi active steps			Up to 256 steps per all programs	
	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 specifications NEW

Q17nDSCPU

Synchronous control

Item		Number of settable axes	
		Q173DSCPU	Q172DSCPU
Input axis	Servo input axis	32 axes/module	16 axes/module
	Command generation axis	32 axes/module	16 axes/module
	Synchronous encoder axis	12 axes/module	
Composite main shaft gear		1/output axis	
Main shaft main input axis		1/output axis	
Main shaft sub input axis		1/output axis	
Main shaft gear		1/output axis	
Main shaft clutch		1/output axis	
Auxiliary shaft		1/output axis	
Auxiliary shaft gear		1/output axis	
Auxiliary shaft clutch		1/output axis	
Auxiliary shaft composite gear		1/output axis	
Speed change gear		2/output axis	
Output axis		32 axes/module	16 axes/module

Cam

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

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		Specifications	
		Q173DSCPU	Q172DSCPU
Number of control axes		Up to 32 axes	Up to 16 axes
Servo amplifier connection system		SSCNET III/H (2 systems)	SSCNET III/H (1 system)
Maximum overall cable distance [m(ft.)]		SSCNET III/H : 1600 (5249.34), SSCNET III : 800 (2624.67)	
Overall cable distance [m(ft.)]		SSCNET III/H : 100 (328.08), 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 [I_{IN}]	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 less/0.9mA or less	
	Input resistance	Approx. 5.6kΩ	
	Response time	1ms or less	
	Recommended wire size	AWG18 to AWG22	
Forced stop input signal	Number of input points	1 point	
	Input method	Sink/ Source	
	Rated input voltage	2.4mA	
	Rated input current [I_{IN}]	Photocoupler	
	Operating voltage range	20.4 V DC to 26.4 V DC (+10/-15 %, ripple ratio 5 % or less)	
	ON voltage/current	17.5 V DC or more/ 2.0 m A or more	
	OFF voltage/current	1.8 V DC or less/ 0.18m A or less	
	Input resistance	Approximately 10kΩ	
	Response time	1ms or less	
	Recommended wire size	AWG22	
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)	
Extension base unit		Up to 7	
5VDC internal current consumption [A]		1.75	1.44
Mass [kg]		0.38	
Exterior dimensions [mm(inch)]		120.5 (4.74)(H) × 27.4 (1.08)(W) × 120.3 (4.74)(D)	

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

Q17nDSCPU

Safety signal module Q173DSXY

Item		Specifications
		Q173DSXY
Input signals	Number of input points	32 points × 2 systems (PLC CPU control 32 points + Motion CPU control 32 points, Safety input 20 points × 2 systems, Feedback inputs 12 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 (PLC CPU control 12 points + Motion CPU control 12 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)	Functions according to IEC61800-5-2	STO, SS1, SS2, SOS, SLS, SBC, SSM (IEC61800-5-2 : 2007) and Safety I/Os
	Safety performance	EN ISO 13849-1 Category3 PL d, EN 61800-5-2/IEC 61508 Part 1-7 : 1998/2000, EN 62061 SIL CL 2
	Mean time to dangerous failure (MTTFd)	169 years or more (theoretical value)
	Diagnostic 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 (Max. number of input points: 60 points × 2 systems; Max. number of output points: 36 points × 2 systems)
5VDC internal current consumption		0.20A (TYP. all points ON)
Mass [kg]		0.15
Exterior dimensions [mm(inch)]		98 (3.86)(H) × 27.4 (1.08)(W) × 90 (3.54)(D)

Note) Install Q173DSXY to the main base unit. Do not install to the extension base unit.
(Note-1): These functions are achieved 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 [m(ft.)]	50(164.04)
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

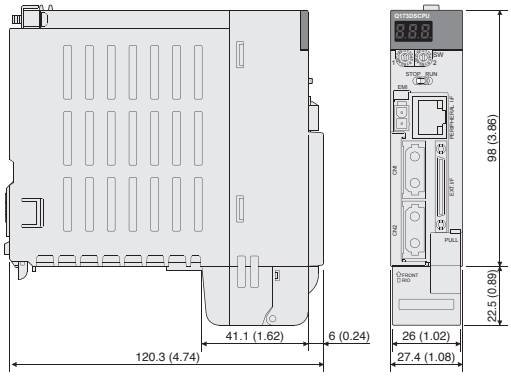
Item			Specifications
Manual pulse generator/ incremental synchronous encoder input	Number of modules		3 per module
	Voltage-output/ Open-collector type	High-voltage	3.0 to 5.25 VDC
		Low-voltage	0 to 1.0 VDC
	Differential-output type	High-voltage	2.0 to 5.25 VDC
		Low-voltage	0 to 0.8 VDC
	Input frequency		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 [m(ft.)]		Voltage-output type: 10(32.79) Differential-output type: 30(98.36)
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

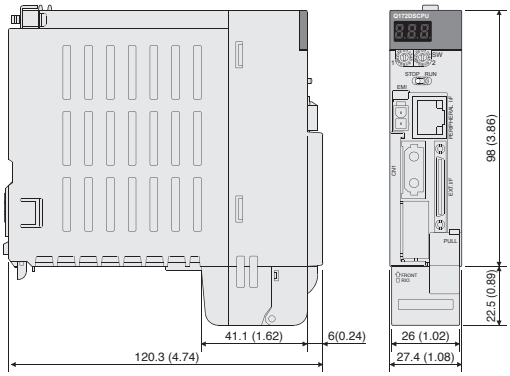
Q17nDSCPU

Motion CPU module Q173DSCPU



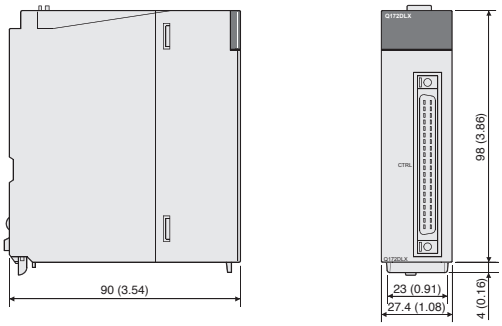
[Unit : mm (inch)]

Motion CPU module Q172DSCPU



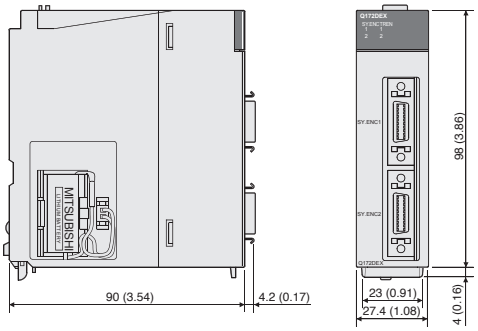
[Unit : mm (inch)]

Servo external signals interface module Q172DLX



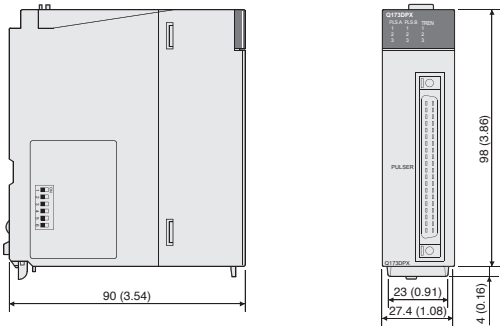
[Unit : mm (inch)]

Synchronous encoder interface module Q172DEX



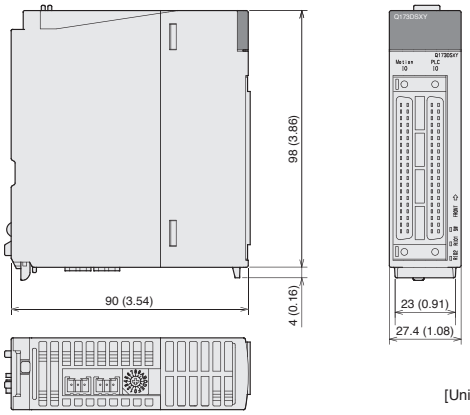
[Unit : mm (inch)]

