Changes for the Better

MITSUBISHI ELECTRIC

Q series Motion Controller for the iQ Platform

Next Generation Motion Controller
Accelerated by Progress

MOTION CONTROLLER

iQ Platform

MELSOFT

SSCNET SERVO SYSTEM CONTROLLER NETWORK

Empowering Industries

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

ISO 14001 JACO EC97J1113 UKAS ENVIRONMENTAL MANAGEMENT 051

ISO 9001 BUREAU VERITAS Certification UKAS QUALITY MANAGEMENT 008

A new platform

aimed at improving total system performance!

MOTI

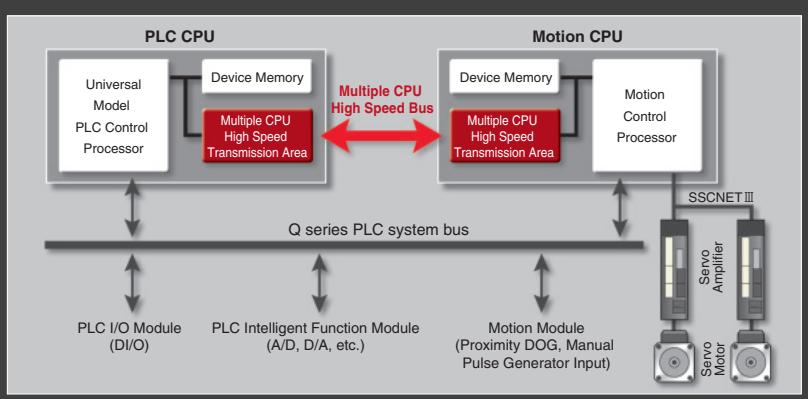
Extract more performance with the multiple CPU system-based controller platform.

iQ Platform

Being Introduced to the Motion controller Q series is the iQ Platform-based Q173DCPU/Q172DCPU.
Motion control performance has been drastically improved.
Including, a natural succession of the functions of the prior Motion controller Q series.
While furthermore improving work productivity in the development, debugging and start-up stages due to the new iQ Platform Engineering Environment.

Multiple CPU High Speed Bus

- Equipped with a Multiple CPU high speed bus reserved specifically for CPU-to-CPU communication.
  With this reserved Multiple CPU high speed bus, data transfer of 0.88ms period is possible for up to 14k words.
- The Multiple CPU high speed transmission cycle is synchronized with the motion control cycle thus optimizing the control system.

