iQ Platform
C Controller

e-F@ctory

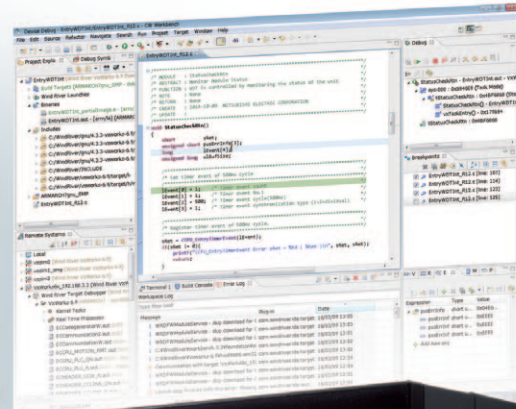## The highly customizable open platform, C Controller

GLOBAL IMPACT OF MITSUBISHI ELECTRIC

Through Mitsubishi Electric's vision, "Changes for the Better" are possible for a brighter future.

Changes for the Better

We bring together the best minds to create the best technologies. At Mitsubishi Electric, we understand that technology is the driving force of change in our lives. By bringing greater comfort to daily life, maximizing the efficiency of businesses and keeping things running across society, we integrate technology and innovation to bring changes for the better.

Mitsubishi Electric is involved in many areas including the following

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

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

Home Appliance
Dependable consumer products like air conditioners and home entertainment systems.

Information and Communication Systems
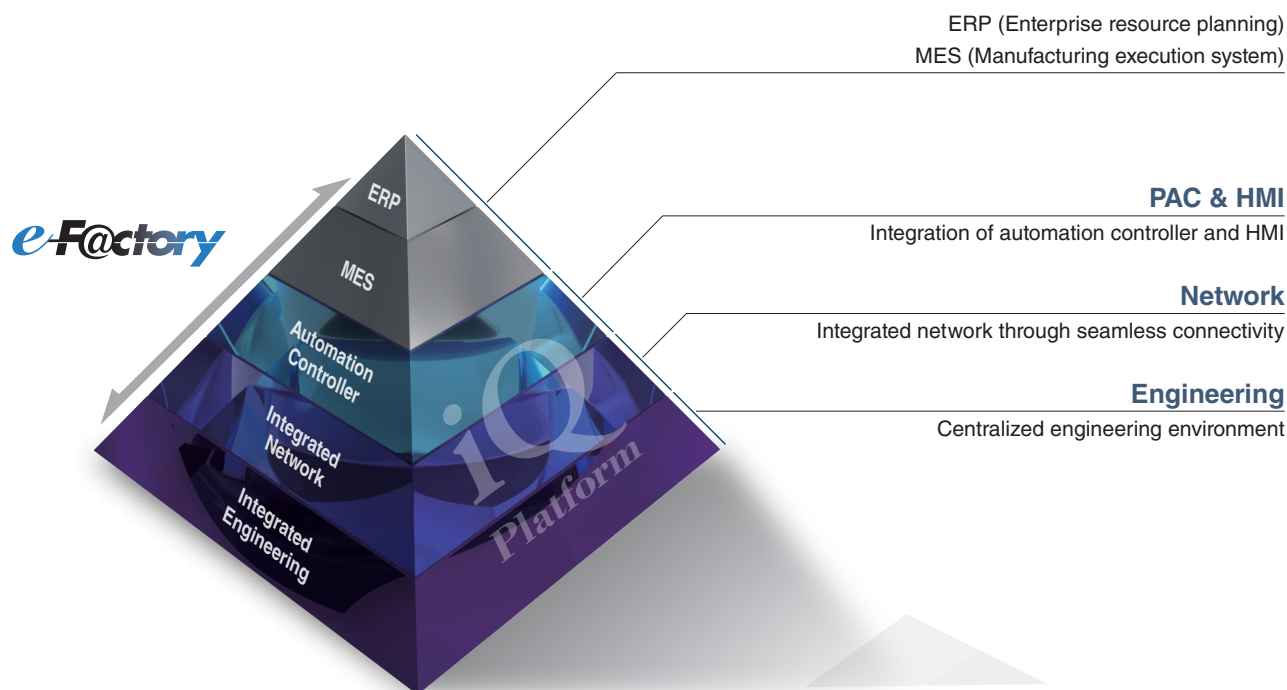Commercial and consumer-centric equipment, products and systems.

Industrial Automation Systems
Maximizing productivity and efficiency with cutting-edge automation technology.

iQ Platform for maximum return on investment

Minimize TCO, Seamless integration, Maximize productivity, Transparent communications: these are common items that highlight the benefits of the iQ Platform and e-F@ctory. The iQ Platform minimizes TCO at all phases of the automation life cycle by improving development times, enhancing productivity, reducing maintenance costs, and making information more easily accessible across the plant. Together with e-F@ctory, offering various best-in-class solutions through its e-F@ctory alliance program, the capabilities of the manufacturing enterprise is enhanced even further realizing the next level for future intelligent manufacturing plants.

ERP (Enterprise resource planning)
MES (Manufacturing execution system)

PAC & HMI
Integration of automation controller and HMI

Network
Integrated network through seamless connectivity

Engineering
Centralized engineering environment

Further reduce TCO while securing your manufacturing assets

Automation Controller

Improve productivity and product quality

1. High-speed system bus realizing improved system performance
2. On-screen multi-touch control enabling smooth GOT (HMI) operations

Integrated Network

Best-in-class integrated network optimizing production capabilities

1. CC-Link IE supporting 1 Gbps high-speed communication
2. Seamless connectivity within all levels of manufacturing with SLMP

Centralized Engineering

Integrated engineering environment with system level features

1. Automatic generation of system configuration
2. Share parameters across multiple engineering software via MELSOFT Navigator
3. Changes to system labels are reflected between PAC and HMI
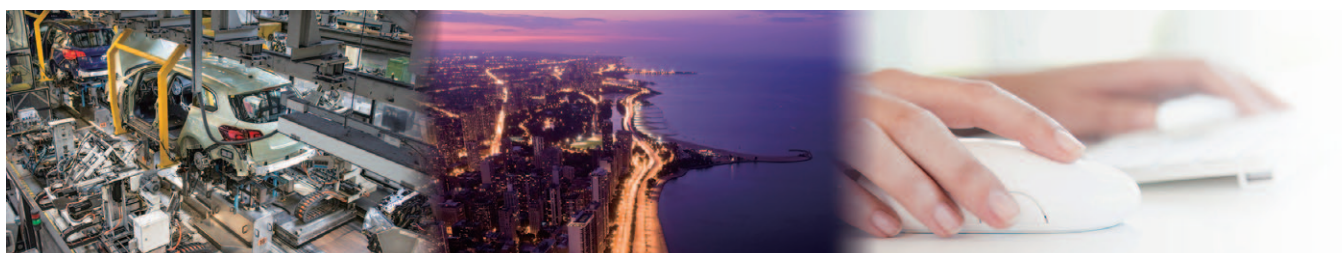
Improving the reliability of PC/Microcomputer systems.
The innovative open platform C Controller.

The C Controller is a generic open platform controller that can execute C language type programs, based on the MELSEC system architecture, it utilizes industrial performance such as long term parts supply, high availability, and advanced functionality.

The high-end model Q24DHCCPU-V/-VG comes pre-installed with VxWorks®, and supports advanced information processing and control system I/O. The standard model Q12DCCPU-V is a space saving controller that realizes high-speed I/O control. The Q24DHCCPU-LS and Q26DHCCPU-LS are an OS independent controller. Linux® based control can be easily realized by installing 3rd Party partner OS, eT-Kernel supporting advanced information processing with a user interface environment close to conventional PCs.

Wide scope of applications are realized with the availability of these 5 C Controllers, used together with MELSEC-Q series I/O modules, 3rd Party products, open source, and customized applications/programs.

Providing freedom with a robust, easier and high-performance system.
The MELSEC C Controller will continue to advance as a new platform to replace PC and microcomputers in various different applications.

Ideal for a diverse range of systems, based on a generic platform architecture

Leveraging the C Controller to realizing customized systems, by utilization of 3rd Party applications, installation of 3rd Party partner OS, utilization of programs, and open source applications.

Partner Zone

OS

System Integrator

Application

Device

C Controller

MELSEC-Q Series

Open Platform

Customize

Plug-in

Application Development

Open Source

CW Workbench
CW-Sim

C Controller
Setting & Monitoring Tool
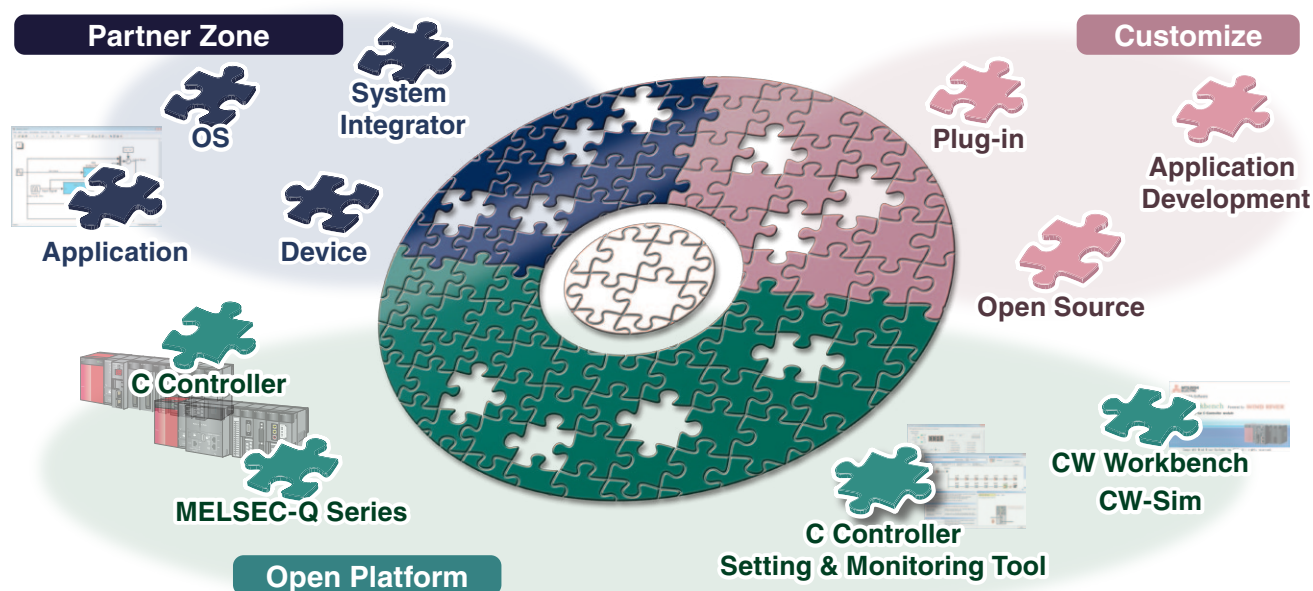
The C Controller overcomes the overheads associated with maintaining embedded PCs (micro boards., etc) and industrial PCs realizing a cost effective solution.

The C Controller platform is a solution that realizes PC level functionality without the burden of high maintenance costs us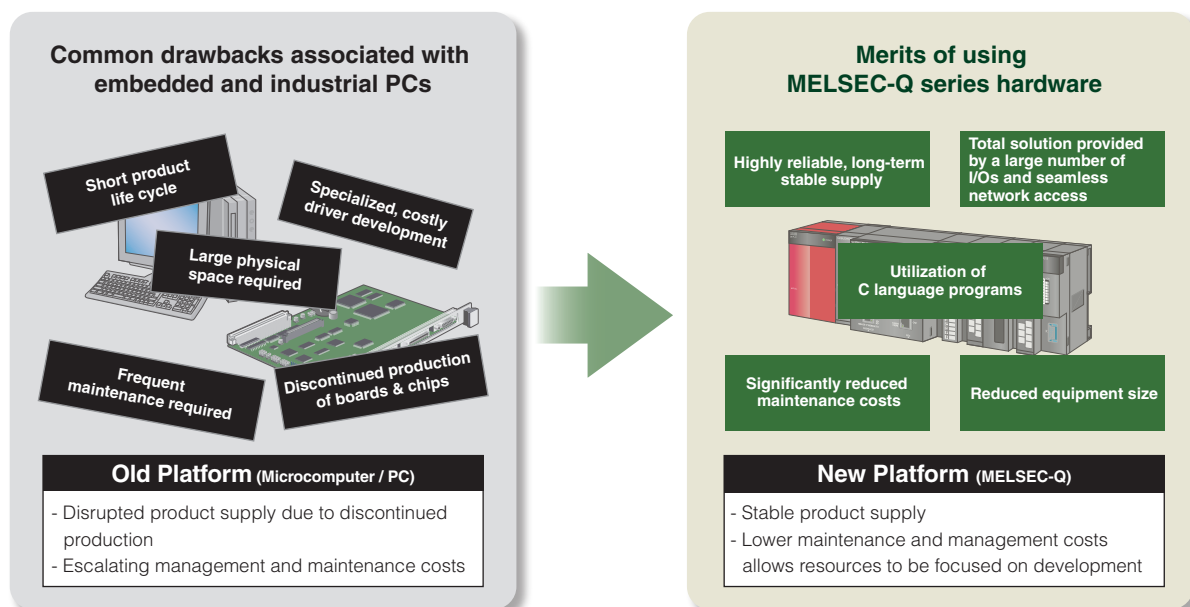ually associated with PCs. In addition, it includes a robust design that is ideal for industrial environments by being based on the high quality MELSEC control system.

Common drawbacks associated with embedded and industrial PCs

- Short product life cycle
- Specialized, costly driver development
- Large physical space required
- Frequent maintenance required
- Discontinued production of boards & chips

Old Platform (Microcomputer / PC)

- Disrupted product supply due to discontinued production
- Escalating management and maintenance costs

Merits of using MELSEC-Q series hardware

- Highly reliable, long-term stable supply
- Total solution provided by a large number of I/Os and seamless network access
- Utilization of C language programs
- Significantly reduced maintenance costs
- Reduced equipment size

New Platform (MELSEC-Q)

- Stable product supply
- Lower maintenance and management costs allows resources to be focused on development

High-end model C Controller for information processing needs

Q24DHCCPU-V
Q24DHCCPU-VG*¹

Standard model C Controller for high-speed I/O control

Q12DCCPU-V

OS independent model C Controller utilizing open source customized programs
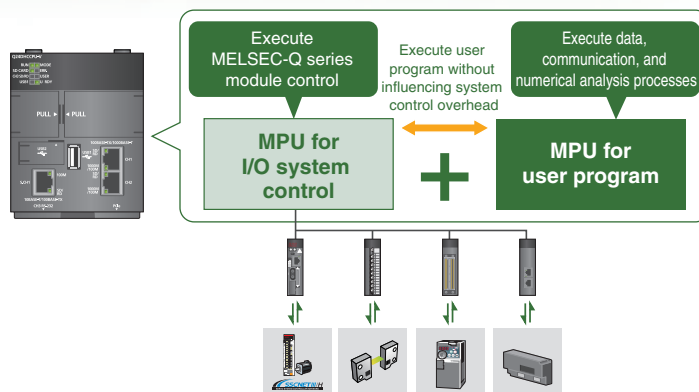
Q24DHCCPU-LS
Q26DHCCPU-LS NEW

Information processing utilizing the Intel®ATOM™ performance

| Q24 -V | Q24 -VG | Q24 -LS | Q26 -LS |

Incorporates two dedicated MPUs:
- For user program
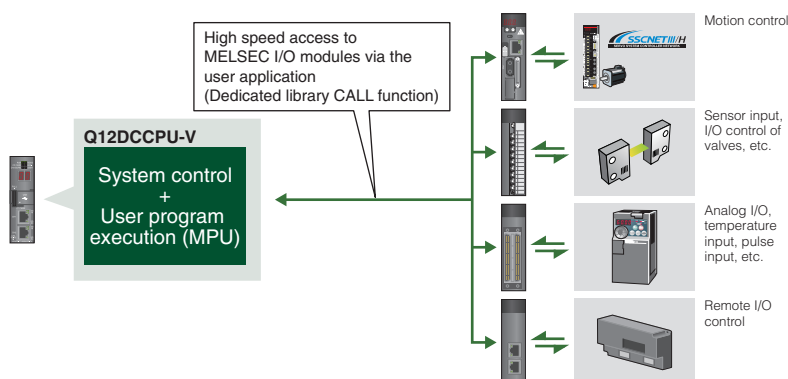- For controlling MELSEC system I/Os

By having both the system and user program on separate MPUs, if there are any variations in the user program overhead, this will not influence the system control side. This is due to the user program utilizing the Intel® ATOM™ characteristics. Hence, realizing an advanced system that is ideal for high speed processing applications without fluctuating performance.
With the open architecture Q24DHCCPU-LS and Q26DHCCPU-LS, the customer can install the operating system into Intel® ATOM™ MPU for user program area.

Execute MELSEC-Q series module control

Execute user program without influencing system control overhead

Execute data, communication, and numerical analysis processes

MPU for I/O system control   +   **MPU for user program**

Access various MELSEC-Q series modules directly from the user program

| Q12 -V |

Various MELSEC-Q series modules can be directly accessed from the user program using Mitsubishi Electric's dedicated library functions, realizing high-speed, high-accuracy control.

High speed access to MELSEC I/O modules via the user application (Dedicated library CALL function)

Q12DCCPU-V

System control + User program execution (MPU)

Motion control

Sensor input, I/O control of valves, etc.

Analog I/O, temperature input, pulse input, etc.

Remote I/O control

*1: A package product with ILC GENWARE® 3-VG

Line up

Development environment

Application Solution

Features

3rd Party Partner Products

Total control

Specifications

Support

Product List

Information processing

Utilizing the 2MPU architecture with integrated display port, installation of an OS specific to the application is possible, realizing an advanced information processing control system.

OS Independent model

Information processing together with flexible expansion can be realized from inheriting the Intel® ATOM™ performance, ideal for replacing existing PC based information processing systems.

Q24DHCCPU-V

Q24DHCCPU-VG

Q24DHCCPU-LS

Q26DHCCPU-LS

VxWorks® version OS

Replacing microcomputer

Replacing PC

Control various MELSEC-Q series modules when space is limited. This is ideal for replacing microcomputer based control systems.

Q12DCCPU-V

I/O control

Extendable system with a diverse range of interfaces available

| Q24 -V | Q24 -VG | Q24 -LS | Q26 -LS |

The C Controller includes a variety of interfaces, such as 2ch gigabit Ethernet ports (for user program), 1ch system Ethernet port (for connecting setting/monitoring tool or other MELSOFT products), SD memory card slot, USB connector and PCI Express® *1 expansion connector.

High speed communication to Enterprise level systems and high-volume data handling are realized. In addition, with the PCI Express® *1 interface utilization of existing PCI Bus devices with high-performance requirements are supported.

By supporting the Linux® OS, the system can be freely expanded utilizing various peripheral devices (drivers) and applications.

System Ethernet port
Ethernet enabled devices
C Controller setting/monitoring tool

User Ethernet port (CH1)
Enterprise level network

1Gbps

Analog RGB
General-purpose display*1*2

Barcode reader*1

Keyboard and mouse*1*2

SD memory card slot
User programs, recipe data

User Ethernet port (CH2)
Device level network

1Gbps

CD-ROM drive*1

Printer*1

USB connector (USB1)
USB mass-storage compatible devices

USB connector (USB1)
HDD

PCI Express® expansion connector*3
PCI Express® bus and PCI bus device

*1: Usable with Q24DHCCPU-LS and Q26DHCCPU-LS installed with Linux® OS.
*2: Usable with Q24DHCCPU-VG
*3: Supporting PCI Express® base specification Rev. 1.0a x1. Consult with your nearest Mitsubishi office or representative for more information when considering using the PCI Express® expansion connector.