Manual pulse generator interface module Q173DPX



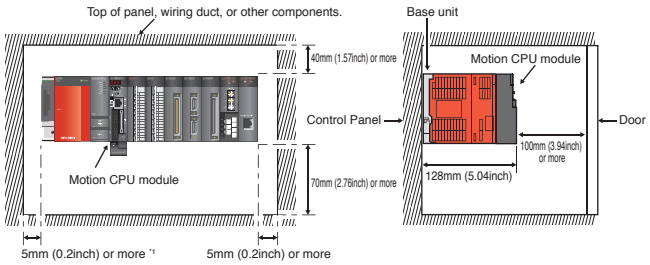
[Unit : mm (inch)]

Safety signal module Q173DSXY



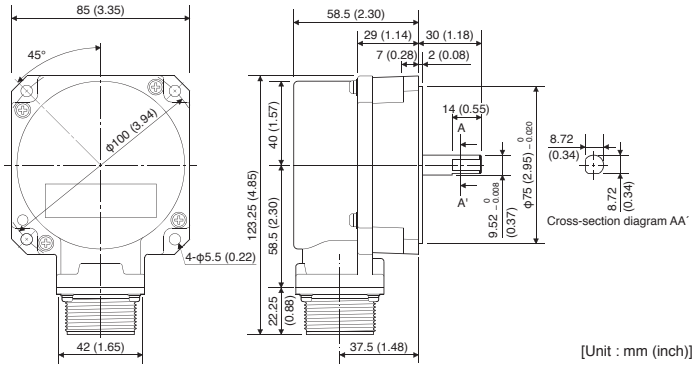
[Unit : mm (inch)]

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.

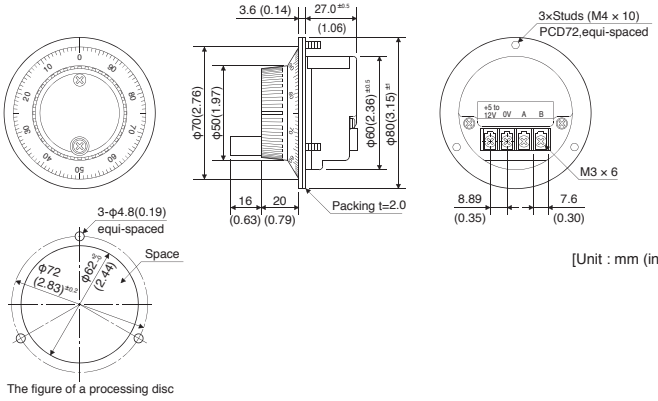
Serial absolute synchronous encoder Q171ENC-W8



[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

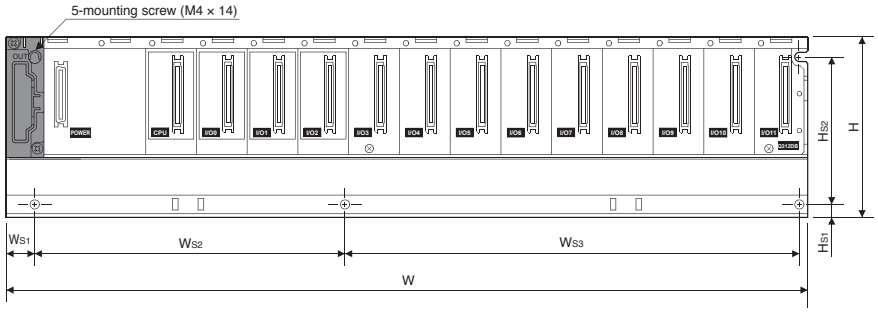


[Unit : mm (inch)]

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 5VDC 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)]

Q17nDSCPU

Q17nDSCPU Motion controller configuration equipment

<Motion dedicated equipment>

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, KC
	Q172DSCPU	Up to 16 axes control, Operation cycle 0.22 ms or more (Attachment: battery (Q6BAT))			CE, UL, KC
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 production (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 inputs for 8 axes (FLS, RLS, STOP, DOG × 8)			CE, UL, KC
Synchronous encoder interface module	Q172DEX	Serial absolute synchronous encoder Q171ENC-W8 interface × 2, Tracking input 2 points, with A6BAT			CE, UL, KC
Manual pulse generator interface module	Q173DPX	Manual pulse generator MR-HDP01/Incremental synchronous encoder interface × 3, Tracking input 3 points			CE, UL, KC
Safety signal module	Q173DSXY	Input: 20 points (2 systems), Output: 12 points (2 systems), Attachment RIO cable (Q173DSXYCBL01M)			CE, UL, KC
Serial absolute synchronous encoder	Q171ENC-W8	Resolution: 4,194,304PLS/rev, Permitted speed: 3600r/min			CE, UL, KC
Serial absolute synchronous encoder cable	Q170ENCCBL2M	Serial absolute synchronous encoder Q171ENC-W8⇔Q172DEX		2m (6.56ft.)	—
	Q170ENCCBL5M			5m (16.40ft.)	—
	Q170ENCCBL10M			10m (32.81ft.)	—
	Q170ENCCBL20M			20m (65.62ft.)	—
	Q170ENCCBL30M			30m (98.43ft.)	—
	Q170ENCCBL50M			50m (164.04ft.)	—
Internal I/F connector set	Q170DSIOCON	Incremental synchronous encoder/Mark detection signal interface connector, With ferrite core (not included with the Motion CPU)			—
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 equipment>

Part name	Model name
PLC CPU module	Q03UDCPU, Q03UDECPU, Q04UDHCPU, Q04UDEHCPU, Q06UDHCPU, Q06UDEHCPU, Q10UDHCPU, Q10UDEHCPU, Q13UDHCPU, Q13UDEHCPU, Q20UDHCPU, Q20UDEHCPU, Q26UDHCPU, Q26UDEHCPU, Q50UDEHCPU, Q100UDEHCPU, Q03UDVCPU, Q04UDVCPU, Q06UDVCPU, Q13UDVCPU, Q26UDVCPU
C Controller CPU module	Q12DCCPU-V, Q24DHCCPU-V
Main base unit	Q35DB, Q38DB, Q312DB
Extension base unit	Q63B, Q65B, Q68B, Q612B, Q52B, Q55B
Extension cable	QC05B, QC06B, QC12B, QC30B, QC50B, QC100B
Power supply module (Note-1)	Q61P, Q62P, Q63P, Q64PN
Input/output module	Input module, Output module, Input/Output composite module
Analogue module	Q68ADV, Q62AD-DGH, Q66AD-DG, Q68ADI, Q64AD, Q64AD-GH, Q68AD-G, Q68DAVN, Q68DAIN, Q62DAN, Q62DA-FG, Q64DAN, Q66DA-G
Interrupt module	QI60

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

Q17nDSCPU Motion controller 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 Q17nDSCPU/Q170MSCPU	SW8DNC-SV1322QJLSET	SW8DNC-SV13QJ, SW8DNC-SV13QL, SW8DNC-SV13QN, SW8DNC-SV22QJ, SW8DNC-SV22QL, SW8DNC-SV22QN

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

<Engineering environment MELSOFT series>

Product	Model name	Description	Application version
MELSOFT MT Works2	SW1DNC-MTW2-E	Parameter setting and program creation of Motion CPU	1.39R or later
	SW1DNC-MTW2-EAZ	Additional license product (1 license)	—
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 Software [MELSOFT MT Works2]
- 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