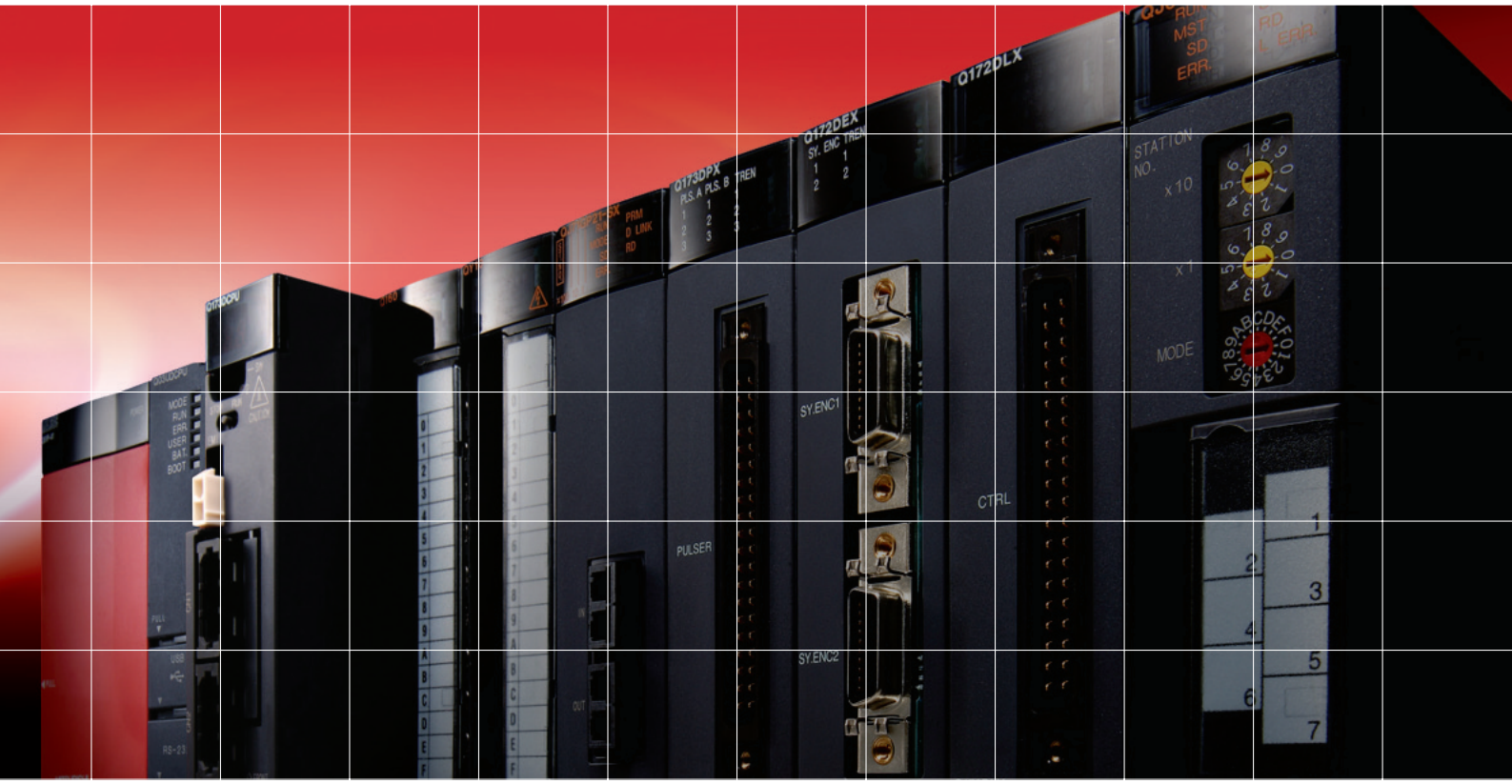


High speed and high accuracy due to improvements in motion control performance

- 2 times (0.44ms/6 axes) the motion operation performance as before resulting in shorter system tact times.
- Instruction communication to the servo amplifier can be executed in as little as a 0.44ms period, realizing high-accuracy synchronous control and speed/position control.
- A motion control specific processor (high performance 64bitRISC) and a proprietary acceleration algorithm ASIC improve hardware efficiency.
- Using the MELSEC Q series universal model CPU, sequence processing is also accelerated.

  (Using the Q06UDHCPU, the PLC basic instruction time is 9.5ns.)
- Equipped with various motion control functions such as multi-axis interpolation, speed control, electronic cam, tracking control and more.
- Using the Motion SFC program as a flowchart, control with suppressed variation in response time is realized.

ON CONTROLLER Qseries



Need-based System Construction

- Up to 4 CPU modules can be freely selected in the Multiple CPU system. (1 PLC CPU required)
- Control up to 96 axes per system using multiple Motion CPUs. (Three Q173DCPU modules use).
- An optimum decentralized control system can be constructed using Multiple CPUs.
  Control is optimized by dispersing processing across the Multiple CPUs with the PLC CPU handling general machine control and the Motion CPU handling servo control tasks.
  System expandability is accomplished with ease due to the availability of over 100 different types of MELSEC Q series modules.
- SSCNETⅢ based MR-J3 servo amplifiers deliver a high speed, high accuracy solution.

SSCNET (Servo System Controller NETwork)

A new advanced Engineering Environment MELSOFT MT Works2

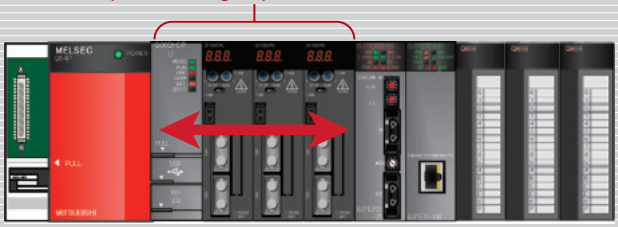
- Easier operation allows for both programming and debugging time to be substantially reduced.
- User-create, easily understood device labels can now be created, simplifying appropriation within the program.
- New import/export function for cam data in CSV file format.
- Substantial shortening of communication time when reading and writing to the Motion CPU. (Q173DCPU/Q172DCPU use)
- Print documents without using Microsoft® Word or Excel.