Extended mode is added

Q12 -V

1.Easier maintenance
Newly provided 12MB standard ROM for user file storage.

2.Easier parameter setting, diagnosis and monitoring of each module
The C Controller supports SW4PVC-CCPU, enabling simple parameter setting of intelligent function modules and network modules with one tool.

3.Enhanced connectivity
Ethernet port embedded in CPU supports SLMP (MC protocol)

4.Enhanced security
Supports accessible functions and service setting function

*4: Products with first five serial number digits are 15102 or later support this function

High-end model C Controller for information processing needs

Q24DHCCPU-V
Q24DHCCPU-VG

C Controller OS independent model
for customized open source

Q24DHCCPU-LS
Q26DHCCPU-LS NEW

2x MPU

Stable operation, high reliability

Real-time OS VxWorks® pre-installed
(Q24DHCCPU-V, Q24DHCCPU-VG)

Utilize 3rd Party partner OS
(Q24DHCCPU-LS, Q26DHCCPU-LS)

iQ Platform compatible

Easy to read display (Dot matrix LED)

Ethernet (3ch.), USB×2,

PCI Express®, RS-232, Analog RGB*1

iQ Platform

USB2 (connector type mini-B)
Programming port for C Controller,
MELSOFT, and monitoring tools.

System Ethernet port (10BASE-T/100BASE-TX)
System Ethernet port for connection to C Controller,
MELSOFT, monitoring tools, and other devices
supporting Ethernet.

Development environment
• Engineering tool for C Controller CW Workbench.
• Integrated development environment
  Wind River Workbench.
• Setting/monitoring tools for C Controller.
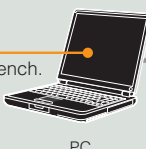
PC

LED display (Dot matrix type)
For debugging and diagnostics.

SD memory card
For saving user programs and recipe data, etc.

USB1 (connector type A)
For connecting USB devices (USB HDD).

Battery backup RAM
For saving user data
(operation history, diagnostics data, etc).

**2x Standard Ethernet ports
(10BASE-T/100BASE-TX/1000BASE-T)**
For TCP/IP communication with
computers, etc.

**PCI Express®
extension connector (on the bottom)**
PCI Express®,
For connecting to devices supporting
PCI Express® or PCI bus connection.

Analog RGB output connector*1
For connecting general purpose
analog RGB display.

RS-232 (on the bottom)
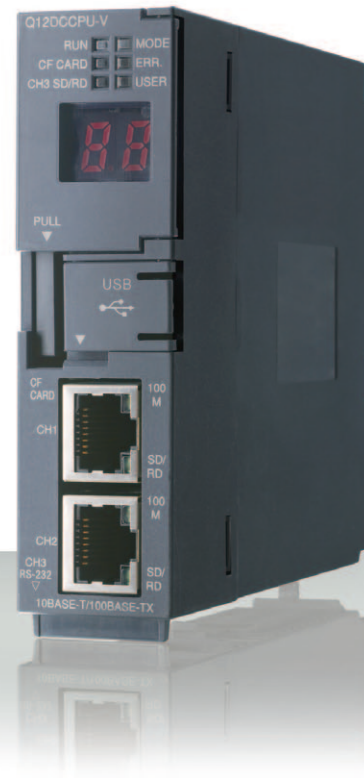For connection to serial communication devices.

Ethernet

*1: Not available with the Q24DHCCPU-V

—7

Standard model C Controller for high-speed I/O control

Q12DCCPU-V

1x MPU
Highly reliable
Compact size
Real-time OS VxWorks® pre-installed
iQ Platform compatible
LED display (7-segment)
Ethernet (2ch.), USB, RS-232

iQ Platform

CompactFlash card
For saving user programs, recipe data, etc.

7-segment LED
For debugging and diagnostics.

USB (connector type mini-B)
For connecting MELSOFT

Battery backup RAM
For saving user data
(operation history, diagnostics data, etc).

Ethernet (10BASE-T/100BASE-TX)
For TCP/IP communication with computers, etc.

RS-232 (on the bottom)
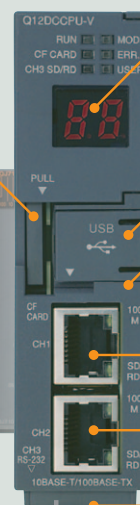For connection to serial communication devices.

Development environment
• Engineering tool for C Controller
  CW Workbench
• Integrated development environment
  Wind River Workbench
• Setting/monitoring tools for C Controller

PC

Ethernet

Providing an embedded system development environment at an affordable price

C Controller module engineering tool

CW Workbench

Q24 -V **Q24 -VG** **Q12 -V**

SW1DND-CWWL□-E□

MITSUBISHI ELECTRIC
Integrated FA Software

CW Workbench Powered by **WIND RIVER**

Engineering tool for C Controller module

Copyright Wind River Systems Inc. 2010. All rights reserved.

Reduced installation costs and easily develop applications

Traditionally, development environments for embedded systems have been very expensive, but now they are affordable.
This allows full-scale embedded systems development at low cost.
CW Workbench has all of the basic functionality expected such as a code editor, compiler, and debugger.
More importantly, the application empowers developers to be able to easily create applications for the C Controller.

Support for multiple languages using plug-ins

Based on the Eclipse platform, CW Workbench supports multiple languages and its functionality can be expanded using third-party plug-ins such as source code management.
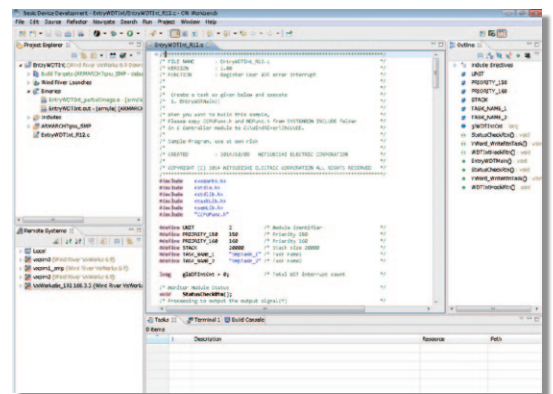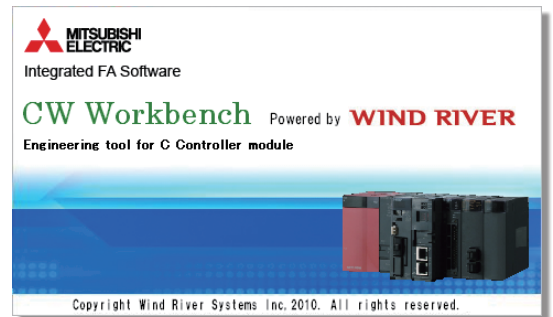
CW Workbench

"Project Explorer" window
Manage projects and settings

"Remote Systems" window
Manage connections to hardware

"Build Console" window
Display the build process history

"Editor" window
Edit programs

"Debug" window
Perform debugging

"Breakpoints" window
Manage break points

Ethernet

PC

"Variables" window
View the current local variable values
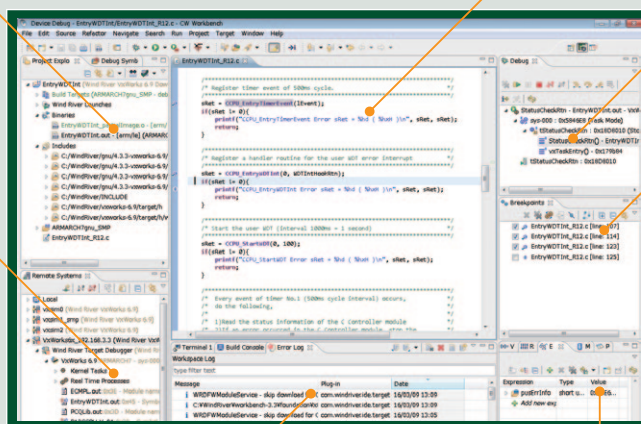
"Registers" window
View the current register values

"Expressions" window
View the current variable values registered to be watched

"Memory Browse" window
View C Controller's memory dump

Line up

Development environment

Application Solution

Features

3rd Party Partner Products

Total control

Specifications

Support

Product List

VxWorks® simulation even without the C Controller module

VxWorks® Simulator

CW-Sim (license set product*¹) [Q24-V] [Q24-VG] [Q12-V]

SW1DNC-CWSIM-E

CW-Sim Standalone [Q24-V] [Q24-VG] [Q12-V]

SW1DNC-CWSIMSA-E

CW-Sim license product simulation environment

CW-Sim + CW Workbench

Program debug from a PC with CW Workbench installed.

CW-Sim Standalone simulation environment

CW-Sim Standalone (Execution file) + Execution module (Compiled program)

A program can be executed even with a PC not installed with CW Workbench.*³

Host server   Host server

Ethernet

Install

VxWorks® simulation without installation of C Controller module.*²

PC

Ethernet

Vision sensor   Microcomputer   Programmable controller

- VxWorks® simulation even without the C Controller module.*²
- Improve your program's quality and system's safety before actually operating your system.
- Useful for system debug developed over several C Controllers and to provide training.

*1 An additional license product (SW1DNC-CWSIM-EZ) is also available.
*2 CW-Sim and CW-Sim Standalone are equipped with only the minimum required functions of Wind River VxWorks® Simulator.
*3 Step execution not possible.

CW Workbench license

Therefore it is important that the correct license is obtained. Different licenses are required to use Q24DHCCPU-V/-VG or Q12DCCPU-V with CW Workbench.
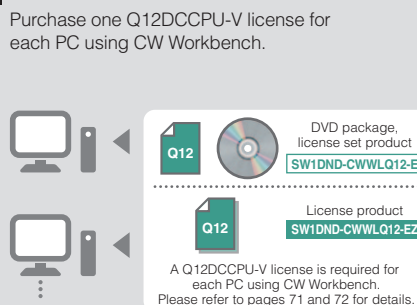
For new C Controller customers

CASE 1 Using Q24DHCCPU-V/-VG

Purchase one Q24DHCCPU-V/-VG license for each PC using CW Workbench.

DVD package, license set product
SW1DND-CWWLQ24-E

License product
SW1DND-CWWLQ24-EZ

A Q24DHCCPU-V/-VG license is required for each PC using CW Workbench.
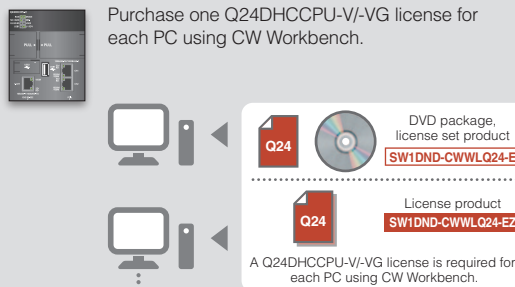
CASE 2 Using Q12DCCPU-V

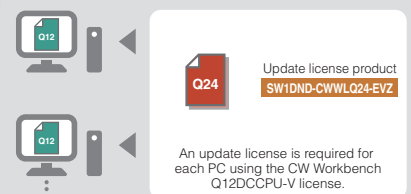Purchase one Q12DCCPU-V license for each PC using CW Workbench.

DVD package, license set product
SW1DND-CWWLQ12-E

License product
SW1DND-CWWLQ12-EZ

A Q12DCCPU-V license is required for each PC using CW Workbench. Please refer to pages 71 and 72 for details.

For customers already having C Controller

In use   Q12DCCPU-V

CASE 3 When adding Q24DHCCPU-V/-VG

For each PC using the CW Workbench Q12DCCPU-V license, purchase an update license to add the Q24DHCCPU-V/-VG license.

Update license product
SW1DND-CWWLQ24-EVZ

An update license is required for each PC using the CW Workbench Q12DCCPU-V license.
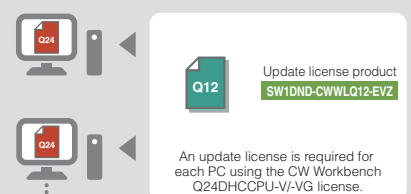
In use   Q24DHCCPU-V/-VG

CASE 4 When adding Q12DCCPU-V

For each PC using the CW Workbench Q24DHCCPU-V/-VG license, purchase an update license to add the Q12DCCPU-V license.

Update license product
SW1DND-CWWLQ12-EVZ

An update license is required for each PC using the CW Workbench Q24DHCCPU-V/-VG license.

Reduce TCO with simple settings, diagnostics, and monitoring capabilities!

C Controller setting/monitor tools

SW4PVC-CCPU `Q24-V` `Q24-VG` `Q12-V` `Q24-LS` `Q26-LS`   SW3PVC-CCPU `Q12-V`

Program-free Parameter Settings

Easily configure C Controller systems,
CC-Link IE field networks (for managing the C Controllers)[1],
CC-Link IE controller networks, and the parameters[2] for
network modules and intelligent function modules such as
CC-Link, all without using any programs.

[1]: SW3PVC-CCPU do not support configuration of CC-Link IE field network parameters.
[2]: SW3PVC-CCPU do not support configuration of intelligent function module parameters.
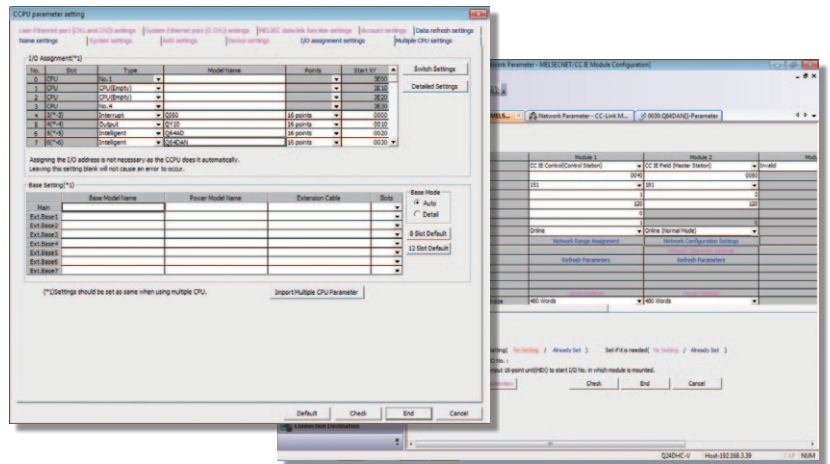
Program-free Diagnostics

Easily diagnose errors that have occurred in the
C Controller or historical events within the user application.
In addition, detect detailed network status information such
as network cable condition, general network status[3].

[3]: SW3PVC-CCPU do not support diagnosis of the CC-Link IE field network.
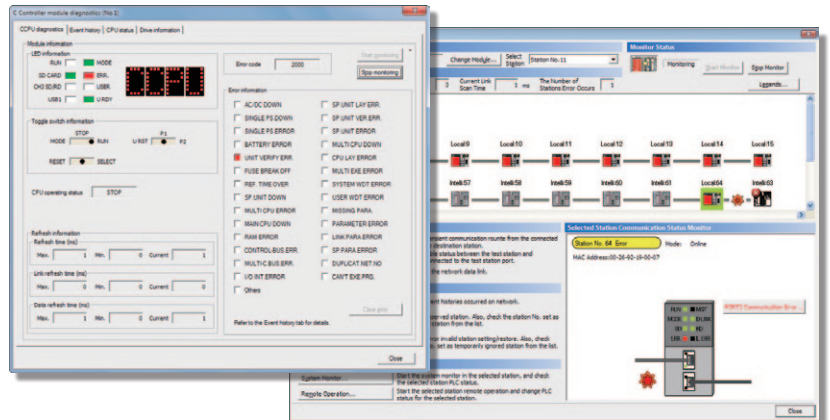
Perform monitoring and testing using convenient tools

Monitor the status (I/P, O/P, buffer memory, multi-CPU common memory) of
connected modules, together with simple debugging, change of state/value of
device memory.
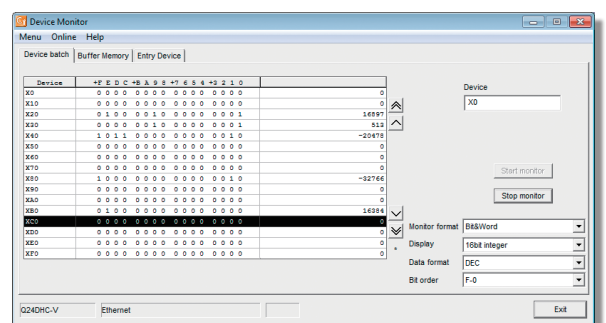
Application development life-cycle support

Wind River Workbench 3.2 2.6.1

Q24-V Q24-VG Q12-V

Developed by Wind River

WIND RIVER

Incorporate advanced runtime diagnostic tools

In addition to basic functions for program editing, compiling and source debugging, Wind River Workbench incorporates advanced run-time analysis tools. When detailed analysis are required, various tools are available for revealing the complex interactions of tasks and interrupts, realizing a far more specified way of analyzing and debugging the application.
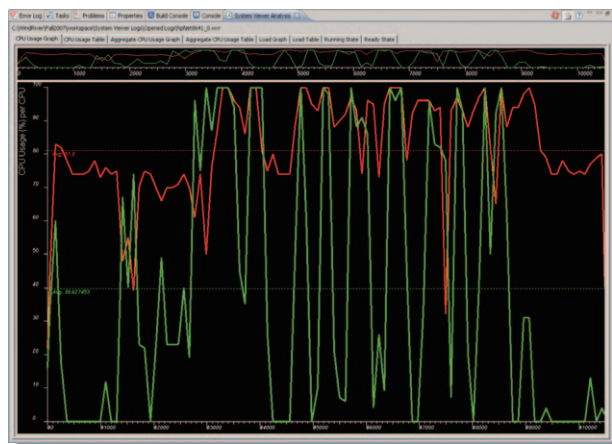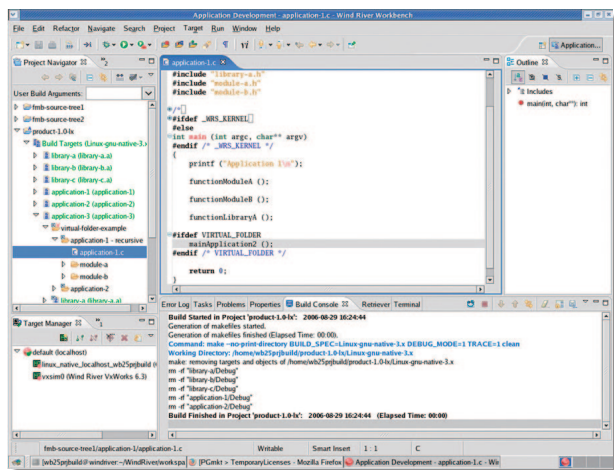
Embedded Linux® Development Environment

Lineo uLinux ELITE

Q24-LS Q26-LS

Lineo@Linux ELITE

Developed by LINEO Solutions, Inc.

Linux® system development based on the C Controller MPU

ELITE is a GUI based development framework consisting of a Linux® kernel, package and tool chain offered as a basic software configuration. This tool is used together with the C Controller Q24DHCCPU-LS and Q26DHCCPU-LS compatible "Board Support Package".
By using ELITE, a Linux® based system perfect for the Q24DHCCPU-LS and Q26DHCCPU-LS can be created, whilst enabling editing of source code and utilizing devices.
Also, access to the developer's site exclusive for the C Controller Q24DHCCPU-LS and Q26DHCCPU-LS to further increase the high security Linux® based controller's product life cycle.
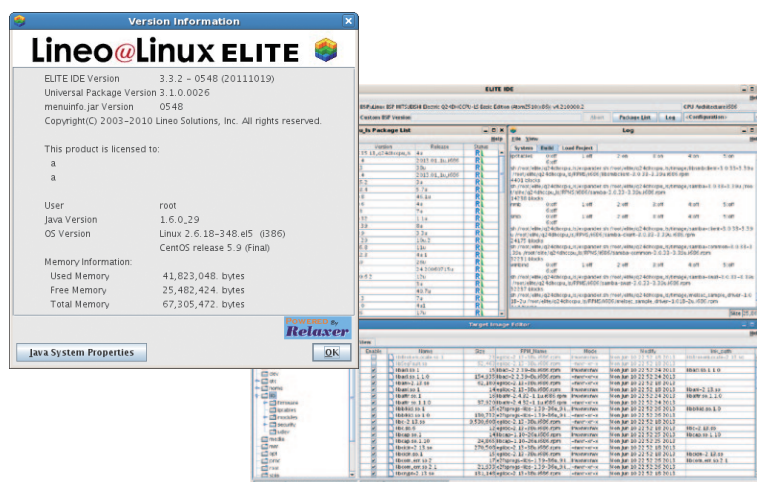
12—

Embedded software development suit

eBinder® Q24 -LS 🔥Binder

Developed by eSOL, Inc.