Q170MSCPU Motion controller specifications

Q170MSCPU

Motion control

Item		Specifications	
		Q170MSCPU-S1	Q170MSCPU
Number of control axes		Up to 16 axes	
Operation cycle (Operation cycle setting)		0.22 ms, 0.44 ms, 0.88 ms, 1.77 ms, 3.55 ms, 7.11 ms	
Interpolation function		Linear interpolation (Up to 4 axes), Circular interpolation (2 axes), Helical interpolation (3 axes)	
Control modes		PTP (Point to Point) control, Speed control, Speed-position switching control, Fixed-pitch feed control, Constant speed control, Position follow-up control, Speed control with fixed position stop, Speed switching control, High-speed oscillation control, 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)	
Servo program capacity		16k steps	
Number of positioning points		3200 points (Positioning data can be set indirectly)	
Peripheral interface		PERIPHERAL I/F (controlled by Motion CPU area), USB/RS-232 (controlled by PLC CPU area)	
Home position return function		Proximity dog type (2 types), Count type (3 types), Data set type (2 types), Dog cradle type, Stopper type (2 types), Limit switch combined type, Scale home position signal detection type, Dogless home position signal reference type (Home position return re-try function provided, home position shift function provided)	
JOG operation function		Provided	
Manual pulse generator operation function		Possible to connect 3 modules (Q173DPX use) Possible to connect 1 module (Motion controller internal I/F use) (Note-4)	
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) (Q173DPX + Motion controller internal interface + servo amplifier)	
M-code function		M-code output function provided, M-code completion wait function provided	
Limit switch output function		Number of output points: 64 points (Advanced synchronous control method) NEW 32 points (Virtual mode switching method) Watch data: Motion control data, Word device	
ROM operation function		Provided	
External input signal		Q172DLX (FLS, RLS, STOP, DOG), External input signals (FLS, RLS, DOG) of servo amplifier, Bit device Upgraded	
High-speed reading function		8 points (Via Input module), Via tracking of Q173DPX, 4 points (Via Motion controller Internal I/F)	
Mark detection function		Continuous Detection mode, Specified Number of Detections mode, Ring Buffer mode NEW	
	Mark detection signal	4 points (Via Motion controller Internal I/F), Bit device, Q172DLX (DOG)	
	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		Up to 6 data/axis (MR-J4-B with SSCNET III/H use) Upgraded	
Forced stop		Motion controller forced stop (EMI terminal, System setting), Forced stop terminal of servo amplifier	
Number of input/output points		Total 256 points (Motion controller Internal I/F (input: 4 points, output: 2 points) + I/O module)	
Clock function		Provided	
Security function		Password registration, Password for every Motion SFC program, 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-3) 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)		1 system	
Number of Motion modules		Q172DLX 2 modules usable Q173DPX 4 modules usable (Note-2)	

(Note-1): The SSCNETIII compatible servo amplifier can be used, but the SSCNET compatible servo amplifier cannot be used.
(Note-2): This is the case when using an incremental synchronous encoder (SV22 used). When using a manual pulse generator, only one module are allowed to use.
(Note-3): 8CH word data and 8CH bit data can be displayed in real time.
(Note-4): The Q173DPX and internal interface can not be used simultaneously.

Motion SFC performance

Item				Specifications	
				Q170MSCPU-S1	Q170MSCPU
Motion SFC program capacity	Code total (Motion SFC chart + Operation control +Transition)			652k bytes	
	Text total (Operation control + Transition)			668k bytes	
Motion SFC program	Number of Motion SFC programs			256 (No.0 to 255)	
	Motion SFC chart size/program			Up to 64k bytes (Included Motion SFC chart comments)	
	Number of Motion SFC steps/program			Up to 4094 steps	
	Number of selective branches/branch			255	
	Number of parallel branches/branch			255	
	Parallel branch nesting			Up to 4 levels	
Operation control program (F/FS) / Transition program (G)	Number of operation control programs			4096 with F (Once execution type) and FS (Scan execution type) combined (F/FS0 to F/FS4095)	
	Number of transition programs			4096 (G0 to G4095)	
	Code size/program			Up to approx. 64k bytes (32766 steps)	
	Number of blocks(line)/program			Up to 8192 blocks (In the case of 4 steps (min)/block)	
	Number of characters/block			Up to 128 (Comment included)	
	Number of operand/block			Up to 64 (Operand: Constants, Word devices, Bit devices)	
	( ) nesting/block			Up to 32 levels	
	Descriptive expression	Operation control program		Calculation expression, Bit conditional expression and branches, Repetition process Upgraded IF~ELSE~IEND, SELECT~CASE~SEND, FOR~NEXT	
		Transition program		Calculation expression, Bit conditional expression, Comparison conditional expression	
Execute specification	Number of multi executed programs			Up to 256	
	Number of multi active steps			Up to 256 steps per all programs	
	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 (Motion controller internal I/F (input: 4 points, output: 2 points) + I/O module)	
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 specifications NEW

Q170MSCPU

Synchronous control

Item		Number of settable axes	
		Q170MSCPU-S1	Q170MSCPU
Input axis	Servo input axis	16 axes/module	
	Command generation axis	16 axes/module	
	Synchronous encoder axis	16 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	

Cam

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

Mechanical system program (SV22)

Item			Specifications	
			Q170MSCPU-S1	Q170MSCPU
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	16	Total 28
		Synchronous encoder	12	
	Virtual axis	Virtual main shaft	16	Total 32
		Virtual auxiliary input axis	16	
	Transmission module	Gear (Note-1)	32	
		Clutch (Note-1)	32	
		Speed change gear (Note-1)	32	
		Differential gear (Note-1)	16	
		Differential gear (Connect to the virtual main shaft) (Note-2)	16	
	Output module	Roller	16	Total 16
		Ball screw	16	
		Rotary table	16	
		Cam	16	
Cam	Types		Up to 256	
	Resolution per cycle		256, 512, 1024, 2048	
	Memory capacity		132k bytes	
	Stroke resolution		32767	
	Control mode		Two-way cam, Feed cam	

(Note-1): Use only one module for one output module. (one gear, clutch, speed change gear or differential gear module for one output module).
(Note-2): The differential gears connected to the virtual main shaft can be used only one module per one main shaft.

Performance specification of Q170MSCPU PLC CPU control area

Item		Specifications	
		Q170MSCPU-S1	Q170MSCPU
PLC CPU		Q06UDHCPU or equivalent NEW	Q03UDCPU or equivalent
Control method		Stored program repeat operation	
I/O control mode		Refresh mode	
Sequence control language		Relay symbol language (ladder), Logic symbolic language (list), MELSAP3 (SFC), MELSAP-L, Structured text (ST)	
Processing speed (Sequence instruction)	LD instruction	9.5ns	20ns
	MOV instruction	19ns	40ns
	PC MIX value(instruction/μs)	60	28
	Floating point addition	0.057μs	0.12μs
Total number of instructions		858	
Operation (floating point operation) instruction		Yes	
Character string processing instruction		Yes	
PID instruction		Yes	
Special function instruction (Trigonometric function, square root, exponential operation, etc.)		Yes	
Constant scan		0.5 to 2000ms (setting available in units of 0.5ms)	
Program capacity		60k steps (240 kbytes)	30k steps (120 kbytes)
CPU shared memory	QCPU standard memory	8k bytes	
	Multiple CPU high speed transmission area	32k bytes	
Number of I/O device points [X/Y]		8192 points	
Number of I/O points [X/Y]		4096 points	
Internal relay [M]	Points by default (Changeable by parameter)	8192 points	
Latch relay [L]		8192 points	
Link relay [B]		8192 points	
Timer [T]		2048 points	
Retentive timer [ST]		0 points	
Counter [C]		1024 points	
Data register [D]		12288 points	
Link register [W]		8192 points	
Annunciator [F]		2048 points	
Edge relay [V]		2048 points	
Link special relay [SB]		2048 points	
Link special register [SW]		2048 points	
File register [R, ZR]		393216 points	98304 points
Step relay [S]		8192 points	
Index register/Standard device register [Z]		20 points	
Index register [Z] (32-bit modification specification of ZR indexing)		Up to 10 points (Z0 to Z18) (Index register [Z] is used in double words.)	
Pointer [P]		4096 points	
Interrupt pointer [I]		256 points	
Special relay [SM]		2048 points	
Special register [SD]		2048 points	
Function input [FX]		16 points	
Function output [FY]		16 points	
Function register [FD]		5 points	
Local device		Yes	
Device initial values		Yes	
Extension base unit		Up to 7 (up to 64 slots) Ver.UP	
PC type when program is made by GX Works2		Q06UDHCPU	Q03UDCPU