Higher performance motion control!

Multiple CPU High Speed Bus

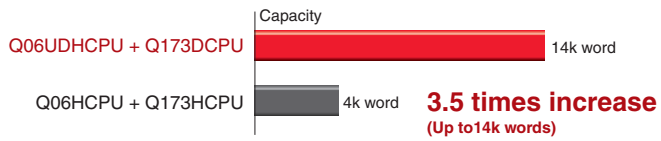
■With reserved Multiple CPU high speed bus, data transfer of 0.88ms period is possible for up to 14k words.

Multiple CPU high speed data transfer

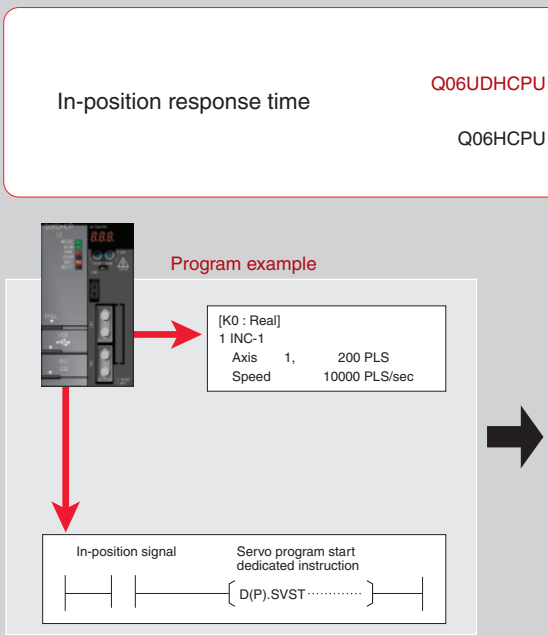


The Multiple high speed transmission cycle is the same as the Motion Control cycle time. → Increased controllability

Shared memory capacity



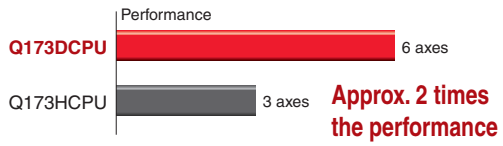
Acceleration of in-position signal response time



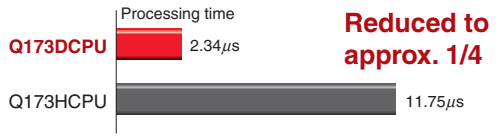
Motion Processing Acceleration

■**Approximately double the basic motion performance and 1/4 the Motion SFC processing time.**

Basic motion performance
(With 0.44 ms operation cycle time)
In case of SV13



Motion SFC processing time
Process time for D800L=D802L+D804L



PLC program interrupt for Multiple CPUs synchronization

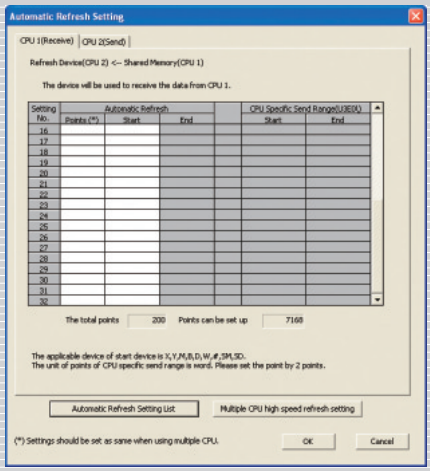
■**Using the new PLC interrupt function synchronized with the motion operation cycle (0.88ms), it is possible to achieve real time processing of the ladder program.**

Application Example

1) A motor real time value can be compared against a specific point and if this point is overrun, the PLC can turn on an output signal.
(Variation of comparison processing does not have an influence on the scan time of the ladder which is processed within 0.88ms.)