Effective development of T-Kernel/µITRON-based real-time OS system

eSOL eBinder® is a development suite for embedded software, designed for real-time OS system development.

With development tools and features, system issues associated with real-time OS system can be easily solved. eBinder® dramatically eases a burden on developer, improving development efficiency.

- Wide-range of tools/functions which cover main development process from configuration, build, debug to verification.
- Platform package creation feature suitable for large-scale development with a large team
- Software reuse assisted by parts package
- T-Kernel and µITRON are supported. Also process model-based real-time OS with memory protection is supported
- Provides as a platform including real-time OS, USB, network and middleware such as files.

Application Solution

Line up

Development environment

Application Solution

Features

3rd Party Partner Products

Total control
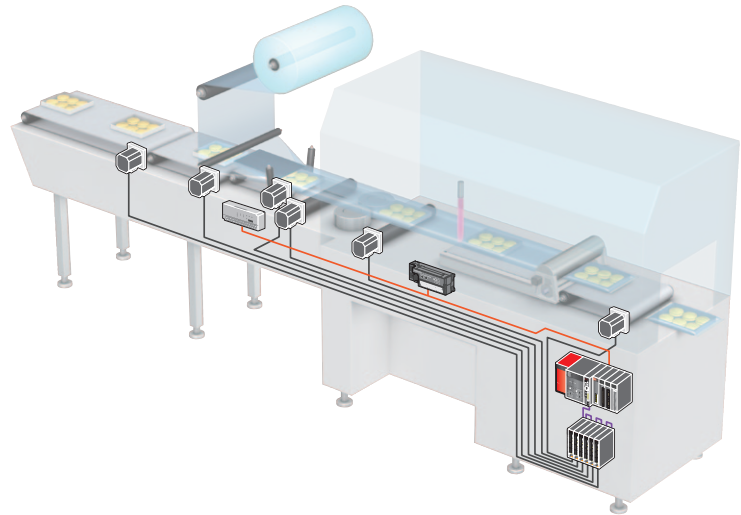
Specifications

Support

Product List
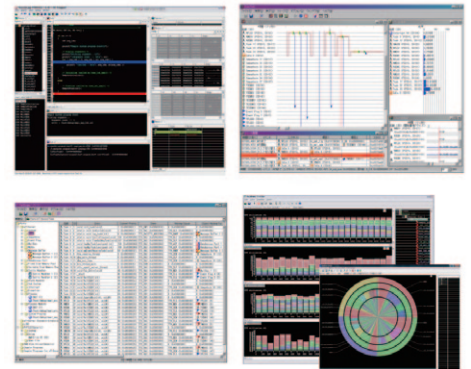
CASE 1

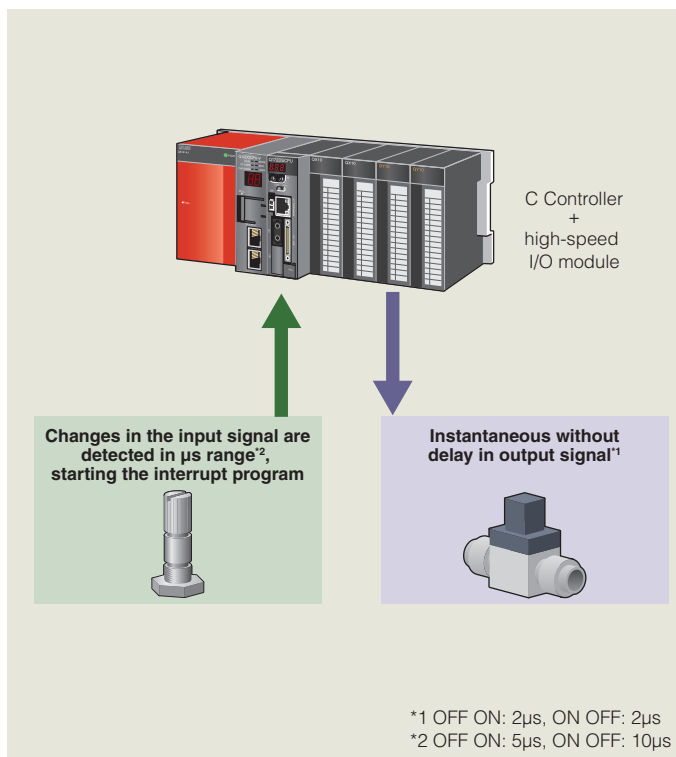# High-speed I/O applications utilizing custom made programs

Common issues

- Micro-controller based systems tend to have short life cycle products that have been discontinued.

- Maintenance cycles are difficult as based on a closed system architecture.

- A substantial amount of investment into custom based programs have resulted in systems difficult to upgrade.

- Software virus prone problems are common place with PC based control architectures.

- Getting the right mix of drivers for each hardware component in the control system can substantially increase the commissioning time.

Solution

C Controller + high-speed I/O module

C Controller + high-speed I/O module

Changes in the input signal are detected in µs range*2, starting the interrupt program

Instantaneous without delay in output signal*1

*1 OFF ON: 2µs, ON OFF: 2µs
*2 OFF ON: 5µs, ON OFF: 10µs

When its time to upgrade the system but certain I/O which require high-speed I/O performance is no longer available can cause a total rethink of the control architecture. This is a common problem with microcomputer and industrial PC based control systems. By switching to the MELSEC control system, these concerns are all but eliminated. Mainly, as the control system architecture is based on long product life cycles with support for discontinued products and a clear upgrade support package.

Although it is uncommon for programmable control systems to have the same performance characteristics as advanced level PCs, the MELSEC system offers a wide range of high-speed, high-performance I/O modules. In addition, if the existing programs are mainly based on C language, this can be utilized by using the C Controller module without having to re-engineer the equipment again.

The MELSEC series also offers high-performance motion control modules that add a further performance upgrade for such applications that require high-speed responses such as in the packaging industry where getting the label on the right way, in the right position at very high-speeds are considered essential in maintaining the manufacturing quality.

Security can also be enhanced as the MELSEC control system eliminates the need to worry about virus prone issues as its not based on PC OS systems, further adding to the security of the overall control system.
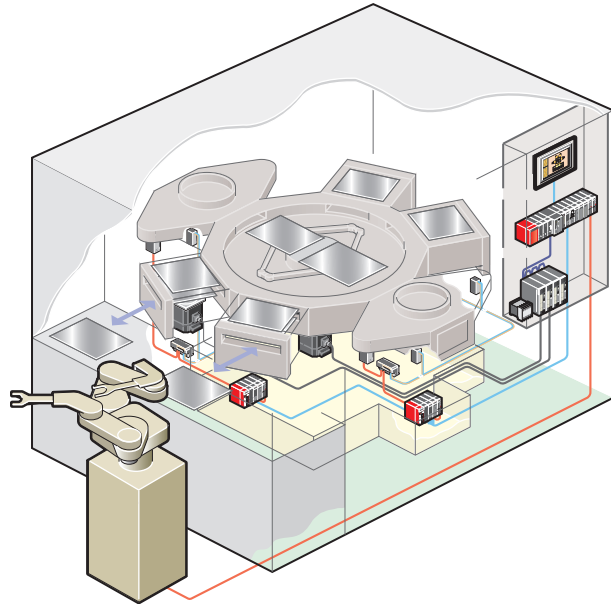
Key advantages

- High-speed I/O performance
- Less discontinued products reducing maintenance costs
- High security systems not weak to software penetration

- Software only requires minor modifications
- Utilize existing programs, no need for complete overhaul
- Robust industrial level build requiring fewer enclosure engineering

CASE 2

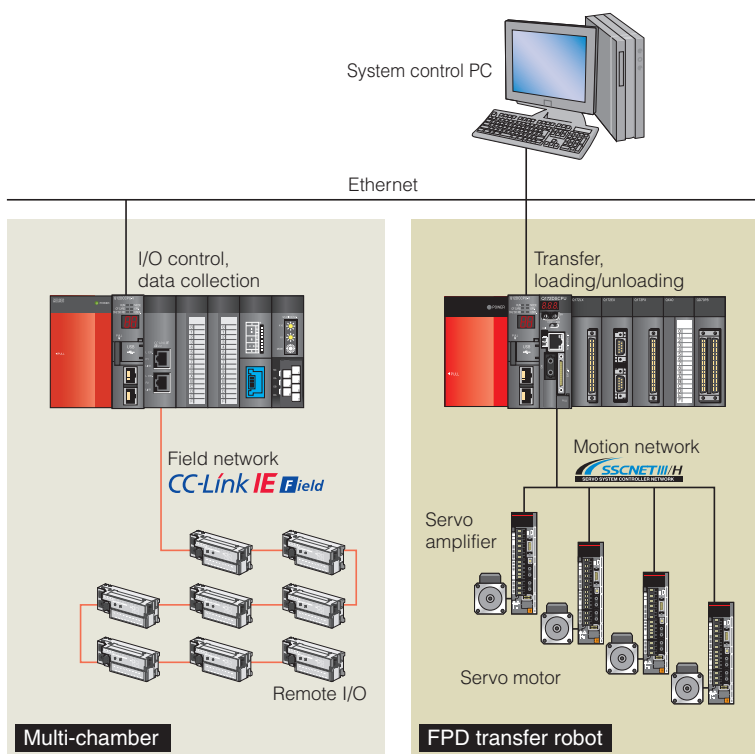# Smaller equipment sizes reduces footprint within the fab

Common issues

- Space can be costly due to complexity of machines and expensive fab space rates.

- Wiring of various hardware can over-complicate the machine causing various maintenance issues.

- Systems developed in-house (PCs / boards) are complicated to maintain.

- Control data communication rates are inadequate and not supporting the amount of data required for production.

- Connectivity to the Enterprise level can introduce a bottle neck in data flow.

Solution

FPD manufacturing equipment

System control PC

Ethernet

I/O control, data collection

Field network
CC-Link IE Field

Remote I/O

Multi-chamber

Transfer, loading/unloading

Motion network
SSCNET III/H
SERVO SYSTEM CONTROLLER NETWORK

Servo amplifier

Servo motor

FPD transfer robot

With FPD (Flat Panel Display) manufacturing becoming more complex due to increased throughput, panel sizes, and increases in manufacturing data, manufacturing equipment have to match these needs becoming more complex with further strain on the control system. PC based and microcomputer based solutions are requiring even more boards and software drivers resulting in larger space requirements and increases in maintenance tasks which in the end make the production of such equipment even more expensive. Add to this the further pressure of end users requiring reduction in overall production costs due to miniaturization in consumer products results in the economies of scale for manufacturing being passed onto the OEM.

Implementing the MELSEC control system can reduce these costs, as the system architecture is far more integrated compared to PC based systems and require fewer maintenance cycles. By utilizing the field and motion networks CC-Link IE Field and SSCNET III/H, wiring within the equipment can be reduced even when the machines are quite complex. This is achieved mainly due to the iQ Platforms integrated approach by having all control CPUs, (C Controller, programmable controller, motion CPU) all on the same rack, consolidating the control system. In addition, information data can be connected directly to Enterprise level presenting the vast amount of valuable production data to the system.

Key advantages

- Reduced equipment sizes
- Reduced wiring
- Enterprise level data connection
- Reduced maintenance
- Increased equipment reliability and performance
- Integrated control architecture
- Standardized solution with fewer customization
- High-speed data collection

Line up

Development environment

Application Solution

Features

3rd Party Partner Products

Total control

Specifications

Support

Product List

CASE 3

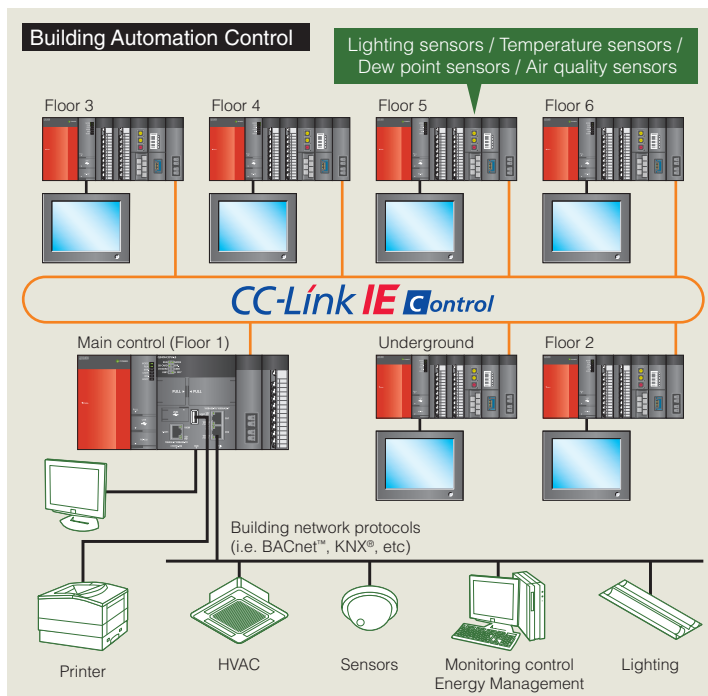# Increase security and ensure effective utilization of energy management capabilities

Common issues

- Building energy costs continually increasing.

- Many different protocols, standards, and products to integrate into the Building Automation System.

- Security issues related to current PC based systems introduce infiltration risks.

- Need to reduce overall building carbon footprint.

Solution

Secure open source based building automation system

Building Automation Control

Lighting sensors / Temperature sensors / Dew point sensors / Air quality sensors

Floor 3　Floor 4　Floor 5　Floor 6

CC-Link IE Control

Main control (Floor 1)　Underground　Floor 2

Building network protocols (i.e. BACnet™, KNX®, etc)

Printer　HVAC　Sensors　Monitoring control Energy Management　Lighting

With Building design technology getting more complex, advance building automation systems are required even more to satisfy ongoing trends in energy conservation. A typical building automation system has many different elements integrated with a diverse range of devices from various 3rd party manufacturers.

With this application example, a customer specifically required to integrate its various devices using known building automation network protocols. The customer eventually decided to base the main control system on the OS-Independent type MELSEC C Controller using a local Linux® based OS software solution. The main reason for the choice was based on security requirements and having an open source solution that enabled taking advantage of the C Controllers capability to install advanced level energy management algorithms.

Building automation, similar to infrastructure solutions are susceptible to online security threats that can be quite serious. Picking a Linux® based solution, gave the customer greater control over its security deployment without disrupting the building automation system. In addition, the C Controllers ability for C language based programming enabled for advanced energy monitoring and control algorithms to be utilized, especially related to the HVAC and lighting control systems. Together with the open platform architecture of the C Controller system, other automation devices such as Inverters and a diverse range of I/O were incorporated into the automation system resulting in an efficient and energy conservation solution.

Key advantages

- Increased security
- Utilization of advanced algorithms
- Reduction of building carbon footprint
- Extensive sensor based control solution
- Integration of various 3rd party devices
- Attractive economies of scale
- Flexible to addition of various protocol standards

CASE 4

Ensuing future availability of parts and improved reliability on an in-line production testing cell

Common issues

- Considering to change to a more reliable system, however integrating existing devices is difficult.

- PC system is not so robust and requires frequent maintenance in addition to coping with the harsh factory operating environment.

- In-line testing cell sometimes viewed as the bottle neck of the production line.

- Multiple maintenance cycles are required as various boards may require driver updates.

- Cannot easily connect to existing production control network.
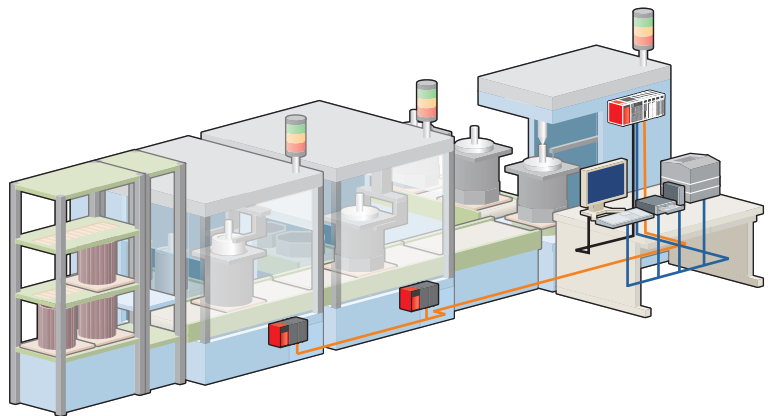
Solution

C Controller based solution utilizing existing devices

In-line production testing cell

Execute testing procedure from within C Controller

Indicator lamps, switches/buttons, transfer devices

Display monitor (RGB Connection)

CC-Link **IE** **C**ontrol

Ethernet (To plant-wide network)

USB

CD-ROM Drive

Keyboard / Mouse

Printer

HDD

Utilize existing PC peripherals

As production cycles are getting more faster and traceability requirements are getting more stringent to improve overall quality, the integration of highly robust discrete control to PC based analytical systems on the production line is becoming more common.

In general, the discrete controller is ideal for actual machine control but has been overlooked for analytical processes such as production management, testing procedure, etc. The development of the C Controller module has enabled a way of satisfying these requirements by having a PC like performance product designed with robust industrial standard requirements which can be installed on the main control system rack.
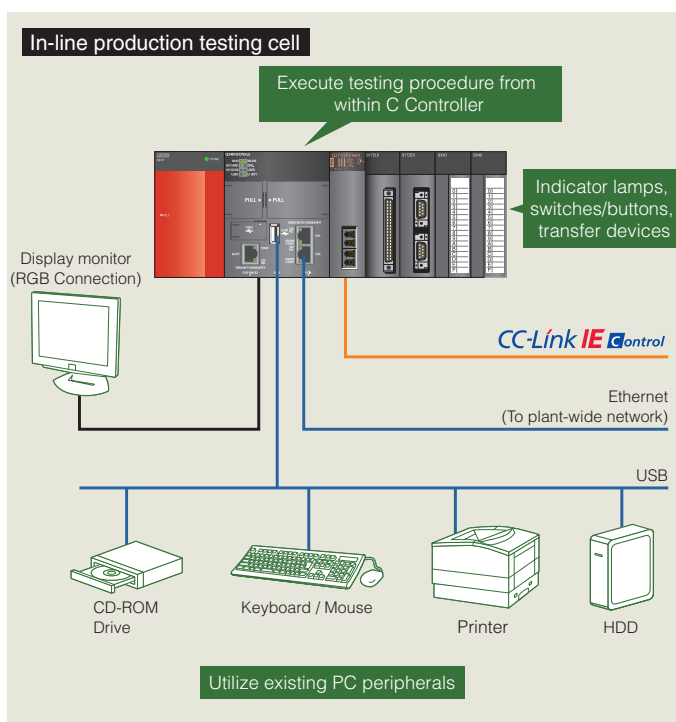
The controller has an OS independent architecture (in this case with a Linux® OS installed), enabling utilization of several USB type PC peripherals, which usually would have been replaced. The original PC based system was easily replaced and the existing testing program which was a custom made C based program was able to be executed in the C Controller.