Q170MSCPU

Motion Controller Q170MSCPU / Q170MSCPU-S1

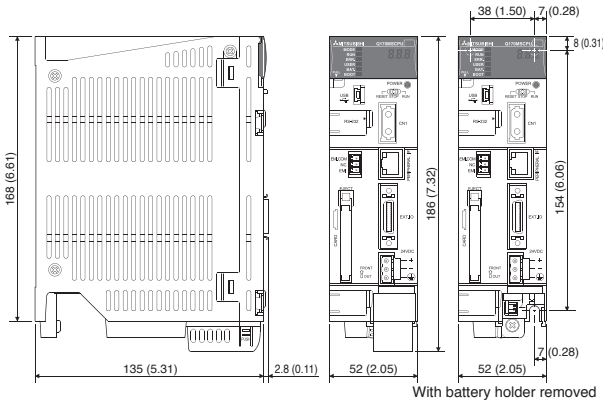
Item		Specifications	
		Q170MSCPU-S1	Q170MSCPU
Number of control axes		Up to 16 axes	
Servo amplifier connection system		SSCNET III/H (1 system)	
Maximum overall cable distance [m(ft.)]		SSCNET III/H : 1600 (5249.34), SSCNET III : 800 (2624.67)	
Overall cable distance [m(ft.)]		SSCNET III/H : 100 (328.08), SSCNET III : 50 (164.04)	
Peripheral I/F		PERIPHERAL I/F (controlled by Motion CPU area), USB/RS-232 (controlled by PLC CPU area)	
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 2 modules per CPU	
	Q173DPX	Up to 4 modules per CPU (Incremental synchronous encoder use in SV22)	
		Up to 1 module per CPU (Only manual pulse generator use)	
	Input/output module	Total : Up to 256 points per CPU	
	Analogue module		
	QI60	Up to 1 module per CPU	
Input signal	Number of input points	4 points	
	Input method	Positive Common/ Negative Common Shared Type (Photocoupler)	
	Rated input voltage	24VDC	
	Rated input current [I_{IN}]	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 less/0.9mA or less	
	Input resistance	Approx. 5.6kΩ	
	Response time	1ms or less	
	Recommended wire size	AWG18 to AWG22	
Forced stop input signal	Number of input points	1 point	
	Input method	Sink/ Source	
	Rated input voltage	2.4mA	
	Rated input current [I_{IN}]	Photocoupler	
	Operating voltage range	20.4 V DC to 26.4 V DC (+10/-15 %, ripple ratio 5 % or less)	
	ON voltage/current	17.5 V DC or more/ 2.0 mA or more	
	OFF voltage/current	1.8 V DC or less/ 0.18m A or less	
	Input resistance	Approximately 10kΩ	
	Response time	1ms or less	
	Recommended wire size	AWG16 to AWG22	
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)	
Memory card interface		Internal interface	
Extension base unit		Up to 7	
24VDC internal current consumption [A]		1.4	
Mass [kg]		0.8	
Exterior dimensions [mm(inch)]		186(7.32)(H) × 52(2.05)(W) × 135(5.31)(D)	

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

Exterior dimensions

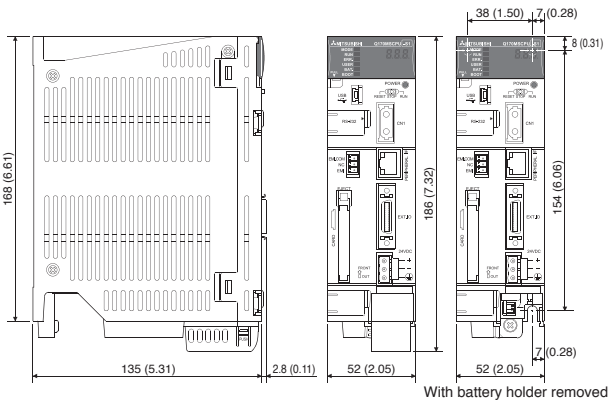
Q170MSCPU

Motion controller Q170MSCPU



[Unit: mm (inch)]

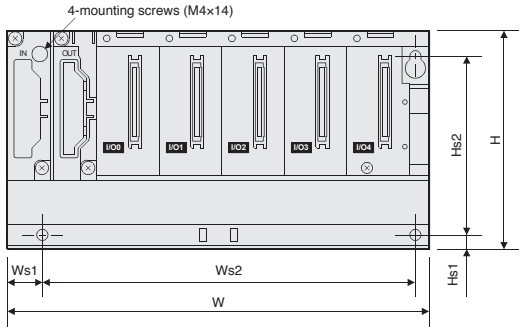
Motion controller Q170MSCPU-S1



[Unit: mm (inch)]

Extension base unit (Note-1)

The power supply unit is not required to use.



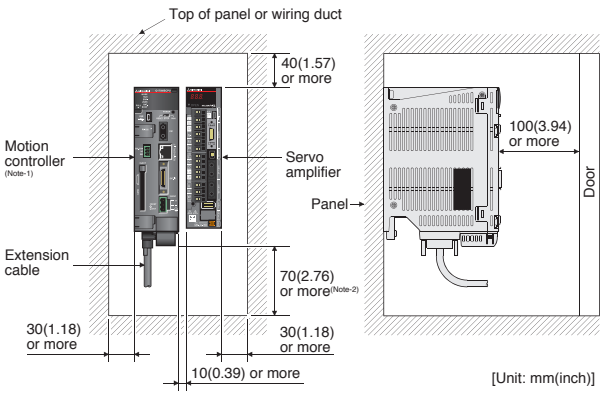
	Q52B	Q55B
W	106(4.17)	189(7.44)
Ws1	15.5(0.61)	
Ws2	83.5±0.3 (3.29±0.01)	167±0.3 (6.57±0.01)
H	98(3.86)	
Hs1	7(0.28)	
Hs2	80±0.3(3.15±0.01)	

[Unit: mm (inches)]

(Note-1): Refer to the exterior dimensions of the Q17nDSCPU for the base unit with the power supply unit.

Installation

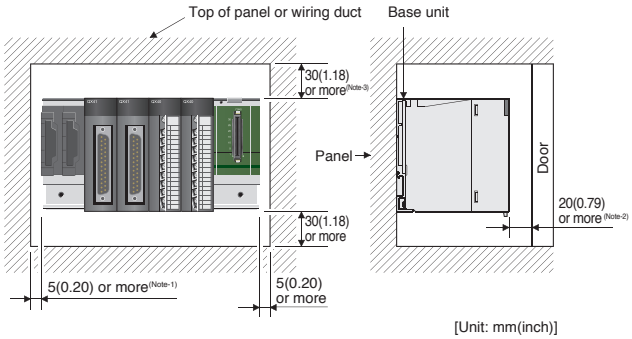
Motion CPU module



[Unit: mm(inch)]

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

Base unit



[Unit: mm(inch)]