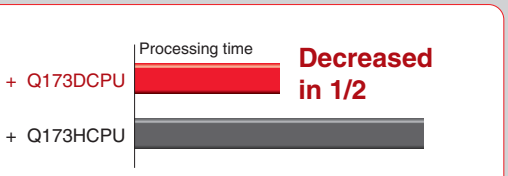
2) Multiple Motion CPUs can be started simultaneously.

■Automatic refresh setting count has increased from 4 to 32.

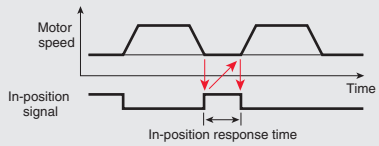


– More freedom in setting up the program for CPU-to-CPU data exchange.

– Motion critical data such as position and velocity information can be assigned to specific CPU-to-CPU high-speed refresh area thus synchronizing their exchange between the Multiple CPU's with that of the motion control system's operation cycle.



Measurement details



<In-position response time>

In a 2 CPUs, Multiple CPU system consisting of a PLC CPU and Motion CPU, the Motion CPU receives the in-position signal from the servo amplifier of the first axis. Next, the PLC CPU sends a start command to the second amplifier. This example thus shows the time it takes from the stopping of motion on one axis until the beginning of motion on a second axis. Since the Motion CPU and PLC CPU must continuously communicate back-and-forth, this time is a good indicator of CPU-to-CPU data transfer speed and more importantly, overall system performance and tact time.

Motion Dedicated PLC Instruction

■**Introducing easy-to-use Motion dedicated PLC instructions.**

Issue multiple instructions at the same time

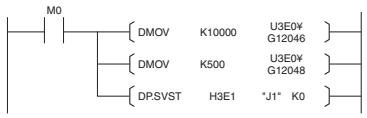
Ex: Execution of 3 Motion dedicated SVST instruction at the same time.

Ladder program

Indirectly set data and execute instructions at the same time

Ex: Indirect data setting of speed and position plus execution of the Motion dedicated SVST instruction all at the same time.

Ladder program



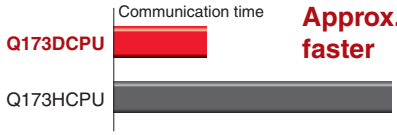
Servo program

```
[K0 : Real]
1 INC-1
   Axis      1, U3E0¥G12046 PLS
   Speed     U3E0¥G12048 PLS/sec
```

Large reduction in programming read/write time

■**Increased debugging efficiency by reducing program read/write time to 1/3 the previous execution time.**