In addition, the C Controller system gave possibilities for the cell to be connected to the production wide LAN and to the controller real-time network providing a way to pass on vital production data to the central management system along with the line control system further improving its traceability capabilities. The system was also able to share control information in the machine and interact with various discrete devices, such as switches and indicator lamps.

Key advantages

- Utilization of existing PC peripherals
- Industrial based robust architecture
- Open source capabilities

- Integration to factory network
- Long term cost efficient replacement
- Standard components ensuring easy commissioning

- Utilize C based program

CASE 5

Improved reliability on MES communications reduces downtime

Common issues

- System adjustment is required after updating PC OS, drivers, etc.

- PC errors frequently occur in a factory environment where vibration, dust and such are easily generated.

- Operating efficiency declines once a PC controlling the facility stops.

- Setting drivers and networks require time and labor.

Inner sheet printing · Bending furnace · Glass · Mold · Programmable controller · Beveling · Cutting · Lay up outskirt trimming · Pre-press · Outer Inner sheet sheet · Programmable controller · Loading of new glass · Layer · Programmable controller · C Controller · Washing · Pressing (Autoclave) · Programmable controller

CC-Link IE Control

Inspection ▶ Packing ▶ Shipment
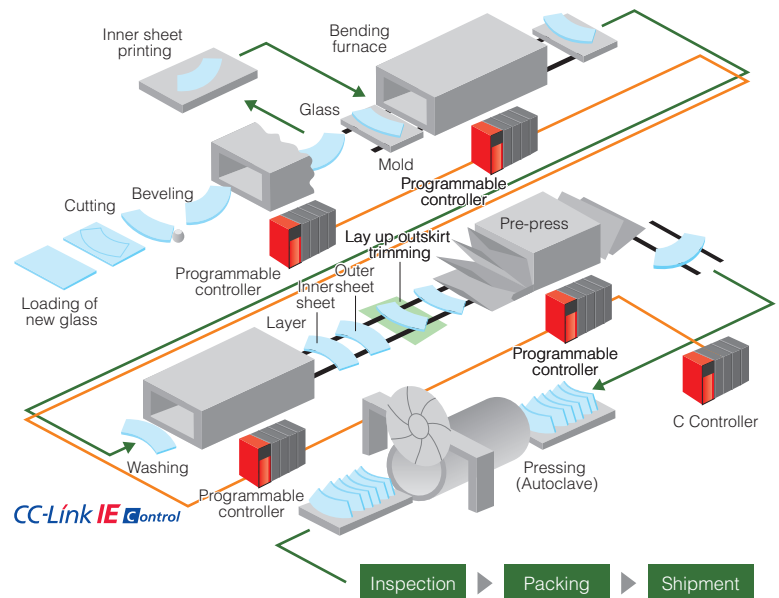
Solution

C Controller based MES communications and facility control

MES · Shop floor · Ethernet · C Controller · CC-Link IE Control
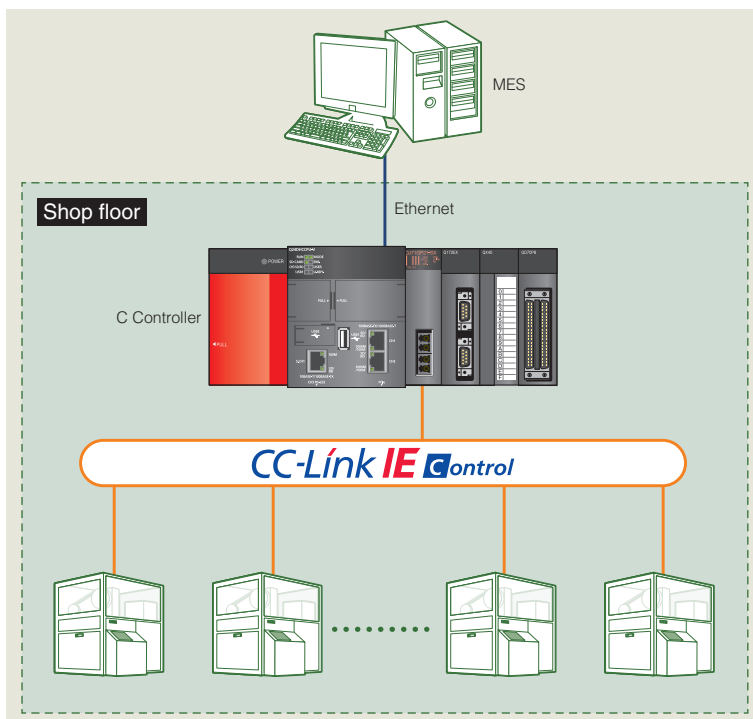
The FA dedicated durable C Controller ensures stable system architecture and reduced downtime, realizing increased productivity and improved operating efficiency.

Wide compatible varieties of Mitsubishi MELSEC programmable controllers allow the C controller to be connected with advanced motion control, high-speed I/O control and different networks, enabling utilization for variety of applications.

The existing C/C++ based programming (MES communications) system can be smoothly replaced while reducing programming time.

By replacing the PC based control system, the C Controller can utilize the existing devices as a new FA controller.

Key advantages

- Ensured reliability
- Utilization of existing assets
- Increased utilization

CASE 6

High-speed data collection without PC under harsh environment

Common issues

- Considering to replace obsolescent hardware in the existing PC data collection system, however the same PC is no more available.

- Due to discontinuation of OS (Windows®98) and IO board, redevelopment of software is necessary.

- For limited performance of PC itself, collecting increased control data is difficult.
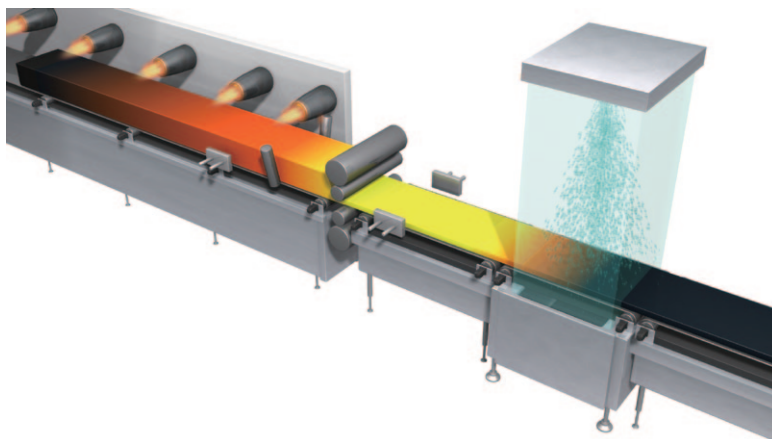
Solution

C Controller based high-speed facility data collection
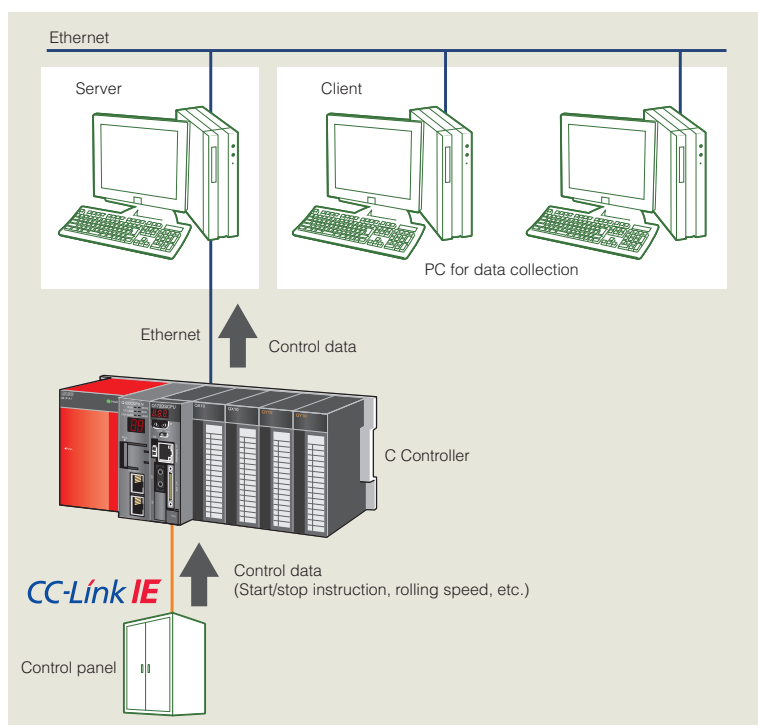
For the steel industry which requires a long-term facility operation, the C Controller is a solution to realize a stable and long-term system operation assured by highly reliable and long-term stable supply MELSEC product.

High-speed performance and stability of VxWorks® which is pre-installed real-time multitasking OS and MPU function incorporated with the C Controller enable collection and storage of entire control data at a very short cycle.

Almost all peripheral modules used with the MELSEC series are compatible with the C Controller. Accordingly, supplementary equipments can be re-used and maintenance cost can be reduced. The C Controller does not require a dedicated board unlike PC which is affected by discontinuation of boards and such.In addition, the C Controller supports variety of networks, allowing free selection of data storages.

Key advantages

- Ensured reliability
- Intuitive calculation processing
- High-speed collection/editing/ processing of large volume data
- Increased utilization
- Improved system operating efficiency
- Reduced system expansion cost
- Improved data collection performance

Line up

Development environment

Application Solution

Features

3rd Party Partner Products

Total control

Specifications

Support

Product List

CASE 7

System configuration without PC utilizing Linux® assets

Common issues

- A plant which continuously operates for a long period of time (redundant system) with arithmetic control (PC) based architecture has a risk in system stability.

- Considering to execute existing PC program on a real-time basis for more improved accuracy and performance.

- Considering to use assets developed by Linux® and reduce development costs.

Iron ore   Lime stone

Correction calculation

Control system

Iron ore sinter

Sintering machine

Blast furnace

Solution

C Controller based high-speed collection of facility data

System control PC

Ethernet

C Controller
Q24DHCCPU-LS,Q26DHCCPU-LS
Linux® OS

Correction calculation function

Correction calculation control function

CC-Link IE Control

Process computer

Line control programmable controller (redundant CPU)

Ethernet
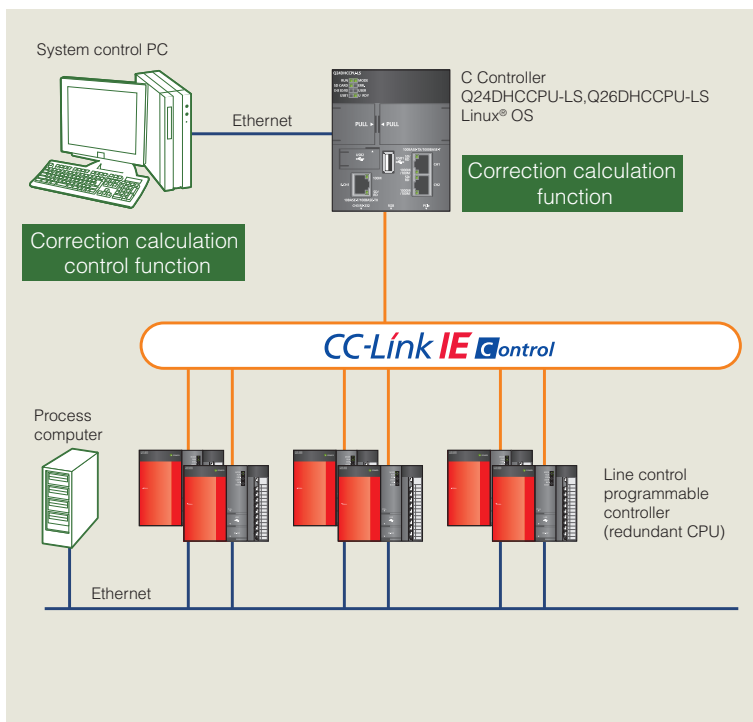
The C Controller, designed without driving components such as fan and hard drive, can operate stably in an environment with large temperature difference and vibrations.

As compared to 5 to 10 years of product cycle of PCs and servers, the MELSEC programmable controller series has more than 10 years of supply history, enabling a system life span to increase.

Equipped with general interfaces such as PCI Express® expansion connector and 1G byte Ethernet ports, devices operated by PC can be resued.

Representing complex arithmetic in C program is much easier than in a ladder form and maintenance is also easy.

The module with Linux® OS pre-installed is available, allowing a scalable system development.

Key advantages

- Reliability
- Long-term supply
- Utilization of existing assets
- Intuitive calculation processing
- Increased utilization

20—

CASE 8

Arithmetic processing and high-speed data collection

Common issues

- A PC is used on the control network connecting facilities to collect inspection results and judge shipment. Once a PC becomes faulty, the line stops, decreasing operating efficiency.

- Higher performance to collect complex and large volume data at high-speed and judge shipment in real time is necessary.

Process 1
Process 2
Process n
Shipping judgement
Pass
Fail

Solution

C Controller based high-speed collection of facility data

Data base server

Internet

Ethernet

* Data is available on Web

C Controller
Q12DCCPU-V

Data collection/
calculation function

Judgement result
calculation function

Data management
function

CC-Link IE **C**ontrol
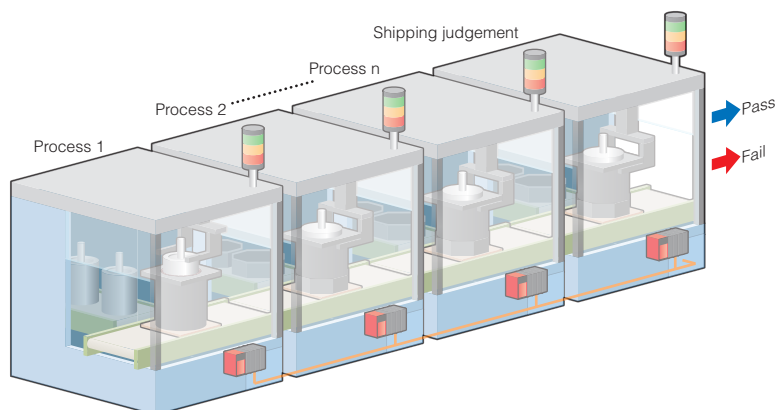
Process 1 facility
Process 2 facility
Process n facility
Shipping judgement
facility
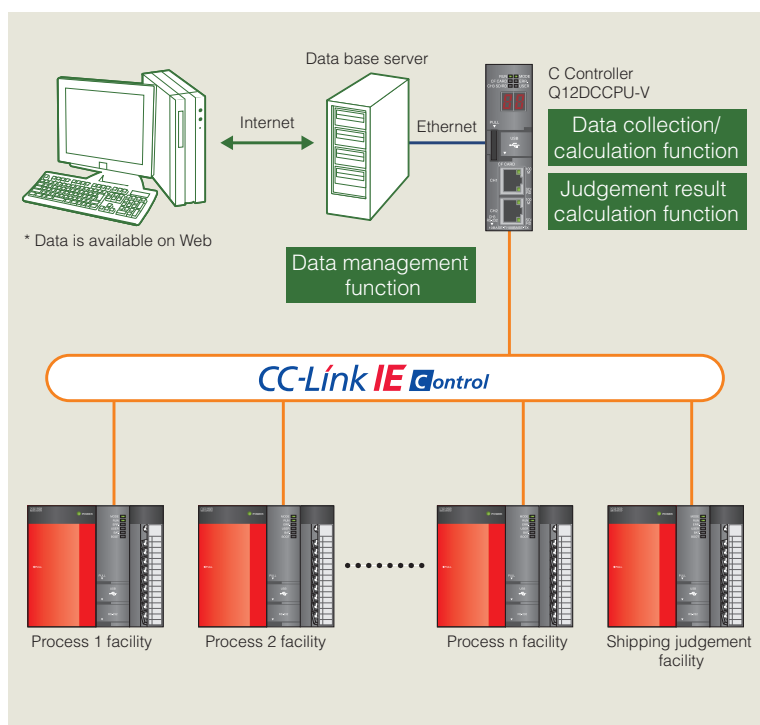
Quality data from each process facility is calculated at high-speed, enabling judgement processing for pass or fail when a product reaches the shipping judgement facility. High-speed processing by the C Controller reduces an operating cycle of devices, thereby improving production efficiency.

This robust system substantially decreases problems such as operating efficiency decline and production loss due to a line stop which are common to the system controlled by PC that requires frequent maintenance.

Unlike a PC that requires the CC-Link IE controller network card, the C Controller can use the MELSEC CC-Link IE control network module and reduces supplementary equipments.
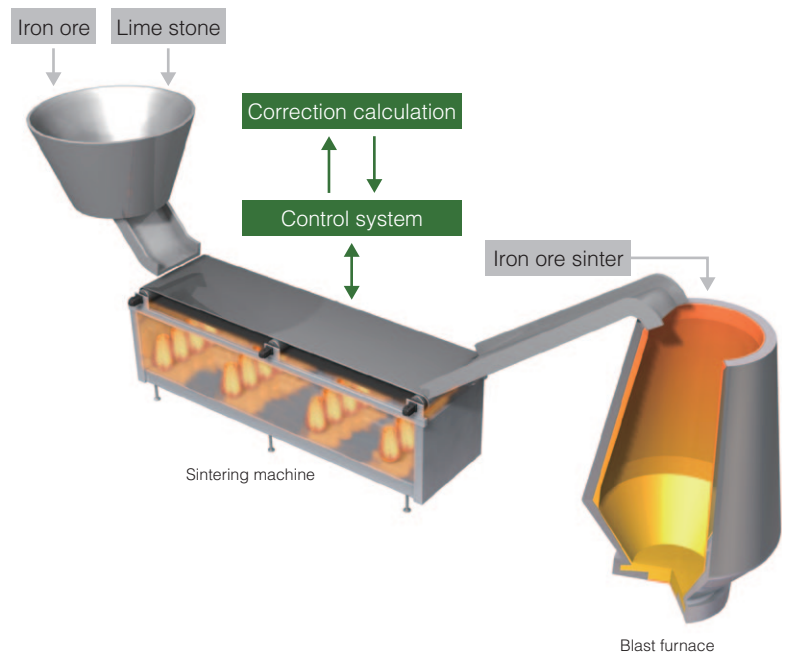
Key advantages

- Long-term supply
- Utilization of existing assets
- Reliability

- Intuitive calculation processing
- High-speed collection/editing/processing of large volume data

Line up

Development environment

Application Solution

Features

3rd Party Partner Products

Total control

Specifications

Support

Product List

CASE 9

Utilizing dedicated protocols with the C Controller

Common issues

- Increased costs maintaining various different protocols.

- Performance degrades over different protocol drivers and software to realize connectivity.

- Integrating protocol drivers written in C language to discrete control systems can be very difficult.