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

Q170MSCPU

Q170MSCPU Motion controller configuration equipment

<Motion dedicated equipment>

Part name	Model name	Description			Standards
Stand-alone Motion controller	Q170MSCPU	Integrated with power supply, PLC CPU, and Motion CPU			CE, UL, KC
	Q170MSCPU-S1	Attachment: battery (Q6BAT), 24VDC power supply connector, emergency stop input cable connector (Note-1)			CE, UL, KC
SSCNET III cable (Note-3)	MR-J3BUS_M	Q170MSCPU(-S1)⇔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 inputs for 8 axes (FLS, RLS, STOP, DOG × 8)			CE, UL, KC
Manual pulse generator interface module	Q173DPX	Manual pulse generator MR-HDP01/ Incremental synchronous encoder interface ×3, Tracking input 3 points			CE, UL, KC
Serial absolute synchronous encoder	Q171ENC-W8	Resolution: 4,194,304PLS/rev, Permitted speed: 3600r/min			CE, UL, KC
Serial absolute synchronous encoder cable	Q170ENCCBL2M-A	Serial absolute synchronous encoder Q171ENC-W8⇔ Servo amplifier MR-J4-B-RJ		2m (6.56ft.)	—
	Q170ENCCBL5M-A			5m (16.40ft.)	—
	Q170ENCCBL10M-A			10m (32.81ft.)	—
	Q170ENCCBL20M-A			20m (65.62ft.)	—
	Q170ENCCBL30M-A			30m (98.43ft.)	—
	Q170ENCCBL50M-A			50m (164.04ft.)	—
Internal I/F connector set	LD77MHIOCON	Incremental synchronous encoder/ Mark detection signal interface connector set (This set is not included with the Q170MSCPU(-S1))			—
Battery	Q6BAT	For memory data backup of SRAM built-in Motion controller (program, parameter, absolute position data, latch data)			—
Large capacity battery	Q7BAT				
Battery holder	Q170MSBAT-SET	Battery holder for Q7BAT (included with the battery)			—
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 status 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 equipment>

Part name	Model name
Extension base unit	Q63B, Q65B, Q68B, Q612B, Q52B, Q55B
Extension cable	QC05B, QC06B, QC12B, QC30B, QC50B, QC100B
Power supply module	Q61P, Q62P, Q63P, Q64PN
Input/output module	Input module, Output module, Input/Output composite module
Analogue module	Q68ADV, Q62AD-DGH, Q66AD-DG, Q68ADI, Q64AD, Q64AD-GH, Q68AD-G, Q68DAVN, Q68DAIN, Q62DAN, Q62DA-FG, Q64DAN, Q66DA-G
Interrupt module	QI60

Q170MSCPU Motion controller software

<Operating system software> (Note-1)

Application	Model name	
	Q170MSCPU-S1	Q170MSCPU
Conveyor assembly use SV13	SW8DNC-SV13QN	
Automatic machinery use SV22	SW8DNC-SV22QN	

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

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

<Engineering environment MELSOFT series>

Product	Model name	Description	Application version
MELSOFT MT Works2	SW1DNC-MTW2-E	Parameter setting and program creation of Motion CPU	1.56J or later
	SW1DNC-MTW2-EAZ	Additional license product (1 license)	—
MELSOFT GX Works2	SW1DNC-GXW2-E	Sequence program creation	1.98C 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 Software [MELSOFT MT Works2]
- 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

QD77MS Simple Motion module specifications

QD77MS

Control Specification

Item			Specifications		
			QD77MS16	QD77MS4	QD77MS2 (Note-3)
Number of control axes			Up to 16 axes NEW	Up to 4 axes	Up to 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 modes			PTP (Point To Point) control, Trajectory control (both linear and arc can be set), Speed control, Speed-position switching control, Position-speed switching control, Speed-torque control		
Acceleration/deceleration process			Trapezoidal acceleration/deceleration, S-curve acceleration/deceleration		
Compensation function			Backlash compensation, Electronic gear, Near pass function		
Synchronous control			External encoder, Cam, Phase Compensation, Cam auto-generation 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-pitch feed control	1-axis fixed-pitch feed, 2-axis fixed-pitch feed, 3-axis fixed-pitch feed, 4-axis fixed-pitch feed		
		2-axis circular interpolation 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 controls	Current value change	Positioning data, Start No. for a current value changing		
		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, Tightening & Press-fit control NEW		
Absolute position system			Made compatible by setting battery to servo amplifier		
Synchronous encoder interface			Up to 4 channels (Total of the internal interface and 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		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 speed to target position are changeable		
Other functions	M code output function		Provided		
	Step function		Deceleration unit step, Data No. unit step		
	Skip function		Via PLC 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 enabled only at the reference axis speed.

Applicable system

Basic Model QCPU	Q00JCPU, Q00CPU, Q01CPU
High performance model QCPU	Q02CPU, Q02HCPU, Q06HCPU, Q12HCPU, Q25HCPU
Universal model QCPU	Q00UJCPU, Q00UCPU, Q01UCPU, Q02UCPU, Q03UDCPU, Q04UDHCPU, Q06UDHCPU, Q10UDHCPU, Q13UDHCPU, Q20UDHCPU, Q26UDHCPU, Q03UDECPU, Q04UDEHCPU, Q06UDEHCPU, Q10UDEHCPU, Q13UDEHCPU, Q20UDEHCPU, Q26UDEHCPU, Q50UDEHCPU, Q100UDEHCPU
High-speed universal model QCPU	Q03UDVCPU, Q04UDVCPU, Q06UDVCPU, Q13UDVCPU, Q26UDVCPU

Synchronous control

Item		Number of settable axes		
		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 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		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 (depending on memory capacity, cam resolution and number of coordinates)
Comment			Up to 32 characters for each cam data
Cam data	Stroke ratio data type	Cam resolution	256, 512, 1024, 2048, 4096, 8192, 16384, 32768
		Stroke ratio	–214.7483648 to 214.7483647 [%]
	Coordinate data type	Coordinate number	2 to 16384
		Coordinate data	Input value: 0 to 2147483647 Output value: -2147483648 to 2147483647
Cam auto-generation			Cam auto-generation for rotary cutter

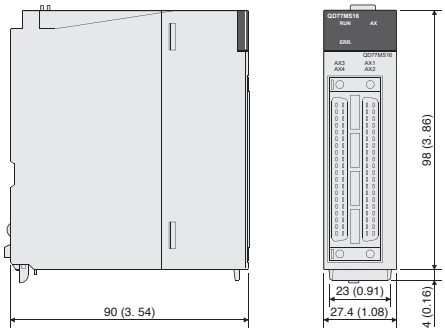
Module

Item				Specifications	
				QD77MS16	QD77MS4	QD77MS2
Servo amplifier connection system				SSCNET III/H (1 system)		
Maximum overall cable distance [m(ft.)]				SSCNET III/H : 1600 (5249.34), SSCNET III : 800 (2624.67)		
Overall cable distance [m(ft.)]				SSCNET III/H : 100 (328.08), SSCNET III : 50 (164.04)		
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	Up to 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	Up to 10 m (32.81ft.)		
Number of I/O occupying points				32 points (I/O allocation: Intelligent function module, 32 points)		
Number of module occupied slots				1		
5VDC internal current consumption [A]				0.75	0.6	
Mass [kg]				0.16		0.15
Exterior dimensions [mm(inch)]				98.0 (3.86)(H) × 27.4 (1.08)(W) × 90.0 (3.54)(D)		

Exterior Dimensions

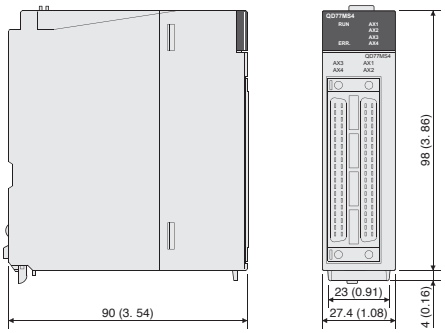
QD77MS

Simple Motion module QD77MS16



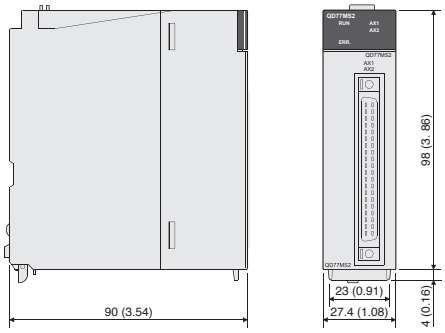
[Unit : mm (inch)]

Simple Motion module QD77MS4



[Unit : mm (inch)]

Simple Motion module QD77MS2



[Unit : mm (inch)]

(Note): Refer to the exterior dimensions of the Q17nDSCPU Motion controller for a manual pulse generator.