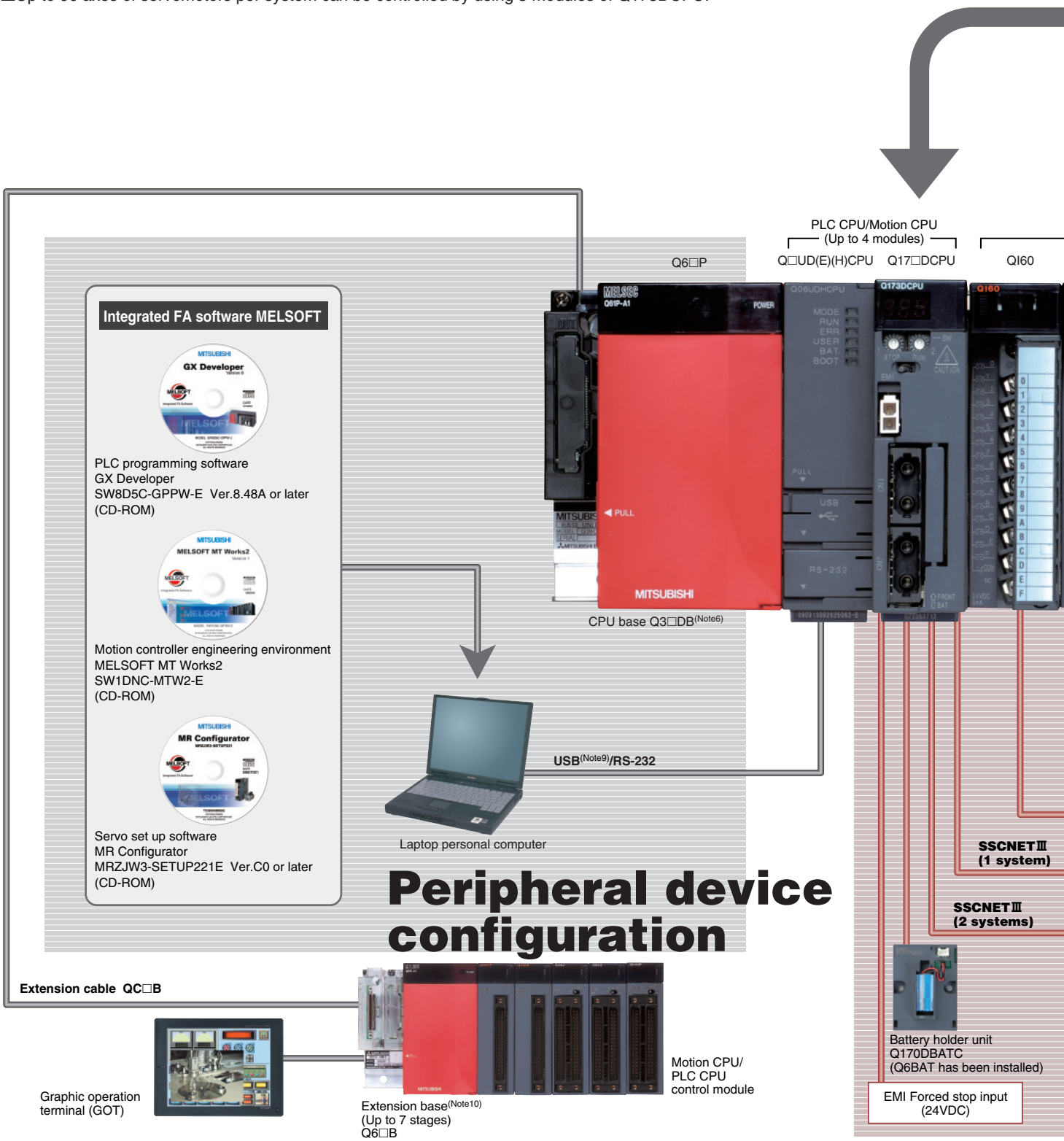
Motion CPU communication time
Servo program read time



System Configuration

Flexible High-Speed Motion Control System Achieved with Multiple

■Compatible with the Q Series PLC (Platform) in the Multiple CPU system.
■The appropriate CPU modules for PLC control and Motion control can be selected to meet the application requirements.
■The Multiple CPU configuration allows up to 4 CPU modules to be selected. (1 PLC CPU must be used.)
■Up to 96 axes of servomotors per system can be controlled by using 3 modules of Q173DCPU.



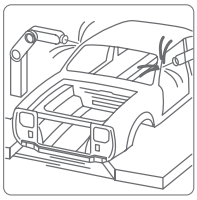
Operating system software packages

Operating system software
SW8DNC-SV□□Q□
(CD-ROM)

Conveyor assembly use Motion SFC compatible SV13

Dedicated language

SW8DNC-SV13QB (Q173DCPU)
SW8DNC-SV13QD (Q172DCPU)



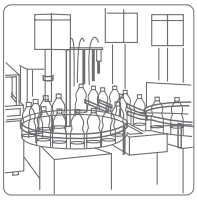
Electronic component assembly, Inserter, Feeder, Molder, Conveying equipment, Paint applicator, Chip mounting, Wafer slicer, Loader/Unloader, Bonding machine, X-Y table

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

Automatic machinery use Motion SFC compatible SV22

Mechanical support language

SW8DNC-SV22QA (Q173DCPU)
SW8DNC-SV22QC (Q172DCPU)