- Cannot effectively maintain different field devices using various protocols inside the control architecture.
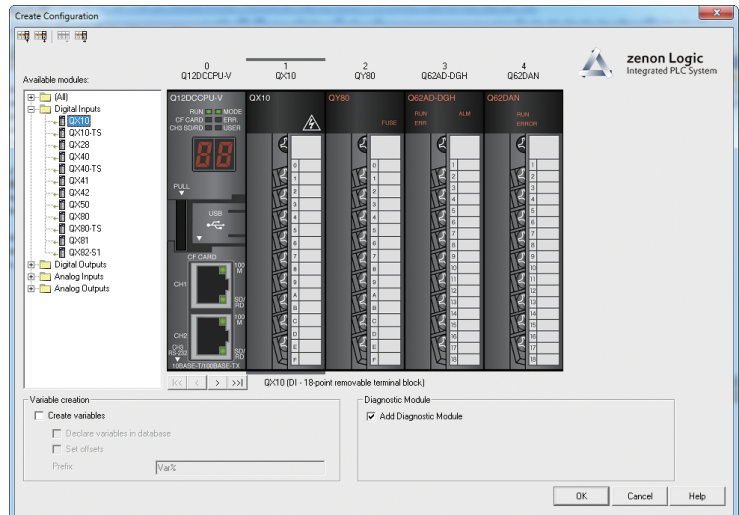
Solution

C Controller + zenon Logic (straton)™ protocol conversion

Socket communication (TCP/IP)

DNP3
IEC 60870
IEC 61850

Support multiple protocols*1
C Controller
+
zenon Logic (straton)™

DNP3
IEC 60870
IEC 61850

Various device protocols

*1 Other protocols available on request
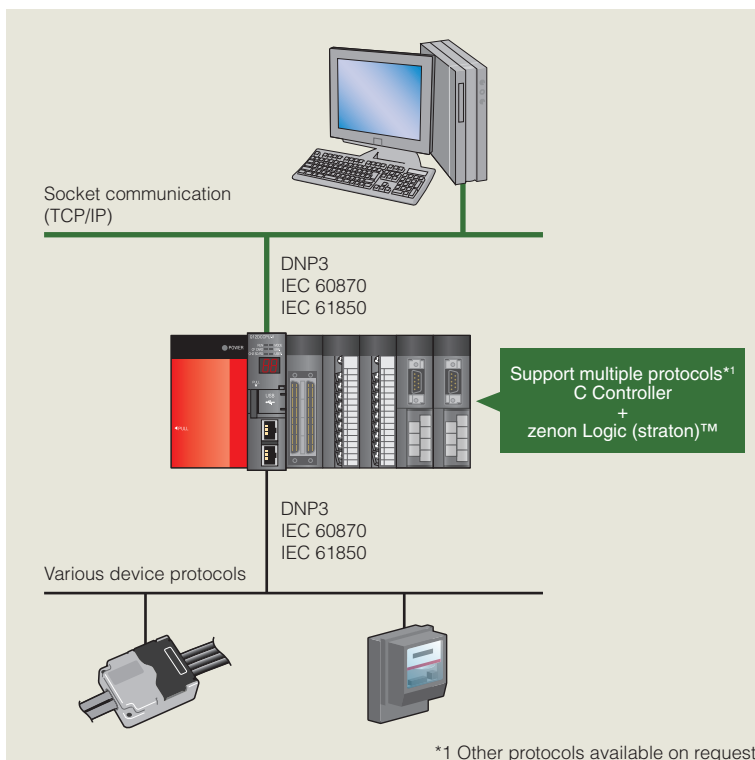
zenon Logic (straton)™ is a product of COPA-DATA

Within the control system it is quite common to see various different field devices based on different protocols. Although it is quite common to use a PC based system installing various drivers to handle the connection to these devices, this can cause bottle necks along the communication flow.

Adding to this the vast maintenance required whenever hardware becomes obsolete and needs to be changed with continuous updates of drivers required which again adds to the overall cost. Choosing a discrete control system instead such as the MELSEC system results in a much more streamlined control system at the same time reducing costs.

Various protocols can be handled easily within the C Controller module by utilizing zenon Logic (straton)™ a software developed by COPA-DATA, embedded inside the module to provide the flexibility that is required to maintain various different devices and communication protocols. In addition, the MELSEC control system is based on harsh industrial environments and is suitably designed for such situations where PC based solutions would require special enclosures to handle such environments.

Key advantages

- Handle variables from different devices
- No need to worry about gateway PCs failing
- Open up connectivity to multiple applications
- Industrial spec hardware
- Reduced upgrading costs
- Protocol know-how handled by control system
- Easily define and configure device variables

Easily integrate renewal energy management/design, while reducing investment and maintenance costs

Common issues

- Extensive investment in custom built control system makes overall system cost very expensive.

- Ever changing PC based systems making maintenance difficult.

- Expensive condition monitoring solution required

- Turbines at remote locations require off-site monitoring as unable to visit turbines frequently

- Have to re-engineer all information at design stage when creating the control system

CC-Link IE Control

CC-Link IE Control

Ethernet

Solution

C Controller + MATLAB® / Simulink® ➡P30

Main control

Wind farm network (SCADA, other turbines)

Ethernet

Vibration sensors
Accelerometer
Remote monitoring
Power measurement

CC-Link IE Control

Nacelle control

SSCNETIII/H SERVO SYSTEM CONTROLLER NETWORK

Wind direction vane
Anemometer
Rotation brakes
Blade control sensors
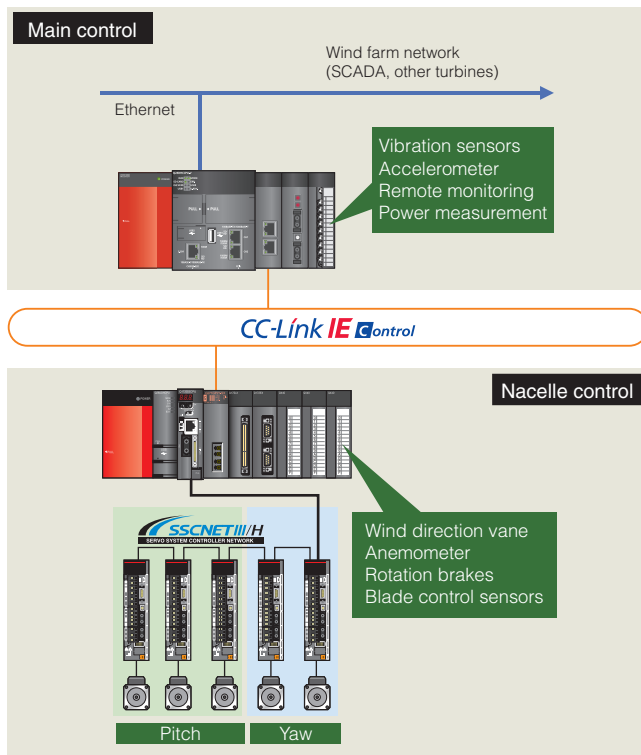
Pitch   Yaw

MATLAB®/Simulink® are products of MathWorks Inc.
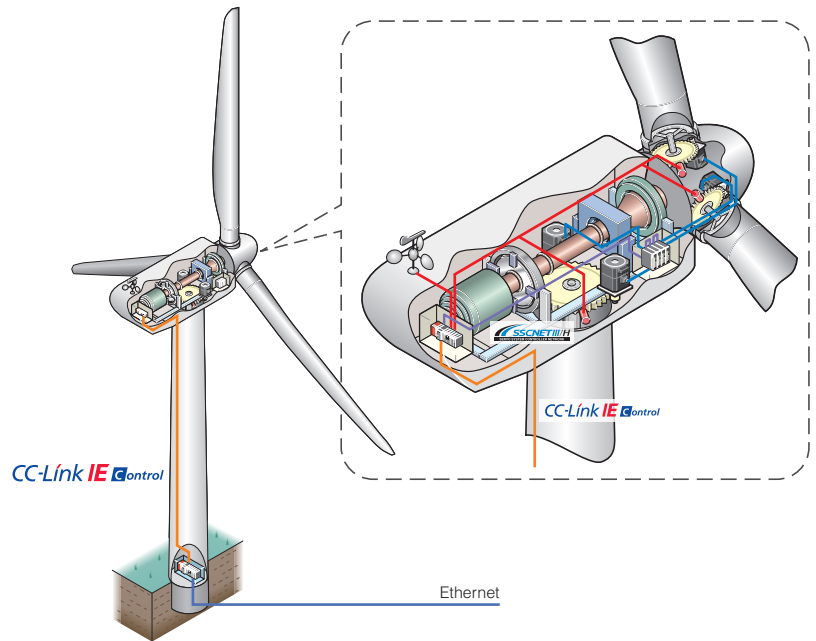
With an increase of global warming and carbon footprint reduction incentives, renewable energy systems are becoming more common place within the power generation industry. One of these technologies, the Wind Turbine, has gained in share over the past few years and the technology is becoming more common mainly due to its high energy-to-generation ratio.

Designing an effective control system for such an application can be expensive with an extensive investment in engineering required. The collaboration of MathWorks Inc. MATLAB®/Simulink® and the C Controller has provided a way of getting information created at the design stage to the engineering stage of commissioning the control system. C-code can be automatically generated once the simulation and design of the system has been completed, without having to re-enter it all over again which can induce errors in the production chain.

Utilizing the MELSEC control system has increased advantages within the actual control of the turbine too. The pitch and yaw, fundamental features in a windmill which enable optimum utilization of wind speed/direction are controlled directly by the Q series Motion CPU. In addition, condition monitoring algorithms can be executed directly in the C Controller, with real-time values coming from various sensors connected directly to the MELSEC control system. Both the Main control and Nacelle control are connected via CC-Link IE Control system ensuring fast and reliable data communication between systems. The Ethernet line is used for connecting to the overall farm monitoring substation and interconnecting other turbines within the same farm site.

Key advantages

- Reliable control system
- Integration of design stage data
- Accurate control of pitch/yaw

- Farm-wide data visualization
- Extensive real-time power control
- Standard components ensuring easy commisioning

- Flexible, reliable, efficient

Device function

Quickly and easily establish communications without a program using the device function.

Create virtual devices, similar to those used by MELSEC programmable controllers, in the memory of the C Controller CPU using the device function.

These devices can be accessed from the Mitsubishi display GOT without a communication program in the similar way as the programmable controller CPU, and the data can be read or written.

Reduce engineering costs by simplifying the implementation of HMIs and other devices by removing the need to write communication programs.

■ **Application example: Easily create a GOT screen to display device values and control operations.**

The GOT screen accesses device data directly.

On the C Controller side, device data can be easily accessed with user applications.

Word device **D0** Bit device **M0**

GOT

Developing HMI controls can be done easily just by designing GOT screens and simply assigning devices, without creating a specific communication program.
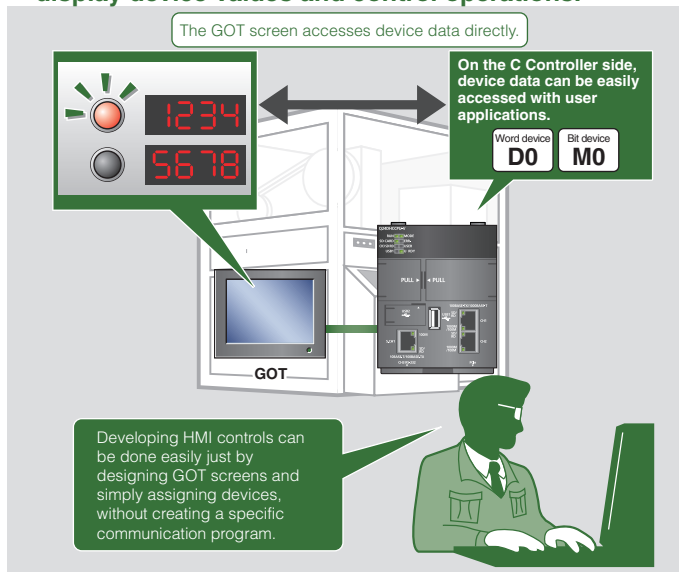
SLMP (MC Protocol Function)

Easily monitor the system, analyze data and control production from a PC or HMI

SLMP (MC protocol (QnA compatible 3E frame)), the programmable controller communication protocol, is supported via the system Ethernet port.

Various types of units (C Controller, programmable controller) are supported for communication with external devices (PC, HMI, etc.), allowing data to be exchanged with a standard communication method.
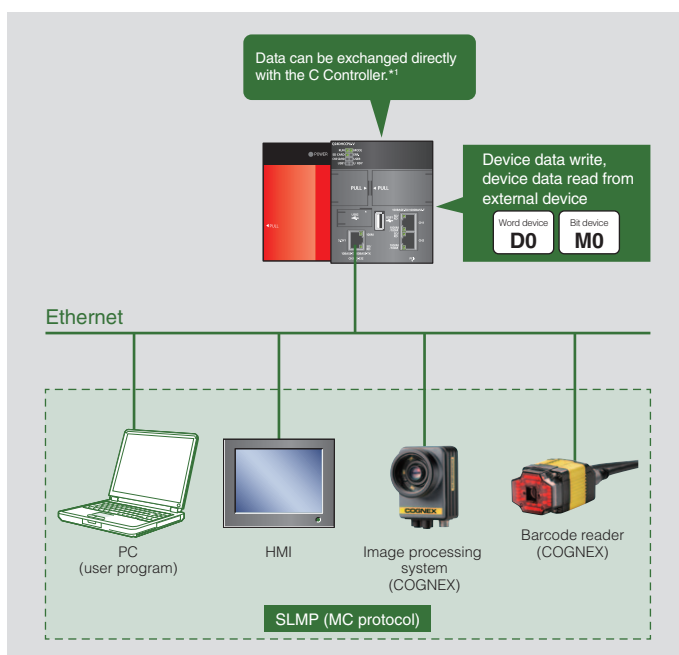
Data can be exchanged directly with the C Controller.*1

Device data write, device data read from external device

Word device **D0** Bit device **M0**

Ethernet

PC (user program)

HMI

Image processing system (COGNEX)

Barcode reader (COGNEX)

SLMP (MC protocol)

Line up

Development environment

Application Solution

Features

3rd Party Partner Products

Total control

Specifications

Support

Product List

24—

Designed for ease of use with high performance capabilities

Access level hierarchy

| Q24 -V | Q24 -VG | Q12 -V | Q24 -LS | Q26 -LS |

Set the log-in user restrictions and lockout to prevent unauthorized access

Set the log-in user and account lockout* settings when accessing by the C Controller software, FTP, and Telnet.
Unauthorized access can be prevented by having different access levels (administrator, field operator, etc) corresponding to accessible functions (read, write, execute).

* Setting to limit number of times account verification mistaken in succession.
  If the account verification successively fails more than the set number of times, the verification will be denied (locked out) for a set time.

Account setting screen

Setting and monitoring tool

FTP

Telnet

Registered user: ○
Basic verification
: Non-registered user ✕

Prevent access by unauthorized users

Service Setting Function

| Q24 -V | Q24 -VG | Q12 -V | Q24 -LS | Q26 -LS |

Further increase security by stopping of various connection services

Services that are executing inside the C Controller can be individually set. To increase security, the following service status can be enabled/disabled in the C Controller setting and monitor tool parameter settings, for example.

Service stop function setting screen

Ethernet

Telnet (disabled)

FTP (disabled)

CW Workbench (enabled)

Line up

Development environment

Application Solution

Features

3rd Party Partner Products

Total control

Specifications

Support

Product List

PCI Express® *1 extension connector

| Q24 -V | Q24 -VG | Q12 -V | Q24 -LS | Q26 -LS |

Utilize PCI Express® and PCI bus compatible devices

A PCI Express® type expansion chassis can be connected to the built-in PCI Express® extension connector. By connecting a PCI Express® or PCI bus compatible device to this expansion chassis, your valuable assets can be incorporated into various system configurations.

The MELSEC-Q series can replace PCI Express® or PCI bus compatible devices, having ample program assets, or even systems using dedicated devices with special functions.

*1: Supporting PCI Express® base specification Rev. 1.0a x1.

MPU for system control **+** MPU for user program execution

By utilizing the C Controller and PCI Express® expansion chassis you can connect PCI Express® and PCI bus compatible devices to the MELSEC system

Connect

PCI Express® expansion chassis

PCI Express®, PCI bus compatible device
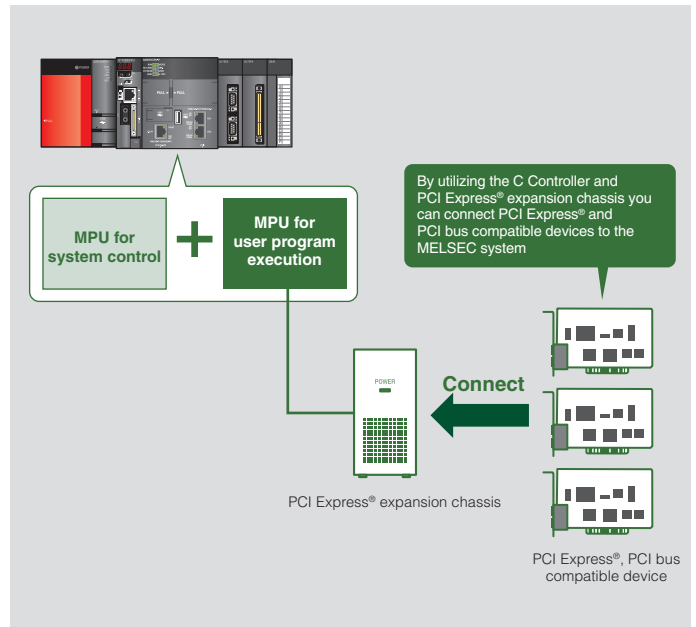
*2 Consult with your nearest Mitsubishi sales office or representative for more information when considering using the PCI Express® expansion connector.

User programmable display

| Q24 -V | Q24 -VG | Q12 -V | Q24 -LS | Q26 -LS |

Easily view the system status and improve maintenance with the embedded LED display

Maintenance operations and downtime responses are improved by allowing system status information to be viewed easily on the fly or remotely from a PC using the dedicated monitoring tool. Also status codes can be customized directly from within the user program, which is very helpful during debugging and commissioning of the equipment.

LED display (Dot-matrix)
Q24DHCCPU-V/-VG
Q24DHCCPU-LS
Q26DHCCPU-LS
Display alphabetic characters and symbols in addition to numbers.

LED display (7-segment)
Q12DCCPU-V
Display numeric and simple alphabetic characters.
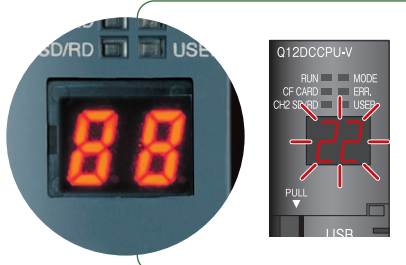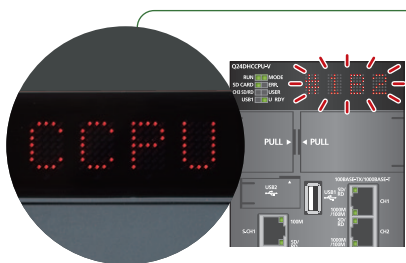
End user

The module is flashing "22". Can you tell me what's causing it?

Equipment manufacturer

Flashing "22" is caused by .... I'll send a service engineer immediately.

Dedicated library functions

Q24 -V	Q24 -VG	Q12 -V	Q24 -LS	Q26 -LS

Simpler programming by using a dedicated library suite for access to MELSEC platform hardware.

Do away with issues relating to PC control systems by having a dedicated library for access to the MELSEC system platform. Various libraries exist, including C Controller dedicated library (CCPU function), QBUS interface library (QBF function), and MELSEC communication library to directly access the C Controller, I/O modules, intelligent function modules, network modules, and other multi-CPU modules such as the programmable controller and motion CPU.

CCPU functions[1]
This dedicated library is used to read the C Controller status, control the LED, and access resources such as the clock and battery backed-up RAM, etc.

QBF functions
This dedicated library enables the C Controller to access I/O modules and intelligent function modules.

QBF functions for ISR (Interrupt Service Routine)[2]
This QBF library can be used in interrupt programs that are called by multiple CPU synchronous interrupts, interrupts from intelligent function modules/ interrupt modules, or other programmable controller CPUs.

MD functions
These dedicated library functions are allow easy access other programmable controller CPUs.

Function help - easy to understand, view and search.