QD77MS 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, KC
	QD77MS4	Up to 4 axes control			CE, UL, KC
	QD77MS2	Up to 2 axes control			CE, UL, KC
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 (164.04ft))
(Note-3): You need to order the A6CON1, A6CON2, and A6CON4 connectors separately.

QD77MS Simple Motion module software

<Engineering environment MELSOFT series>

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
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 Software [MELSOFT MT Works2]
- Servo Setup Software [MELSOFT MR Configurator2]
- Screen Design Software [MELSOFT GT Works3]
- Robot Total Engineering Support Software [MELSOFT RT ToolBox2 mini]

< 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

QD77GF Simple Motion module specifications

QD77GF

Module specification

Item			Specifications
			QD77GF16
Servo amplifier connection system			Connection with CC-Link IE Field Network
Maximum transmission distance between servo amplifiers [m(ft.)]			100 (328.08)
Peripheral I/F			Via CPU module (USB, RS-232, Ethernet)
Interface with external devices	External input signal	Number of input points	4 points
		Input method	Positive common/ Negative common shared (Photocoupler)
		Rated input voltage/ Rated input current	24 VDC/ Approx. 5 mA
		Operating voltage range	21.6 to 26.4 VDC (24 VDC ±10%, ripple ratio 5% or less)
		ON voltage/current	17.5 VDC or more/ 3.5 mA or more
		OFF voltage/current	5 VDC or less/ 0.9 mA or less
		Input resistance	Approx 5.6 kΩ
		Response time	1 ms or less
		Recommended wire size	AWG24 (0.2 mm^2)
	Forced stop input signal (EMI)	Number of input points	1 point
		Input method	Positive common/ Negative common shared (Photocoupler)
		Rated input voltage/ Rated input current	24 VDC/ Approx. 2.4 mA
		Operating voltage range	20.4 to 26.4VDC (24VDC +10%/-15%, ripple ratio 5% or less)
		ON voltage/current	17.5 VDC or more/ 2 mA or more
		OFF voltage/current	1.8 VDC or less/ 0.18 mA or less
		Input resistance	Approx. 10 kΩ
		Response time	1 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 (equivalent to 26LS31) 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	± 0.2 VDC
		Cable length [m(ft.)]	Up to 30 (98.43)
		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 [m(ft.)]	Up to 10 (32.81)
Number of I/O occupying points			32 points (I/O allocation: Intelligent function module, 32 points)
Number of module occupied slots			1
5VDC internal current consumption [A]			0.8
Mass [kg]			0.26
Exterior dimensions [mm(inch)]			98.0 (3.86) (H) ×27.4 (1.08) (W) ×115 (4.53) (D)

Performance specifications

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

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

Cable specifications

Item		Specifications
Ethernet cable		Category 5e or higher, (Double shielded/STP) Straight cable
	Standard	The following conditioning cables: • IEEE802.3 (1000BASE-T) • ANSI/TIA/EIA-568-B (Category 5e)
	Connector	RJ-45 connector with shield

(Note): Use the cables recommended by CC-Link Partner Association for CC-Link IE Field Network.
CC-Link IE Field Network cables are not compatible with CC-Link IE Controller Network.
The cable for CC-Link IE Field Network cable is produced by Mitsubishi Electric System & Service Co., Ltd.
For details of Mitsubishi Electric System & Service Co., Ltd. products, contact us by sending an e-mail to the following address.
<Sales office> FA PRODUCT DIVISION mail: osb.webmaster@melsc.jp

Control specification

Item			Specifications
			QD77GF16
Number of control axes			Up to 16 axes
Operation cycle (Note-1)			0.88ms/1.77ms/3.55ms
Interpolation function			Linear interpolation (Up to 4 axes), 2-axis circular interpolation
Control modes			PTP (Point To Point) control, Trajectory control (both linear and arc can be set), Speed control, Speed-position switching control, Position-speed switching control
Acceleration/deceleration process			Trapezoidal acceleration/deceleration, S-curve acceleration/deceleration
Compensation function			Backlash compensation, Electronic gear, Near pass function
Synchronous control			External encoder, Cam, Phase Compensation, Cam auto-generation
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
	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-3) (Composite speed, Reference axis speed)
		Fixed-pitch feed control	1-axis fixed-pitch feed, 2-axis fixed-pitch feed, 3-axis fixed-pitch feed, 4-axis fixed-pitch feed
		2-axis circular interpolation 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 controls	Current value change	Positioning data, Start No. for a current value changing
		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)
Absolute position system			Made compatible by setting battery to servo amplifier
Synchronous encoder interface			Up to 4 channel (Total of the internal interface and 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		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 speed to target position are changeable
Other functions	M-code output function		Provided
	Step function		Deceleration unit step, Data No. unit step
	Skip function		Via PLC CPU, Via external command signal
	Teaching function		Provided
Mark detection function			Continuous Detection mode, Specified Number of Detections mode, Ring Buffer mode
	Mark detection signal		4 points
	Mark detection setting		16
Digital oscilloscope function (Note-2)			Bit data:16 channels, Word data: 16 channels

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

Applicable system

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

QD77GF

Synchronous control specification

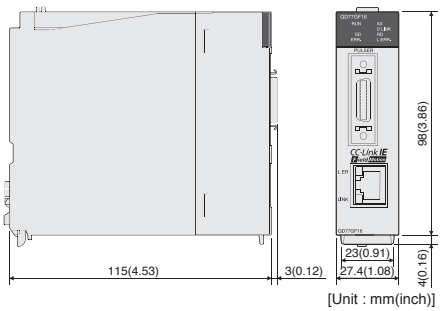
Item		Number of settable axes
		QD77GF16
Input axis	Servo input axis	16 axes/module
	Synchronous encoder axis	4 axes/module
Composite main shaft gear		1/output axis
Main shaft main input axis		1/output axis
Main shaft sub input axis		1/output axis
Main shaft gear		1/output axis
Main shaft clutch		1/output axis
Auxiliary shaft		1/output axis
Auxiliary shaft gear		1/output axis
Auxiliary shaft clutch		1/output axis
Auxiliary shaft composite gear		1/output axis
Speed change gear		1/output axis
Output axis (Cam axis)		16 axes/module

Cam specification

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

Exterior Dimensions

Simple Motion module QD77GF16



(Note): Refer to the exterior dimensions of the Q17nDSCPU Motion controller for a manual pulse generator.