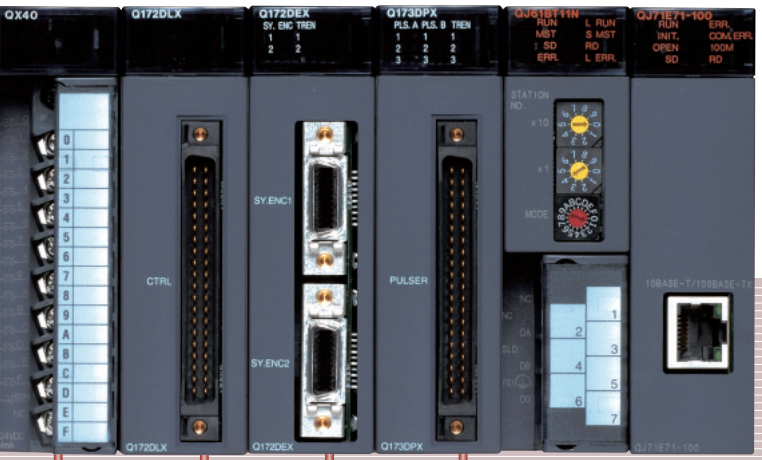


Press feeder, Food processing, Food packaging, Winding machine, Spinning machine, Textile machine, Printing machine, Book binder, Tire molder, Paper-making machine

Synchronous control, Electronic shaft, Electronic clutch, Electronic cam, Draw control

Motion CPU control(Note1, 2, 3) modules
PLC CPU control (Note5) modules

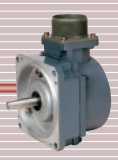
QX/Y□□ Q172DLX Q172DEX(Note4) Q173DPX



Notes :
1. Only input module among Motion CPU control modules can be accessed from PLC CPU.
2. Motion modules (Q172DLX/Q172DEX/Q173DPX) cannot be installed in CPU slot and I/O slot 0 to 2 of the main base unit.
3. Motion modules (Q172LX/Q172EX(-S2)/Q173PX) for Q17□HCPU/Q17□CPUN cannot be used.
4. Installation position of Q172DEX is only the main base unit. It cannot be used on the extension base unit.
5. Other CPU modules cannot be accessed from Motion CPU.
6. It is impossible to mount the main base unit by DIN rail when using the Motion CPU module.
7. Be sure to use the cable for forced stop input (sold separately). The forced stop cannot be released without using it.
8. Be sure to use the external battery.
9. USB cannot be used in WindowsNT® 4.0.
10. Motion CPU cannot control the module installed to the QA1S6□B.
11. The servo amplifiers for Linear servomotors are required.
12. Connecting target can be selected for each axis from general-purpose input of servo amplifier or Q172DLX.

Device configuration

Manual pulse generator (3 units per module)
MR-HDP01



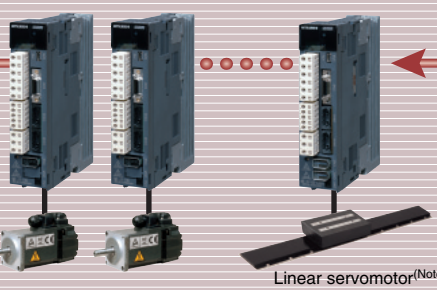
Serial absolute synchronous encoder
(2 units per module)
Q170ENC

Servo external signal (Note12)
(FLS,RLS,STOP,DOG/CHANGE)×8 axes/module

Motion CPU input/output
(Up to 256 points)

External interrupt input
(16 points)

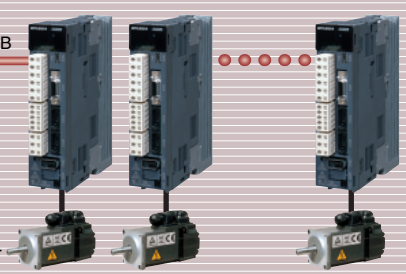
Servo amplifier MR-J3-□B



Servomotor

Linear servomotor(Note11)

Servo amplifier MR-J3-□B



Servomotor

Servo external signal(Note12)
(FLS, RLS, DOG)

Q173DCPU : 2 systems(Up to 32 axes) Q172DCPU : 1 system(Up to 8 axes)

Q series Motion Controller for the iQ Platform

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