The function help gives easy-to-understand explanations on how to use the various dedicated library functions.
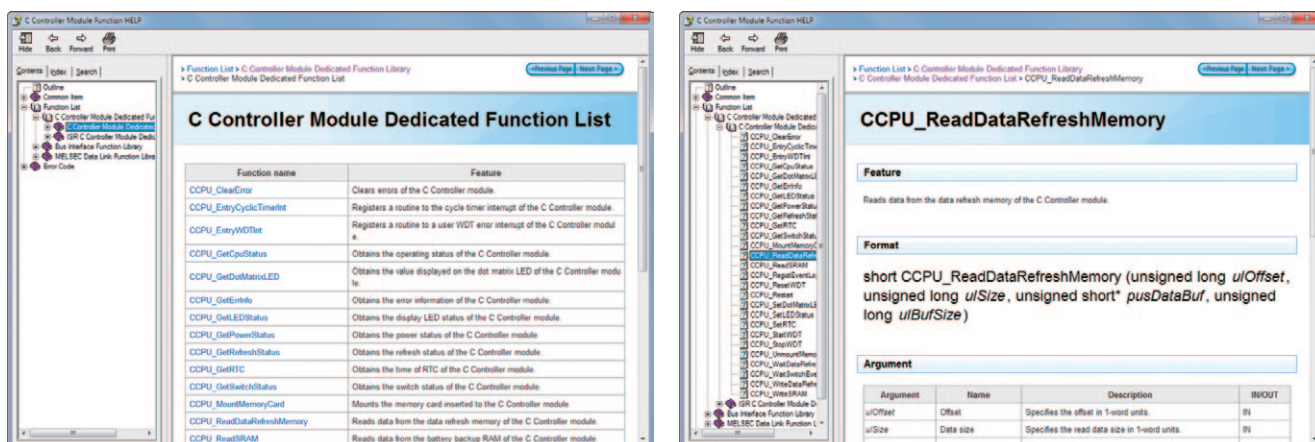
* The screens show the function help for Q24DHCCPU-V.

■ Programming example: Y output


```
18  void vSample()
19  {
20      short    sRet;    /* QBF Function Return Value */
21      long     lPath;   /* Bus Path */
22      short    i;
23
24      /* Open Bus */
25      sRet = QBF_Open(2, &lPath);
26
27      for(i = 0; i < 0x40; i++){
28          /* Read data from Y output */
29          sRet = QBF_Y_Out_BitEx(lPath,0,i,1);
30      }
31
32      /* Close Bus */
33      sRet = QBF_Close(lPath);
34      return;
35  }
```

Lamp

*1: Only supported by Q24DHCCPU-V.
*2: Only supported by Q12DCCPU-V.

Cyber Operator™

Line up

Development environment

Application Solution

Features

3rd Party Partner Products

Total control

Specifications

Support

Product List

Q24 -V	Q24 -VG	Q12 -V	Q24 -LS	Q26 -LS

NIPPON DENNO Co., Ltd.

Realize automated manufacturing with the C Controller without any system modifications

Cyber Operator™ emulates manual operation tasks such as "keyboard input", "mouse operations", "screen recognition" and "reading of values on the screen" etc., realizing automated manufacturing without having to drastically change the existing control system.
By using the dedicated tool enclosed with Cyber Operator™, system operation procedures can be easily developed[1] using the visual based GUI that creates applications to run directly in the C Controller.

*1: Easy to use such as pasting parts into a flow chart and setting the task properties.

Use dedicated tools for visualization and automatic application generation (Support design, manufacture, test and maintenance processes)

Realize automation of system operations

Emulates manual operation procedures

Screen and value data recognition

System is fully automated

Maintain high quality as mistakes are eliminated

Reduction in TCO

Cyber Operator™

Monitor

Development PC[2]

HUB

Keyboard

Mouse

Emulates simple manual operating tasks

*2: CW Workbench and the C Controller setting and monitoring tool must be installed.

CIMOPERATOR®

Q24 -V	Q24 -VG	Q12 -V	Q24 -LS	Q26 -LS

NIPPON DENNO Co., Ltd.

Implement SECS communication (GEM/non-GEM) through an easy setup process that doesn't require programming

Using CIMOPERATOR®, it is possible to perform GEM (Generic Equipment Model) compatible functions that do not require an additional PC or programmable controller program.Engineering costs can be substantially reduced utilizing the SECS (SEMI Equipment Communications Standard) communication directly to existing servers.

Programmable controller

SECS message

SECS server

No need for a PC

Engineers responsible for the programmable controller can easily develop, implement, and test SECS communication on their own.

Easy to change communication specifications

No additional programming

Supports GEM standard

Ladder program

CIMOPERATOR® SECS+

SECS/GEM

CIMSNIPER

| Q24 -V | Q24 -VG | Q12 -V | Q24 -LS | Q26 -LS |

NIPPON DENNO Co., Ltd.

Easy monitoring of process data and system errors at a reduced cost
Optimization of equipment control and efficiency

By implementing CIMSNIPER, a system to monitor the process data and manufacturing equipment errors can be inexpensively and easily implemented without modifying the existing system or MES (Manufacturing Execution System).

Connect the C Controller and CIMSNIPER to external systems, and easily create an equipment monitoring system

Communication setting   External device data setting   Sampling setting

Optimize process parameters without modifying the system

Production control supervisor   MES

LAN / SECS

Collect recipe data and detect process errors without modifying the system

Equipment maintenance supervisor   FDC

LAN / FTP

Collect system data from external sensors and controllers

LAN / SECS

Mass flow controller

Easily collect equipment data at a reduced cost

No modifications required

No additional programming

No need for a PC

Direct link to programmable controller

DNA Designer

| Q24 -V | Q24 -VG | Q12 -V | Q24 -LS | Q26 -LS |

NIPPON DENNO Co., Ltd.

Model base development support tool that enables automatic program generation by just pasting FA parts to the chart

This tool eliminates coding, reducing associated system errors and development time substantially, thereby lowering program development cost.
System development is possible by just pasting FA parts to the chart even if no control development expert is available.
The C programs can be loaded (imported) as components, allowing the existing assets to be utilized.
Model base development makes no difference between design specification and implementation.

Visual programming
Automatic program generation from chart

FA parts
Provides FA functions as parts

Utilization of existing assets
Software developed in C/C++ with microcomputer, PC and such can be loaded as parts.

Automatic generation of complex multi-task programs
DNA Designer
Ethernet connection

Visual test
Online debugging is possible on the chart

Supports all life cycle of products
All phases of programs development, including design, manufacture, testing and maintenance are supported with charts.

NIPPON DENNO Co., Ltd.

URL **http://www.den.co.jp**
For more information on this product,
please contact your local Nippon Denno representative.

Line up

Development environment

Application Solution

Features

3rd Party Partner Products

Total control

Specifications

Support

Product List

MATLAB®/Simulink®

Q24 -V	Q24 -VG	Q12 -V	Q24 -LS	Q26 -LS

MathWorks, Inc.

Automatic program generation directly from MATLAB®/Simulink® to C Controller

By using MATLAB®/Simulink®, applications can be developed using high-level language for numerical computation, such as linear algebra, statistics, and Fourier analysis, together with visualization based product development. Simulation using Simulink®, simulation and model based design can be achieved to root out problems and errors at the design stage before commissioning.

Overall a far more efficient C Language program can be automatically generated reducing overall code size and also reducing the possibility of human induced errors being introduced.

MATLAB®
- Data collection
- Data analysis & visualization
- Programming

Simulink®
- Modeling
- Simulation
- Automatic code generation

XXX.out

Into C Controller

XXX.c

Compile with development environment (CW Workbench, etc.)

Automatically generate C language program

MathWorks, Inc.
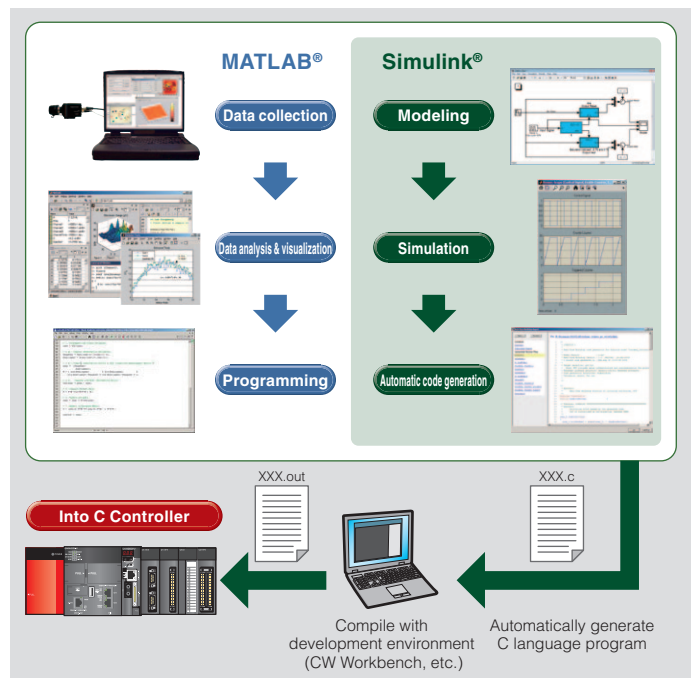
URL **http://www.mathworks.com**
For more information on this product,
please contact your local MathWorks representative.

Vmech®

Q24 -V	Q24 -VG	Q12 -V	Q24 -LS	Q26 -LS

Lattice Technology Co., Ltd.

Development using virtual mechanical models without actual devices

By utilizing 3D-CAD data, a virtual manufacturing line with machines (digital mock-up) can be created and machine performance can be simulated.

Software debugging is possible while the product is still in design, enabling front-loading of machine performance verification, thus realizing shorter development schedule.

In addition, faulty performance verification which is difficult with actual devices can be virtually done helping to improve software quality.

MELSEC **Q** series

Socket

C Controller CPU
- User program
- Memory

Motion CPU
- Motion program
- Memory

Positioning module
- Motion parameter
- Memory

MELSEC C-CPUSim for Vmech®

Interface (Vmech® optional product)

Virtual machine

VMECH

Virtual motor/sensor

Lattice Technology Co., Ltd.
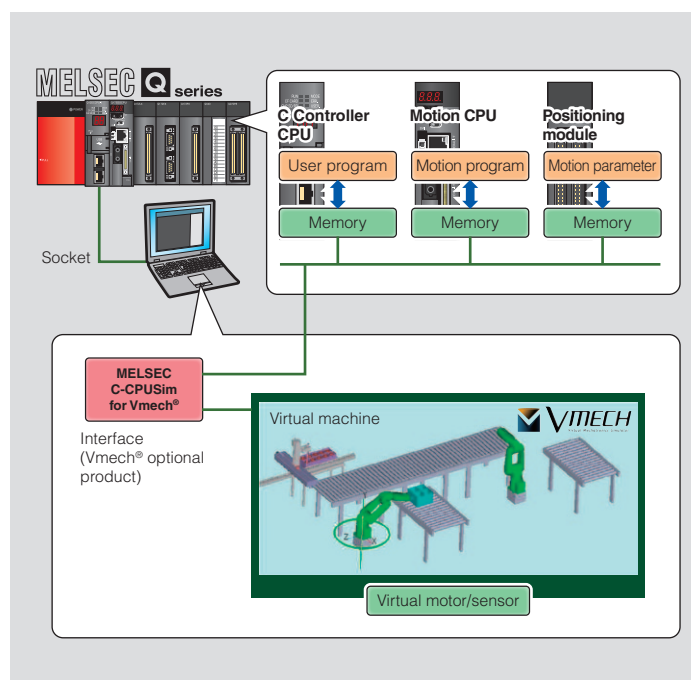
URL **http://www.lattice.co.jp/ja/product/vmech.html**
For more information on this product,
please contact your local Lattice Technology representative.

3rd Party Partner Products

GENWARE®3/GENWARE®3-VG

| Q24 -V | Q24 -VG | Q12 -V | Q24 -LS | Q26 -LS |

International Laboratory Corporation

Automatic C program generation from design data substantially reduces GUI development time

GUI[*1] applications, such as monitor screen and operation screen, can be developed in the visual programming style similar to VB/VC using the supplied GUI[*1] development tool (GENSKETCH).
Icon image data and animation data created with general design tool can be imported and automatically converted to C program, realizing easy creation of well-designed GUI[*1].

*1: GUI:Graphical User Interface

International Laboratory Corporation

Design data

Icon image data created with Photoshop and Flash animation data can be imported

Screen transition diagram

Screen transition diagram created with Visio® can be imported

Edit screen layout using supplied GUI development tool

The developed GUI operation can be monitored in real-time by connecting to the C Controller and can be debugged.

Ethernet connection

Add user-specific processing program

Automatic code generation of C program

Load to the C Controller

Link to the library provided by ILC and build using specified compiler

---
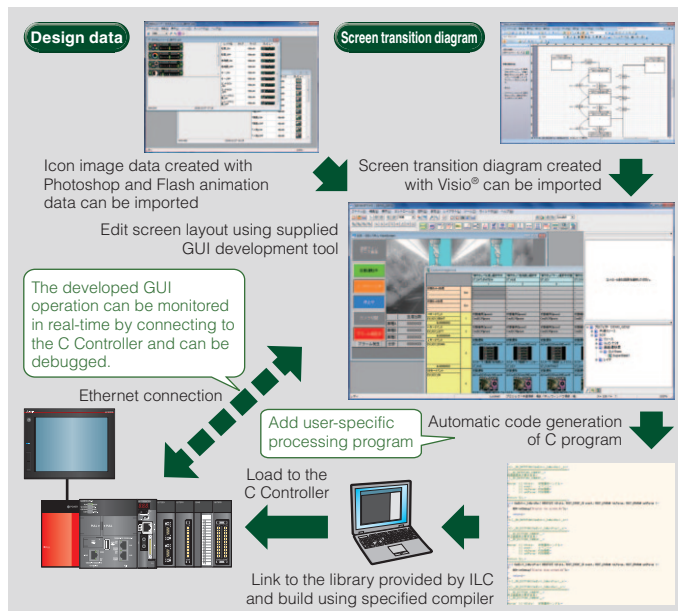
Touch panel monitor

| Q24 -V | Q24 -VG | Q12 -V | Q24 -LS | Q26 -LS |

Mitsubishi Electric Engineering Co, Ltd.

Touch panel monitor FA environment dedicated

Analog resistive touch panel monitor. A protective sheet which keeps out water and foreign substances such as dust is provided, realizing environment resistance equivalent to IP65 (display only).
In addition, a LED back light is built in for power consumption reduction.The life of LED back light is 60,000 hours.The estimated life expectancy of aluminum electrolytic capacitor is 62,000 hours (operating ambient temperature at 35°C)

TSD-FT1514-MNU

USB

Picture signal

Mitsubishi Electric Engineering Co, Ltd.
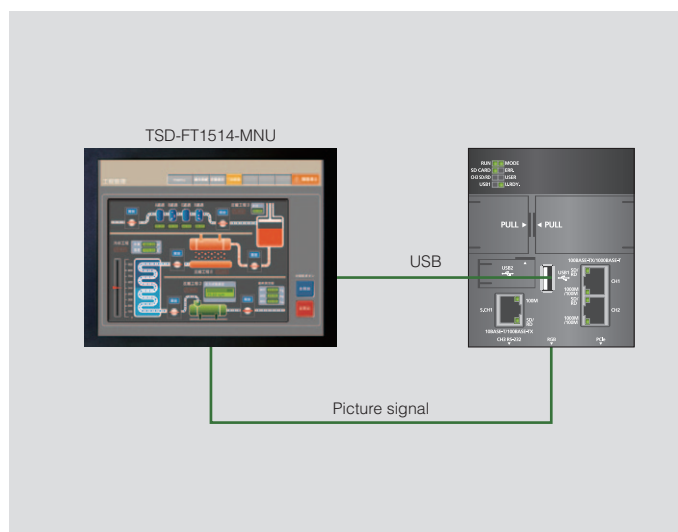
In-Sight vision system

Cognex Corp.

Create a machine vision system with COGNEX In-Sight EZ, In-Sight 7000 Series and the C Controller

Easily realize a machine vision control system based on the C Controller with the integration of COGNEX compact smart camera. Machine vision system control can be executed directly from the C language program simplifying various automation processes realizing a simple and cost efficient solution.

Simple communication with SLMP

The "In-Sight EZ" supports SLMP (MC protocol), enabling easy data communication between the vision and controller system. The communication is simply done using "EasyBuilder", just by selecting the target device and SLMP as the communications protocol. In addition, event driven image capture is realized via the SLMP when in scanner mode.

Cognex Corporation

URL **http://www.cognex.com**
For more information on this product,
please contact your local Cognex representative.

Send native mode[1] or MC Protocol commands from the C program via Ethernet to trigger image capture.

Captured images are stored directly in the C Controller.

In-Sight EZ Series

In-Sight EZ-700[2]

In-Sight 7000 Series[2]

HUB
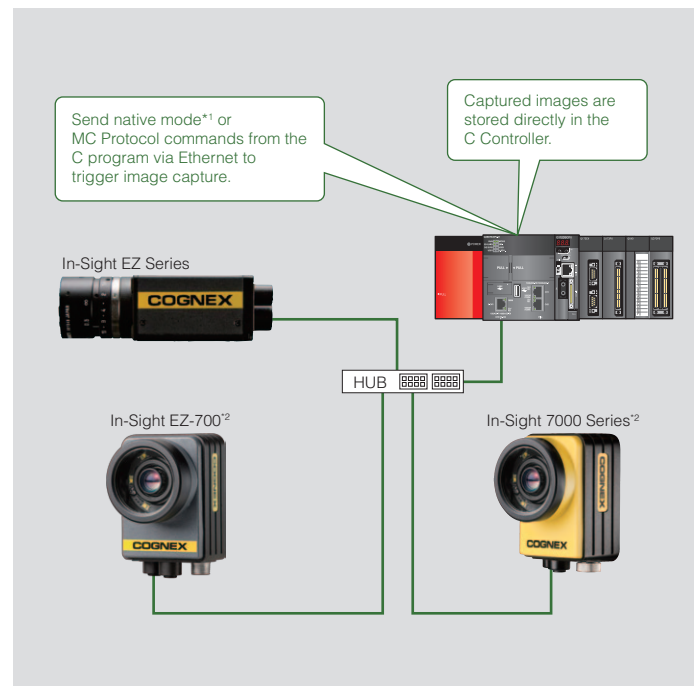
*1: Native mode is a dedicated communication protocol for the COGNEX vision system.
*2: An external power supply (24 V) is required for In-Sight EZ-700 and In-Sight 7000.

Line up

Development environment

Application Solution

Features

3rd Party Partner Products

Total control

Specifications

Support

Product List

Total control

Take complete control of an application using driving modules

The Q series platform provides outstanding flexibility by scaling to match the needs of the system.

■ The C Controller can be combined with a simple motion module, motion CPU or C Controller interface module.

■ Create the optimum configuration according to the control application and system scale.

Perform positioning and synchronous control using the C Controller only

C Controller

```
// To Simple Motion
// Set to Buffer Memory
ret=QBF_ToBuf();
```
• Data control
• Data collection
• Scheduling
• Recipe data
• Start positioning

Read/write

Simple Motion

Interface

Positioning control processing   Positioning data table

- Realizing wide range of high speed and high accuracy controls similar to positioning module.
- In addition to the already supported positioning control, speed control, torque control and synchronous control are supported.
- "C Controller setting/monitor tools" enables simple positioning data setting, monitoring and debugging.

C Controller CPU

SSCNETⅢ/H
SERVO SYSTEM CONTROLLER NETWORK

For medium and large scale system

C Controller

```
// To Motion CPU
// Activate servo program
ret=QBF_MotionSVST();
```
• Data control
• Data collection
• Scheduling
• Recipe data
• Activate servo program

Read/write

Motion CPU

• Servo control
• Event control

- Dividing control tasks between the C Controller for machine control and the motion CPU for motion control ensures stable operation of the system where many axes and machines are controlled

- A wide array of motion functions can be implemented (interpolation control, speed control, electronic cam, excursion control, etc.)