Configuration of QD77GF Simple Motion module

<Simple Motion dedicated device>

Part name	Model name	Specifications	Standards
Simple Motion module	QD77GF16	Up to 16 axes control	CE, UL, KC
Connector for external input signal cable	LD77MHIOCON	Manual pulse generator/Incremental synchronous encoder interface, Forced stop input interface, External command signal/Switching signal interface	—
Manual pulse generator	MR-HDP01	Pulse resolution: 25PLS/rev (100PLS/rev after magnification by 4), Permitted speed: 200r/min (Normal rotation)	—

Software list for QD77GF Simple Motion module

<Engineering environment MELSOFT series>

Product	Model name	Description	Application version
MELSOFT GX Works2	SW1DNC-GXW2-E	Sequence program creation, QD77GF16 setting	1.98C or later
MELSOFT MR Configurator2	SW1DNC-MRC2-E	Servo amplifier MR-J4 series setting and adjustment	1.19V 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 Software [MELSOFT MT Works2]
- Servo Setup Software [MELSOFT MR Configurator2]
- Screen Design Software [MELSOFT GT Works3]
- Robot Total Engineering Support Software [MELSOFT RT ToolBox2 mini]

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

Item	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 GX Works2: HDD available capacity is 2.5GB or more. When operating GX Works2: Virtual memory available capacity is 512MB or more.
Optical drive	CD-ROM supported disk drive
Monitor	Resolution 1024 × 768 pixels or higher

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 Automation Manufacturing (Changshu) 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-how 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

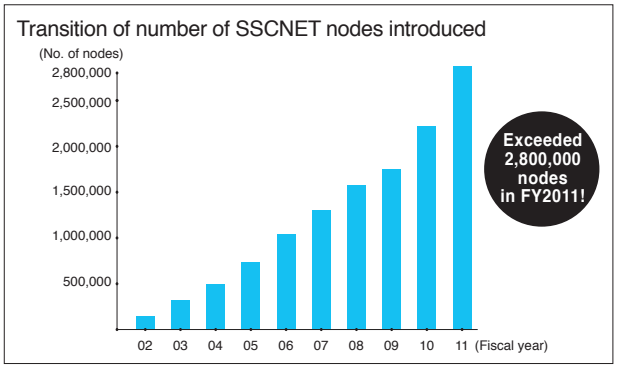
FA Development Center

e&eco-F@ctory implementation

EDC (Europe Development Center)

SSCNET Partner Association (SNP)

The SSCNET Partner Association (SNP) carries activities to introduce the advanced servo system controller network "SSCNET" 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 other countries such as Taiwan and India. SNP aims to make SSCNET a more global servo system controller network.



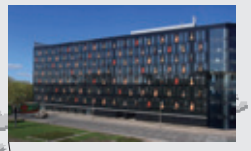
A global support network for MELSERVO users

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.

Ratingen, Germany
German FA Center/
Europe Development Center

Krakowska, Poland
European FA Center (Poland)



St. Petersburg, Russia
Russian FA Center

Pune/Gurgaon/Bangalore, India
India FA Center

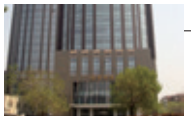
Bangkok, Thailand
Thailand FA Center

Hatfield, U.K.
UK FA Center

Praha, Czech Republic
Czech Republic FA Center

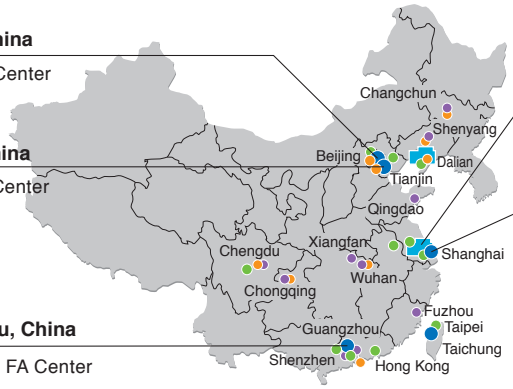
China (including Hong Kong District)

Beijing, China
Beijing FA Center



Tianjin, China
Tianjin FA Center

Guangzhou, China
Guangzhou FA Center



Changshu, China
China Local Factory
Mitsubishi Electric Automation Manufacturing (Changshu) 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).
* Mitsubishi servo system controller bears cULus Mark.
* 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
Korea FA Center

Nagoya, Japan
Nagoya Works

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

Chicago IL, U.S.A.
North America FA Center/
North American Development Center

Singapore
ASEAN FA Center

Sao Paulo SP, Brazil
Brazil FA Center

Complies with Restriction of Hazardous Substances Directive (RoHS).

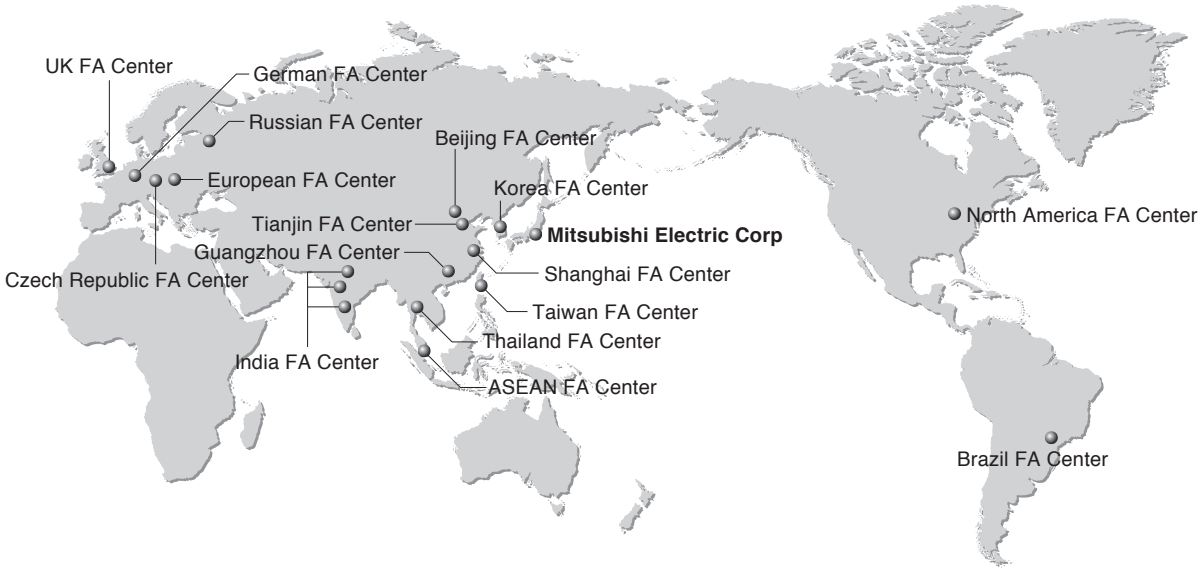
Human and environment-friendly Mitsubishi servo system controllers are compliant with RoHS Directive.

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).

Global FA Centers



China

Shanghai FA Center
MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD. Shanghai FA Center
10F, Mitsubishi Electric Automation Center, No.1386 Hongqiao Road, Changning District, Shanghai, China
Tel: 86-21-2322-3030 Fax: 86-21-2322-3000 (9611#)

Beijing FA Center
MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD. Beijing FA Center
Unit 908, Office Tower 1, Henderson Centre, 18 Jianguomennei Avenue, Dongcheng District, Beijing, China
Tel: 86-10-6518-8830 Fax: 86-10-6518-3907

Tianjin FA Center
MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD. Tianjin FA Center
Room 2003 City Tower, No.35, Youyi Road, Hexi District, Tianjin, China
Tel: 86-22-2813-1015 Fax: 86-22-2813-1017

Guangzhou FA Center
MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD. Guangzhou FA Center
Room 1609, North Tower, The Hub Center, No.1068, Xingang East Road, Haizhu District, Guangzhou, China
Tel: 86-20-8923-6730 Fax: 86-20-8923-6715

Taiwan

Taiwan FA Center
SETSUYO ENTERPRISE CO., LTD.
3F, No.105, Wugong 3rd Road, Wugu District, New Taipei City 24889, Taiwan, R.O.C.
Tel: 886-2-2299-9917 Fax: 886-2-2299-9963

Korea

Korea FA Center
MITSUBISHI ELECTRIC AUTOMATION KOREA CO., LTD.
B1F, 2F, 1480-6, Gayang-Dong, Gangseo-Gu, Seoul, 157-200, Korea
Tel: 82-2-3660-9630 Fax: 82-2-3663-0475

Thailand

Thailand FA Center
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

ASEAN

ASEAN FA Center
MITSUBISHI ELECTRIC ASIA PTE. LTD.
307 Alexandra Road, Mitsubishi Electric Building, Singapore 159943
Tel: 65-6470-2480 Fax: 65-6476-7439

India

India FA Center
MITSUBISHI ELECTRIC INDIA PVT. LTD.
India Factory Automation Centre
Emerald House, EL-3, J Block, M.I.D.C., Bhosari, Pune, 411026, Maharashtra State, India
Tel: 91-20-2710-2000 Fax: 91-20-2710-2100

MITSUBISHI ELECTRIC INDIA PVT. LTD.
Gurgaon Head Office
2nd Floor, Tower A & B, Cyber Greens, DLF Cyber City, DLF Phase - III, Gurgaon - 122002 Haryana, India
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MITSUBISHI ELECTRIC INDIA PVT. LTD.
India Factory Automation Centre Bangalore Branch
Prestige Emerald, 6th Floor, Municipal No.2, Madras Bank Road, Bangalore 560001, India
Tel: 91-80-4020-1600 Fax: 91-80-4020-1699

America

North America FA Center
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

Brazil FA Center
MITSUBISHI ELECTRIC DO BRASIL COMÉRCIO E SERVIÇOS LTDA.
Rua Jussara, 1750- Bloco B Anexo, Jardim Santa Cecilia, CEP 06465-070, Barueri, San Paulo, Brazil
Tel: 55-11-4689-3000 Fax: 55-11-4689-3016

Europe

European FA Center
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

German FA Center
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 FA Center
Mitsubishi Electric Europe B.V.
UK Branch
Travellers Lane, Hatfield, Hertfordshire, AL10 8XB, U.K.
Tel: 44-1707-28-8780 Fax: 44-1707-27-8695

Czech Republic FA Center
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

Russian FA Center
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

MEMO

FA Products

PLC | MELSEC-Q Series Universal Model

Introducing the high-speed QCPU (QnUDVCPU) for faster processing of large data volumes.

◎Realize high-speed, high-accuracy machine control with various iQ Platform compatible controllers and multiple CPUs.
◎Easily connect to GOTs and Programming tools using built-in Ethernet port.
◎25 models from 10 k step small capacity to 1000 k step large capacity, are available.
◎Seamless communication and flexible integration at any network level.

Product Specifications

Program capacity	10k steps to 1000k steps
Number of I/O points [X/Y], number of I/O device points [X/Y]	256 points to 4096 points/8192 points
Basic instruction processing speed (LD instruction)	120ns to 1.9ns
External connection interface	USB (all models equipped), Ethernet, RS-232, memory card, extended SRAM cassette
Function module	I/O, analog, high-speed counter, positioning, simple motion, temperature input, temperature control, network module
Module extension style	Building block type
Network	Ethernet, CC-Link IE controller network, CC-Link IE field network, CC-Link, CC-Link/LT, MELSECNET/H, SSCNETⅢ (/H), AnyWire, RS-232, RS-422

HMI | Graphic Operation Terminal GOT1000 Series GT16 Model

Full-flat face body integrating all the functions required of a HMI.

◎All models are equipped with Ethernet, RS-422/485 and RS-232 interfaces enabling a diverse range of communications.
◎A multimedia unit and a video/RGB unit (optional) are supported for smooth recording and playback of moving images.
◎USB host and device ports are provided as a standard on the front panel. Easily connect to a personal computer for data exchange.
◎Large 15MB memory capacity allows you to use optional functions and real parts, etc., without worrying about memory space.

Product Specifications

Screen size	15", 12.1", 10.4", 8.4", 5.7"
Resolution	XGA, SVGA, VGA
Intensity adjustment	8-step or 4-step adjustment
Touch panel type	Analog resistive film
Built-in interface	RS-232, RS-422/485, Ethernet, USB, CF card
Applicable software	GT Works3
Input power supply voltage	100 to 240VAC (+10%, -15%), 24VDC (+25%, -20%)

Inverter | FREQROL-A700 Series

High-function, high-performance inverter

◎High-accuracy, high-response speed control using real sensor-less vector control is possible with a general-purpose inverter having no PLG (encoder) (200% torque/0.3 Hz (3.7 K or less)).
◎Full-scale vector control is possible when used in combination with a motor with PLG (when using option).
◎The built-in noise filter (EMC filter) helps reduce noise generated from the inverter.
◎This series supports IPM motor operation. Use auto tuning to operate with the optimum motor characteristics.

Product Specifications

Inverter capacity	200V class: 0.4kW to 90kW, 400V class: 0.4kW to 500kW
Control method	IPM control, Soft-PWM control, high-carrier frequency PWM control (Select from V/F, advanced flux vector, or real sensor-less vector), vector control (when using options)
Output frequency range	0.2 to 400Hz (real sensor-less vector, upper frequency during vector control is 120Hz)
PM offline auto tuning	200V class: 0.4K to 1.5K (150%3%ED), 2.2K/3.7K (100%3%ED) When using the MM-CF Series, the motor constants, etc., are automatically measured for operation with the optimum motor characteristics (IPM motors other than the MM-CF Series, and other IPM motor brands are also supported)
Starting torque	200% 0.3Hz (3.7K or less), 150% 0.3Hz (5.5K or more) (when using real sensor-less vector, vector control)

Magnetic motor starters | MS-T Series

Collection large satisfaction in a small body.

◎The industry-leading smallest dimension* is achieved in a general purpose Magnetic Contactor.
* In general Magnetic Contactors of 10A frame class (our survey in September, 2012)
◎Standard terminal cover improves safety.
◎Wide range of operation coil ratings available. Reducing inventory types and supporting selections.
◎Supporting your overseas business with compliance to various International Standards.

Product specifications

Frame	10 A to 32 A
Applicable standards	Certification to various standards including IEC, JIS, UL and CE (TÜV, CCC certification pending)
Terminal cover	Standard terminal cover improves safety, simplifies ordering, and reduces inventory, etc.
Improved wiring	Wiring and operability are improved with streamlining wiring terminal BC specifications.
Operation coil rating	Wide range of operation coil ratings reduces number of coil types from 14 (N Series) to seven types and simplifies selection.
Option units	Diverse lineup includes auxiliary contact blocks, surge absorber unit, and mechanical interlock unit.

Robot | MELFA F Series

High speed, high precision and high reliability industrial robot

◎Compact body and slim arm design, allowing operating area to be expanded and load capacity increased.
◎The fastest in its class using high performance motors and unique driver control technology.
◎Improved flexibility for robot layout design considerations.
◎Optimal motor control tuning set automatically based on operating position, posture, and load conditions.

Product Specifications

Degrees of freedom	Vertical:6 Horizontal:4
Installation	Vertical:Floor-mount, ceiling mount, wall mount (Range of motion for J1 is limited) Horizontal:Floor-mount
Maximum load capacity	Vertical:2-20kg Horizontal:3-20kg
Maximum reach radius	Vertical:504-1503mm Horizontal:350-1,000mm

CNC | Mitsubishi Numerical Control Unit C70 Series

iQ Platform compatible CNC to provide TCO reduction effect.

◎A CNC structured in building block method on iQ Platform.
◎High performance CNC integrated with high-speed PLC offers high-speed control to reduce cycle time.
◎A wide variety of FA products helps construct flexible lines.

Product specifications

Maximum number of control axes (NC axis + spindle + PLC axis)	16 axes
Maximum number of part system	Machining center system: 7 systems, Lathe system: 3 systems
Maximum number of NC axes per part system	8 axes
Maximum program capacity	2,000 kB (5,120 m)
Maximum number of files to store	124 files/252 files
Number of input/output points	4,096 points
Safety observation function	Safety signal comparison function, speed monitoring function, duplexed emergency stop

Check here for detailed information: http://www.mitsubishielectric.co.jp/fa/index.html

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.

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Mitsubishi Electric Corporation Nagoya Works is a factory certified for ISO14001 (standards for environmental management systems) and ISO9001(standards for quality assurance management systems)

⚠ Safety Warning

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

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