Replace with C Controller

SSCNETⅢ/H
SERVO SYSTEM CONTROLLER NETWORK

Line up
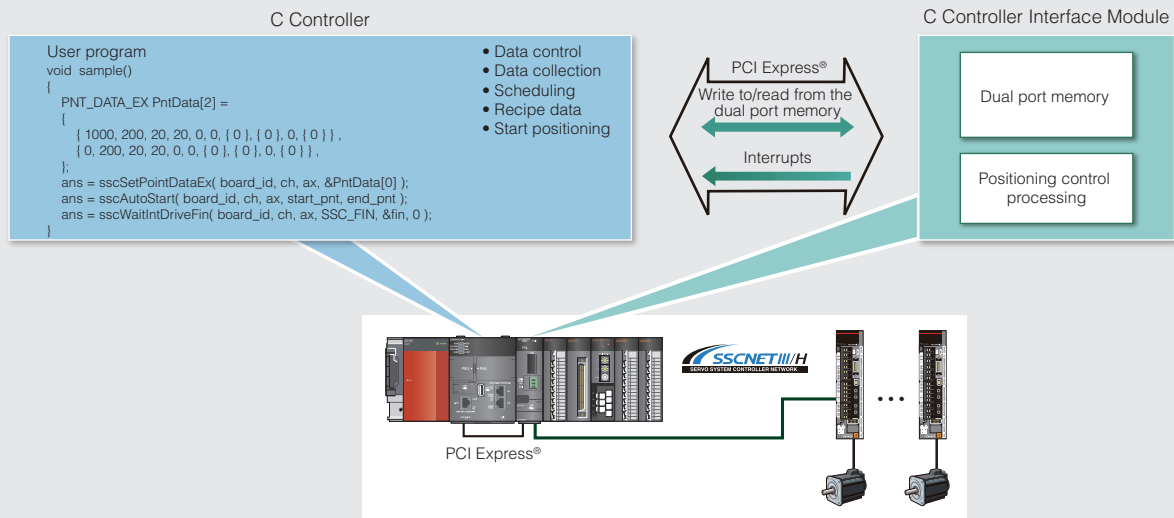
Development environment

Application Solution

Features

3rd Party Partner Products

Total control

Specifications

Support

Product List

Configure a high-response servo system in combination with the C Controller

Connected directly to the C Controller via PCI Express®, this module is used for controlling MELSERVO-J4 SSCNET III/H compatible servo amplifiers, through a user program.

- High speed access is possible from user program execution MPU directly connected via PCI Express®
- Event-driven programs, which use PCI Express® interrupts, can be created.
- Equipped with positioning functionality using point table.
- An API library is available for more efficient software development.
- In the interface mode, direct control of the servo amplifier is possible using position command created in user program.

C Controller

```
User program
void  sample()
{
    PNT_DATA_EX PntData[2] =
    {
        { 1000, 200, 20, 20, 0, 0, { 0 }, { 0 }, 0, { 0 } } ,
        { 0, 200, 20, 20, 0, 0, { 0 }, { 0 }, 0, { 0 } } ,
    };
    ans = sscSetPointDataEx( board_id, ch, ax, &PntData[0] );
    ans = sscAutoStart( board_id, ch, ax, start_pnt, end_pnt );
    ans = sscWaitIntDriveFin( board_id, ch, ax, SSC_FIN, &fin, 0 );
}
```

- Data control
- Data collection
- Scheduling
- Recipe data
- Start positioning

PCI Express®
Write to/read from the dual port memory

Interrupts

C Controller Interface Module

Dual port memory

Positioning control processing

PCI Express®

Comparison between simple motion module, motion CPU and controller interface module

	Simple motion module	Motion CPU	C controller module Interface module
Number of control axes	QD77MS2: Up to 2 axes QD77MS4: Up to 4 axes QD77MS16: Up to 16 axes	Q172DSCPU: Up to 16 axes Q173DSCPU: Up to 32 axes	Q173SCCF: Up to 20 axes
Servo amplifier network	SSCNET III/H		
Max. distance between stations (m)	100		
Electronic gear	Available		
JOG operation	Available		
Incremental feed	Available		
Interpolation	Linear interpolation: Up to 4 axes Circular interpolation: Up to 2 axes	Linear interpolation: Up to 4 axes Circular interpolation: Up to 2 axes	Linear interpolation: Up to 4 axes
Synchronous control	Available	Available	–
Home position return	5 methods	12 methods	10 methods
Acceleration/deceleration control	Trapezoidal acceleration/deceleration S-curve acceleration/deceleration	Trapezoidal acceleration/deceleration S-curve acceleration/deceleration Advanced S-curve acceleration/deceleration	Trapezoidal acceleration/deceleration S-curve acceleration/deceleration Smoothing filter
Program	C (Bus interface function)	Motion SFC	C (API library for position control)
Engineering tool	C Controller setting/monitor tool SW4PVC-CCPU-J	MELSOFT MT Works2	C Controller interface module Utility SW1DNC-QSCCF-B

Specifications

General Specifications

General specifications indicate the environmental specifications in which this product can be installed and operated. Unless otherwise specified, the general specifications apply to all products of the Q series.
Install and operate the Q series products in the environment indicated in the general specifications.
* The general specifications for double brand products will differ. Contact the respective company or refer to the respective product manual.

Item	Specification[*1]				
Operating ambient temperature	0 to 55℃				
Storage ambient temperature	-25 to 75℃ [*2]				
Operating ambient humidity	5 to 95%RH, non-condensing[*3]				
Storage ambient humidity					
Vibration resistance	Compliant with JIS B 3502 and IEC 61131-2		Frequency	Acceleration	Amplitude	Sweep count
		Under intermittent vibration	5 to 8.4Hz	–	3.5mm (0.14 inches)	10 times each in X, Y, Z directions
			8.4 to 150Hz	9.8 m/s^2	–	
		Under continuous vibration	5 to 8.4Hz	–	1.75 mm (0.069 inches)	–
			8.4 to 150Hz	4.9 m/s^2	–	
Shock resistance	Compliant with JIS B 3502, IEC 61131-2 (147 m/s^2, 3 times in each of 3 directions X, Y, Z)				
Operating ambience	No corrosive gases				
Operating altitude[*4]	2000m (6562 feet) max.				
Installation location	Inside control panel				
Overvoltage category [*5]	Ⅱ max.				
Pollution level [*6]	2 max.				
Equipment category	Class Ⅰ				

*1: When installing a commercially available SD memory card/CompactFlash card into the C Controller module, follow the lower specifications of either the C Controller module or SD memory card/CompactFlash card.
*2: The storage ambient temperature is -20 to 75: if the system includes the AnS/A series modules.
*3: The operating ambient humidity and storage ambient humidity are 10 to 90%RH if the system includes the AnS/A series modules.
*4: Do not use or store the programmable controller under pressure higher than the atmospheric pressure of altitude 0m.
　　Doing so can cause a malfunction.
　　When using the programmable controller under pressure, please contact your sales representative.
*5: This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within premises. Category 2 applies to equipment for which electrical power is supplied from fixed facilities.
　　The surge voltage withstand level for up to the rated voltage of 300 V is 2500 V.
*6: This index indicates the degree to which conductive material is generated in terms of the environment in which the equipment is used.
　　Pollution level 2 is when only non-conductive pollution occurs. A temporary conductivity caused by condensing must be expected occasionally.

Performance specifications[*7]

			Specification			
Item			Q12DCCPU-V	Q24DHCCPU-V Q24DHCCPU-VG		Q24DHCCPU-LS Q26DHCCPU-LS NEW
Hardware specifications	Endian format (memory assignment)		Little endian			
	Microprocessor		SH-4A	User CPU	Intel® ATOM™ Processor	User CPU	Intel® ATOM™ Processor (OS Independent)
				System CPU	SH-4A	System CPU	SH-4A
	User file capacity (For user file storage)	Standard RAM	3MB	Maximum 4MB (total 5MB with battery backup)		–
		Standard ROM	12MB (Extended mode only)[*8]	382MB		–
		Built-in SSD	–			Q24DHCCPU-LS: 512MB (including OS) Q26DHCCPU-LS: 8GB (including OS)
		Memory card	Depends on the CompactFlash card used. (Maximum 8GB)	Depends on mounted SD memory card/ SDHC memory card (Maximum 16GB)		
	Working RAM (For OS, driver, user program execution)		128MB	512MB		Q24DHCCPU-LS: 512MB Q26DHCCPU-LS: 1GB
	Battery backed-up RAM		512KB[*9]	Maximum 5MB (total 5MB with standard RAM)		5MB
Software specifications	Operating system		VxWorks® 6.4[*10] (Installed at product shipment)	VxWorks® 6.8.1[*10] (Installed at product shipment)		Lineo uLinux[*11]: kernel2.6.35,eT-Kernel/compact[*12][*13] (Not installed at shipment)
	Development environment	Programming development environment	CW Workbench Wind River Workbench 2.6.1[*10]	CW Workbench Wind River Workbench 3.2[*10]		Lineo uLinux ELITE[*11] eBinder®[*12][*13]
		Programming language	C language (C/C++)			C language (C/C++) Script language (Ruby, PHP, Parl, Python)[*14]
Communication interfaces	Ethernet[*15]		10BASE-T/100BASE-TX	User Ethernet port (CH1, CH2): 10BASE-T/100BASE-TX/1000BASE-T System Ethernet port (S CH1): 10BASE-T/100BASE-TX		
	USB		USB series miniB connector	USB1: Connector type A USB2: Connector type mini-B		
	RS-232		Round type miniature connecter (10pin plug)[*16]			
	PCI Express® extension connector		–	PCI Express®		
	Memory card		CompactFlash card (1 slot)[*17]	SD memory card specifications (1 slot)		
	Display interface		–	Q24DHCCPU-V: – Q24DHCCPU-VG: Analog RGB D-Sub15pin		Analog RGB D-Sub15pin

*7: The performance specifications may be modified without notice.
*8: Basic mode does not support. Extended mode is available with the product with first five serial number digits 15102 or later.
*9: 128KB for products with first five serial number digits 12041 or before, 512KB to 3,584KB for products with first five serial number digits 15102 or later.
*10: VxWorks® 6.8.1, VxWorks® 6.4, Wind River Workbench 3.2 and Wind River Workbench 2.6.1 are products of Wind River Systems, Inc. Refer to the Wind River Systems, Inc. product manuals or contact Wind River Co., Ltd. (Japan office) for service and specifications of Wind River Systems products. Refer to the following web site for contact information of Wind River Co., Ltd. http://www.windriver.com
*11: Must be separately purchased from Lineo Solutions, Inc.
*12: Must be separately purchased from eSOL, Inc.
*13: Q26DHCCPU-LS does not support.
*14: When Lineo uLinux is used. The program language depends on the specifications of the 3rd Party partner OS.
*15: Please refer to the relevant manufacturer for details on the number of connectable stages when using a switching hub.
*16: Attach the RS232 connector cable (Q12DCCPU-CBL) [option], and connect the 9-pin D-sub (male) type RS232 connector. An RS-232 cable with the same specifications as Q06CCPU-V can be used.
*17: TYPE I cards are supported. A TYPE II card cannot be used. I/O cards such as modem cards cannot be used.

List of C Controller CPU functions

Item			Q12DCCPU-V	Q24DHCCPU-V Q24DHCCPU-V G	Q24DHCCPU-LS Q26DHCCPU-LS **NEW**
Applicable modules	General I/O modules	Input	Yes		
		Output	Yes		
		Input/Output	Yes		
		Interrupt input	Yes		
	Analog I/O modules	Analog input	Yes		
		Analog output	Yes		
		Analog input/output	Yes		
		Load cell input	Yes		
		CT input	Yes		
		Temperature input	Yes		
		Temperature control	Yes		
		Loop control	Yes		
	Pulse I/O and positioning modules	Channel isolated pulse input	Yes		
		High-speed counter	Yes		
		Simple motion			
		Positioning	Yes		
	Energy measuring module	Energy measuring	Yes		
		Insulation monitoring	Yes		
	Information modules	MES interface*1	Yes*3	Yes	
		High-speed data logger*2	Yes*3	Yes	
		Web server*4*5*6	Yes		
		Serial communication	Yes		
	Network modules	CC-Link IE controller network	Yes		
		MELSECNET/H	Yes		
		CC-Link IE field network	Yes*7	Yes*8	
		CC-Link	Yes		
		CC-Link/LT	Yes		
		AnyWire DB A20	Yes		
		FL-net (OCPN-2)	Yes		
		AS-i	Yes		
Multiple CPU function		Multiple control system can be configured by combining C Controller module with Motion CPUs and programmable controller CPUs.			
	Communications by dedicated library functions	Data access and control command can be performed from user programs on the C Controller module to Motion CPUs and programmable controller CPUs using dedicated library functions.	Yes		No
	Control command to Motion CPU	Programs on the Motion CPU can be activated, or servo setting value/current value can be read and changed from the C Controller module.	Yes		No
	Interrupt issue to Motion CPU	Interruption can be issued to Motion CPU from C Controller module.	Yes		No
	Data communications by CPU shared memory	Data can be transmitted through CPU shared memory between C Controller module and other CPUs (programmable controller CPU, Motion CPU).	Yes		
	Programmable controller control	Execution status of programmable controller CPU or execution type of sequence (ladder) program can be controlled from user programs on the C controller module.	Yes		No
	Synchronized event notification	By registering processes as synchronized events, programs to be executed in synchrony with the iQ platform compatible Motion CPU module can be created.	Yes	No	
	Multiple CPU high speed transmission	Multiple CPU high speed transmission can be performed by using the multiple CPU high speed main base unit (Q38DB, Q312DB).	Yes		
Interrupt from intelligent function module		The interrupt routine can be started with an interrupt request from the intelligent function module.	Yes*3	No	
Device function		Devices similar to those used in MELSEC Sequence CPUs are created in the RAM of the C Controller.	Yes*3	Yes	
HMI access function	Connection with device function	Data can be exchanged with the GOT by reading and writing C Controller devices via the bus or other network connections.	Yes*3*9	Yes*9	
Self-diagnostic function	Self-diagnostic function	Operating status of each module controlled by the C Controller is monitored and error status are detected.	Yes		
	H/W self-diagnostic function	H/W diagnostic of C Controller module is performed according to the diagnostic items.	Yes		
Watchdog timer (WDT) function		An internal timer to detect errors on a C Controller module, H/W and user program errors are detected by the watchdog timer.	Yes		
Restarting User CPU function		This function allows just the user CPU to be restarted without restarting the entire programmable controller system.	No	Yes	
Data refresh function		The MELSEC system's data is automatically refreshed in the C Controller module's memory area at the timing designated with the C Controller setting and monitor tool.	No	Yes	
Access authority setting function		Restricts operations from Setting/monitoring tools for the C Controller module, Telnet function and FTP function by setting (adding/deleting) user (s) to the C Controller module.	No	Yes	
Intelligent Function Module Access		The intelligent function module's parameters can be set/monitored from the C Controller setting and monitor tool.	No	Yes	
System monitor function		Monitors the system configuration.	No	Yes	
Security Function		Reads the C Controller module's unique identification information by accessing a specified address.	No	Yes	
Battery Less Drive		Operates the C Controller module without battery.	No	Yes	

*1: Use in combination with a QJ71MES96 (first five serial number digits 12092 or later).
*2: Use in combination with a QD81DL96 (first five serial number digits 12062 or later).
*3: Use a product whose first five serial number digits are 12042 or later.
*4: Use in combination with a Q12DCCPU-V (first five serial number digits 12042 or later), or QJ71WS96 (first five serial number digits 14022 or later).
*5: GX RemoteService-I cannot be used.
*6: MX MESInterface-WS Version 1 cannot be used.
*7: Use in combination with a Q12DCCPU-V (first five serial number digits 12042 or later), or QJ71GF11-T2 (first five serial number digits 12062 or later).
*8: Use in combination with a QJ71GF11-T2 (first five serial number digits 14082 or later).
*9: For details about configuring the connection, refer to the GOT2000 Series Handbook and GOT2000 Series Connection Manual.

Line up

Development environment

Application Solution

Features

3rd Party Partner Products

Total control

Specifications

Support

Product List

Support

1. Technical support assistance service regarding the C Controller module

For technical support assistance service regarding the C Controller module, refer to the table below.
If you are not sure which type the inquiry belongs to, please contact your local Mitsubishi Electric sales office or representative. (Please note that inquiries other than MELSEC-related inquiries may not be able to be answered.)

Type	Inquiry	Where to contact
MELSEC-related	• Functions and specifications of the C Controller module • Specifications and usage of the dedicated function library provided by Mitsubishi Electric Corporation • C controller setting and monitoring tool, and functions and specifications of CW Workbench • Functions and specifications of the Mitsubishi products to be used with the C Controller module (such as units and MELSOFT)	Local Mitsubishi representative
Operating system-related	• Functions and specifications of VxWorks®, API functions provided by VxWorks®, and general inquiries regarding programming related to VxWorks® • Functions and specifications of Wind River Workbench and Tornado™	Wind River Systems, Inc. URL: http://www.windriver.com
	• Details regarding Lineo uLinux ELITE • Board Support Package dedicated developers support website.	Lineo Solutions, Inc. URL: http://www.lineo.co.jp/modules/english/ E-mail: sales@lineo.co.jp Dedicated support website: http://eldmicc.lineo.co.jp Provides technical information for installing Linux® OS on the Q24DHCCPU-LS in addition to the uLinux ELITE development software.
	• Details regarding eT-Kernel	eSOL, Inc URL: http://www.esol.co.jp/
3rd Party partner product-related	• Functions and specifications of 3rd Party partner products	3rd Party partner product manufacturer
Plug-in software-related	• Inquiries regarding the plug-in software to be used with CW Workbench or Wind River Workbench	Plug-in software manufacturer

Factory Automation Global website

Mitsubishi Electric Factory Automation provides a mix of services to support its customers worldwide. A consolidated global website is the main portal, offering a selection of support tools and a window to its local Mitsubishi Electric sales and support network.

■ **From here you can find:**

- Overview of available factory automation products
- Library of downloadable literature
- Support tools such as online e-learning courses, terminology dictionary, etc.
- Global sales and service network portal
- Latest news related to Mitsubishi Electric factory automation

Mitsubishi Electric Factory Automation Global website:

www.MitsubishiElectric.com/fa
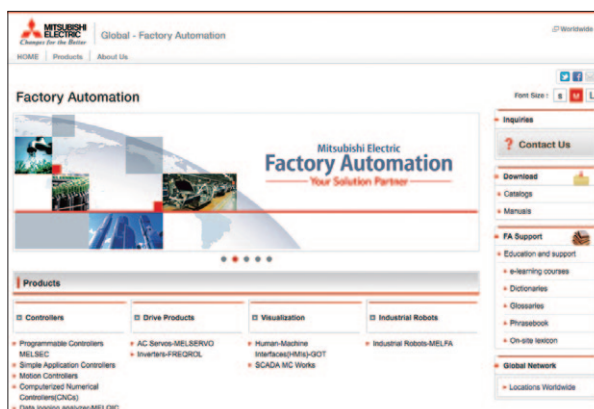
Online e-learning

An extensive library of e-learning courses covering the factory automation product range has been prepared. Courses from beginner to advanced levels of difficulty are available in various languages.
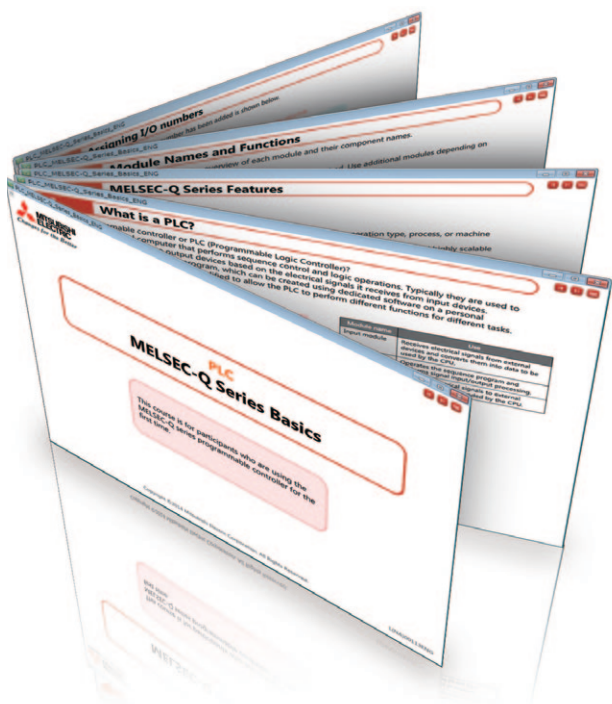
■ **Beginner level**
Designed for newcomers to Mitsubishi Electric Factory Automation products gaining a background of the fundamentals and an overview of various products related to the course.

■ **Basic to Advanced levels**
These courses are designed to provide education at all levels. Various different features are explained with application examples providing an easy and informative resource for in-house company training.

Line up

Development environment

Application Solution

Features

3rd Party Partner Products

Total control

Specifications

Support

Product List

Innovative next-generation, e-Manual

The e-Manual viewer is a next-generation digital manual offered by Mitsubishi Electric that consolidates all manuals into an easy-to-use package with various useful features integrated into the viewer. The e-Manual is modeled around a centralized database allowing multiple manuals to be cross-searched at once, further reducing the time for reading individual product manuals when setting up a control system.

Search by keywords

Database

Search result
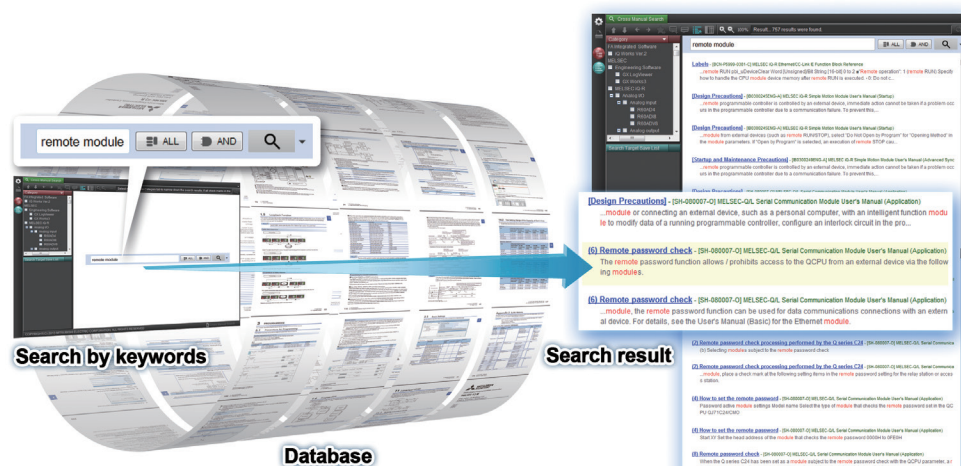
■ Key features include

- One-stop database containing all required manuals, with local file cache
- Included with GX Works3 engineering software
- Also available in tablet version
- Easily download manuals all at once
- Automatic update of manual versions
- Search information across multiple manuals
- Visual navigation from hardware diagram showing various specifications
- Customizable by adding user notes and bookmarks
- Directly port sample programs within manuals to GX Works3

■ MITSUBISHI ELECTRIC FA e-Manual (tablet version)

The e-Manual application is available on iOS and Android™ tablets.
e-Manual files are provided as in-app downloads.

iOS
Version 8.1 or later

Download on the App Store

Android™
Version 4.3/4.4/5.0

ANDROID APP ON Google play

■ Supported versions

OS	OS version	Model
iOS	iOS 8.1 or later	Apple iPad 2, iPad (3rd generation), iPad (4th generation), iPad Air, iPad Air 2, iPad mini, iPad mini 2, iPad mini 3, iPad mini 4
Android™	Android™ 4.3/4.4/5.0	ASUS Nexus7™ (2013)*1

*1: When using a tablet not listed above, 7-inch (resolution of 1920×1200 dots (WUXGA)) or better is recommended.

Extensive global support coverage providing expert help whenever needed

■ Global FA centers

MITSUBISHI ELECTRIC CORPORATION Nagoya Works

Line up
Development environment
Application Solution
Features
3rd Party Partner Products
Total control
Specifications
Support
Product List
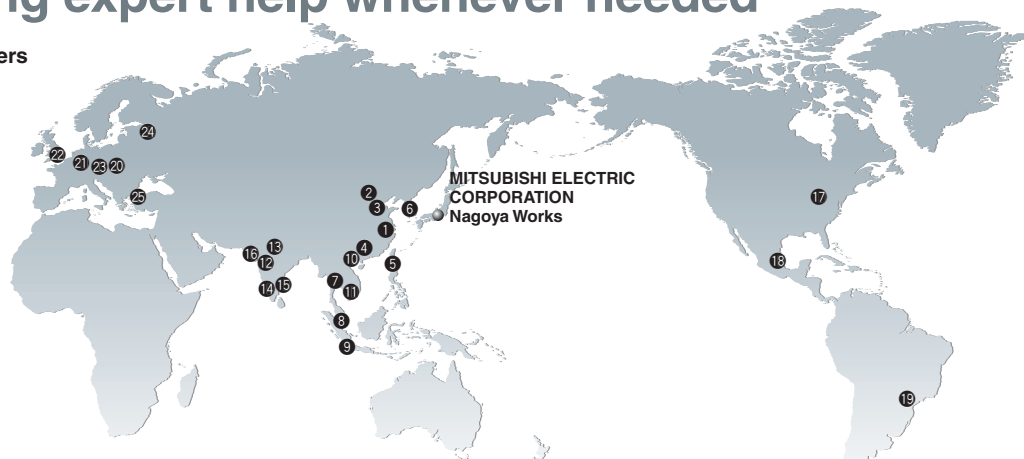
China

❶ Shanghai FA Center
MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD. Shanghai FA Center

Mitsubishi Electric Automation Center, No.1386 Hongqiao Road, Shanghai, China
Tel: +86-21-2322-3030 / Fax: +86-21-2322-3000

❷ Beijing FA Center
MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD. Beijin FA Center

Unit 901, Office Tower 1, Henderson Centre, 18 Jianguomennei Avenue, Dongcheng District, Beijing, China
Tel: +86-10-6518-8830 / Fax: +86-10-6518-2938

❸ 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

❹ 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

❺ Taichung FA Center
MITSUBISHI ELECTRIC TAIWAN CO.,LTD.

No.8-1, Industrial 16th Road, Taichung Industrial Park, Taichung City 40768 Taiwan
Tel: +886-4-2359-0688 / Fax: +886-4-2359-0689

Korea

❻ Korea FA Center
MITSUBISHI ELECTRIC AUTOMATION KOREA CO., LTD.

7F~9F, Gangseo Hangang Xi-tower A, 401, Yangcheon-ro, Gangseo-Gu, Seoul 07528, Korea
Tel: +82-2-3660-9632 / Fax: +82-2-3664-0475

Thailand

❼ Thailand FA Center
MITSUBISHI ELECTRIC FACTORY AUTOMATION (THAILAND) CO., LTD.

12th Floor, SV.City Building, Office Tower 1, No. 896/19 and 20 Rama 3 Road, Kwaeng Bangpongpang, Knet Yannawa, Bangkok 10120, Thailand
Tel: +66-2682-6522~31 / Fax: +66-2682-6020

ASEAN

❽ ASEAN FA Center
MITSUBISHI ELECTRIC ASIA PTE. LTD.

307 Alexandra Road, Mitsubishi Electric Building, Singapore 159943
Tel: +65-6470-2480 / Fax: +65-6476-7439

Indonesia

❾ Indonesia FA Center
PT. MITSUBISHI ELECTRIC INDONESIA Cikarang Office

Jl. Kenari Raya Blok G2-07A Delta Silicon 5, Lippo Cikarang - Bekasi 17550, Indonesia
Tel: +62-21-2961-7797 / Fax: +62-21-2961-7794

Vietnam

❿ Hanoi FA Center
MITSUBISHI ELECTRIC VIETNAM COMPANY LIMITED Hanoi Branch Office

6th Floor, Detech Tower, 8 Ton That Thuyet Street, My Dinh2 Ward, Nam Tu Liem District, Hanoi, Vietnam
Tel: +84-4-3937-8075 / Fax: +84-4-3937-8076

⓫ Ho Chi Minh FA Center
MITSUBISHI ELECTRIC VIETNAM COMPANY LIMITED

Unit 01-04, 10th Floor, Vincom Center, 72 Le Thanh Ton Street, District 1, Ho Chi Minh City, Vietnam
Tel: +84-8-3910-5945 / Fax: +84-8-3910-5947

India

⓬ India Pune FA Center
MITSUBISHI ELECTRIC INDIA PVT. LTD. Pune Branch

Emerald House, EL-3, J Block, M.I.D.C., Bhosari, Pune - 411026, Maharashtra, India
Tel: +91-20-2710-2000 / Fax: +91-20-2710-2100

⓭ India Gurgaon FA Center
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
Tel: +91-124-463-0300 / Fax: +91-124-463-0399

⓮ India Bangalore FA Center
MITSUBISHI ELECTRIC INDIA PVT. LTD. Bangalore Branch

Prestige Emerald, 6th Floor, Municipal No.2, Madras Bank Road, Bangalore - 560001, Karnataka, India
Tel: +91-80-4020-1600 / Fax: +91-80-4020-1699

⓯ India Chennai FA Center
MITSUBISHI ELECTRIC INDIA PVT. LTD. Chennai Branch

Citilights Corporate Centre No. 1, Vivekananda Road, Srinivasa Nagar, Chetpet, Chennai - 600031, Tamil Nadu, India
Tel: +91-4445548772 / Fax: +91-4445548773

⓰ India Ahmedabad FA Center
MITSUBISHI ELECTRIC INDIA PVT. LTD. Ahmedabad Branch

B/4, 3rd Floor, SAFAL Profitaire, Corporate Road, Prahaladnagar, Satellite, Ahmedabad - 380015, Gujarat, India
Tel: +91-7965120063

America

⓱ North America FA Center
MITSUBISHI ELECTRIC AUTOMATION, INC.

500 Corporate Woods Parkway, Vernon Hills, IL 60061, U.S.A.
Tel: +1-847-478-2469 / Fax: +1-847-478-2253

Mexico

⓲ Mexico FA Center
MITSUBISHI ELECTRIC AUTOMATION, INC. Mexico Branch

Mariano Escobedo #69, Col.Zona Industrial, Tlalnepantla Edo. Mexico, C.P.54030
Tel: +52-55-3067-7511

Brazil

⓳ Brazil FA Center
MITSUBISHI ELECTRIC DO BRASIL COMÉRCIO E SERVIÇOS LTDA.

Avenida Adelino Cardana, 293, 21 andar, Bethaville, Barueri SP, Brazil
Tel: +55-11-4689-3000 / Fax: +55-11-4689-3016

Europe

⓴ Europe FA Center
MITSUBISHI ELECTRIC EUROPE B.V. Polish Branch

ul. Krakowska 50, 32-083 Balice, Poland
Tel: +48-12-347-65-81 / Fax: +48-12-630-47-01

㉑ Germany FA Center
MITSUBISHI ELECTRIC EUROPE B.V. German Branch

Mitsubishi-Electric-Platz 1, 40882 Ratingen, Germany
Tel: +49-2102-486-0 / Fax: +49-2102-486-1120

㉒ UK FA Center
MITSUBISHI ELECTRIC EUROPE B.V. UK Branch

Travellers Lane, Hatfield, Hertfordshire, AL10 8XB, U.K.
Tel: +44-1707-27-8780 / Fax: +44-1707-27-8695

㉓ Czech Republic FA Center
MITSUBISHI ELECTRIC EUROPE B.V. Czech Branch

Avenir Business Park, Radlicka 751/113e, 158 00 Praha 5, Czech Republic
Tel: +420-251-551-470 / Fax: +420-251-551-471

㉔ Russia FA Center
MITSUBISHI ELECTRIC (RUSSIA) LLC ST. Petersburg Branch

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

㉕ Turkey FA Center
MITSUBISHI ELECTRIC TURKEY A.Ş Ümraniye Branch

Serifali Mahallesi Nutuk Sokak No:5, TR-34775 Umraniye / Istanbul, Turkey
Tel: +90-216-526-3990 / Fax: +90-216-526-3995

Product purchasing information

■ **Necessary interactions for using CW Worbench/CW-Sim**

Mitsubishi Electric Corporation

■ **CW Workbench**

License set product
[Permanent license application]

Additional license product
[Permanent license application]

Update license product
[Permanent license application]

■ **CW-Sim**

License set product
[Permanent license application]

Additional license product
[Permanent license application]

User

①Purchase

②Send the packaged "permanent license application" by e-mail

③Receive the permanent license file

* A temporary license can be used until the permanent license is received (approximately 1 month).

■ **Necessary interactions for using Wind River Workbench 3.2/2.6.1**

Mitsubishi Electric Corporation

■ **Tool for dedicated settings and diagnostics**
(SW□PVC-CCPU- E)

License set product
[Industrial OEM tool (IOT) purchasing form]

User

①Purchase

②Apply with the packaged
purchasing form*1

Wind River Systems, Inc.

■ **Industrial OEM (IOT)*1**
■ **Including Tornado™ Wind River Workbench**

③Purchase

④License application

*1 Usually, a VxWorks® OEM development license is required, but if you are using Mitsubishi C Controller module, the application development can be performed only with IOT.
 ■ Inquiries to Wind River Systems, Inc.
  (http://www.windriver.com/)

Line up

Development environment

Application Solution

Features

3rd Party Partner Products

Total control

Specifications

Support

Product List

■ Necessary interactions for using Lineo uLinux ELITE

Lineo Solutions, Inc

■ **Linux® BSP**
Lineo uLinux
MELSEC access sample code

■ **Linux® development environment**
Lineo uLinux ELITE

Support for provided products
(Linux® related (including MELSEC access sample code)

Purchase software Linux®(BSP, development environment)
Apply with the quotation request/purchasing form for
Lineo uLinux ELITE Basic Edition
Q24DHCCPU-LS/Q26DHCCPU-LS

■ Inquiries to Lineo Solutions, Inc
E-mail: sales@lineo.co.jp
URL: http://www.lineo.co.jp/

User

Data coordination

Support for provided products
(C Controller, MELSEC, etc)

Mitsubishi Electric Engineering Co, Ltd.

■ **C Controller**
(Q24DHCCPU-LS/Q26DHCCPU-LS)

■ **Dedicated setting/monitor tools**
(SW4PVC-CCPU)

■ **MELSEC Series**

■ Necessary interactions for using eT-Kernel/eBinder®

eSOL, Inc.

■ **μITRON/T-Kernel BSP
eT-Kernel**
• Source code
• Document
  – User's guide
  – Board support guide
  – Getting Started, etc.
• MELSEC access sample code

■ **μITRON/T-Kernel
development environment**
eBinder®

Support for provided products
(T-Kernel related (including MELSEC access sample code)

Purchase software T-Kernel (l BSP, development environment)
Apply with the quotation request/
purchasing form for eT-Kernel Platform

■ Inquiries to eSOL, Inc
E-mail: ep-info@esol.co.jp
URL: www.esol.co.jp/

User

Data coordination

Support for provided products
(C Controller, MELSEC, etc.)

Mitsubishi Electric Engineering Co, Ltd.

■ **C Controller**
(Q24DHCCPU-LS)

■ **Dedicated setting/monitor tools**
(SW4PVC-CCPU)

■ **MELSEC Series**

Product List

Please check the compatibility and restrictions of the product in the related manual before purchasing.
Contact your local Mitsubishi sales office or representative for the latest information on the MELSOFT versions and compatible OS.
[Legend] **DB** : Double brand product*1 **NEW** : Recently released product **SOON** : Product available soon

CPU

Product	Model	Outline
C Controller CPU	Q24DHCCPU-V	No. of I/O points: 4096 points, endian format: little endian, removable storage: SD memory card, OS: VxWorks® Version 6.8.1 Work RAM: 512MB
	Q26DHCCPU-LS NEW	No. of I/O points: 4096 points, endian format: little endian, removable storage: SD memory card, OS: No pre-installed operating system (Operating system installed by user) Work RAM: 1GB
	Q24DHCCPU-LS	No. of I/O points: 4096 points, endian format: little endian, removable storage: SD memory card, OS: No pre-installed operating system (Operating system installed by user) Work RAM: 512MB
	Q12DCCPU-V	No. of I/O points: 4096 points, endian format: little endian, removable storage: CompactFlash card, OS: VxWorks® Version 6.4 Work RAM: 128MB
	Q06CCPU-V	No. of I/O points: 4096 points, endian format: little endian, removable storage: CompactFlash card, OS: VxWorks® Version 5.4 Work RAM: 64MB
Partner products pre-installed models	Q24DHCCPU-V-B019	CIMSNIPER Q24 Data collection package for EES/FDC/APC. Equipped with Simple MES functionality.
	Q24DHCCPU-V-B01B	CIMSNIPER Light Data collection package for EES/FDC/APC. Not equipped with Simple MES functionality.
	Q24DHCCPU-V-B01D	DNA Designer Q24 Model base development support tool
	Q24DHCCPU-VG-B000	GENWARE®3-VG Runtime license version Runtime library and font data are pre-installed.
	Q24DHCCPU-VG-B002	GENWARE®3-VG Tool license version GUI development environment (CI SKETCH-E) is bundled into the Runtime License version.
	Q26DHCCPU-LS-B031 NEW	C Controller: Q26DHCCPU-LS OS: Lineo uLinux, uLinux Station+ Form function added to the web based application which enables basic system setting of Linux® system
	Q24DHCCPU-LS-B030	C Controller: Q24DHCCPU-LS OS: Lineo uLinux, uLinux Station Web based application which enables basic system setting of Linux® system
	Q12DCCPU-V-B011	CIMOPERATOR® SECS+ for ADVANCED Supports SECS-I (SEMI E4) and HSMS (SEMI E37)
	Q12DCCPU-V-B013	CIMOPERATOR® SECS+ for GEM ADVANCED Middle kit version that supports GEM (E30) (Does not support Trace data collection, Limit monitoring, Document file output)
	Q12DCCPU-V-B015	CIMOPERATOR® SECS+ for GEM ADVANCED +(Option Pack) Full kit version that supports GEM (E30). (Supports Trace data collection, Limit monitoring, Document file output)
	Q12DCCPU-V-B019	CIMSNIPER Data collection package for EES/FDC/APC. Equipped with Simple MES functionality.
	Q12DCCPU-V-B01B	CIMSNIPER Light Data collection package for EES/FDC/APC. Not equipped with Simple MES functionality.
	Q12DCCPU-V-B01D	DNA Designer Model base development support tool
Option	Q12DCCPU-CBL*2*3*4	RS-232 connection converter cable (custom mini-DIN to 9-pin D-sub connector)
	Q6BAT	Battery, Replacement battery
	Q7BAT*2*3*4	Battery, Replacement large-capacity battery
	Q7BAT-SET*2*3*4	Battery, Large-capacity battery with holder for mounting CPU
	NZ1MEM-2GBSD*2*3*5	SD memory card, capacity: 2 GB
	NZ1MEM-4GBSD*2*3*5	SDHC memory card, capacity: 4 GB
	NZ1MEM-8GBSD*2*3*5	SDHC memory card, capacity: 8 GB
	NZ1MEM-16GBSD*2*3*5	SDHC memory card, capacity: 16 GB
	GT05-MEM-128MC*6	CompactFlash card, capacity: 128 MB
	GT05-MEM-256MC*6	CompactFlash card, capacity: 256 MB
	QD81MEM-512MBC*4*7	CompactFlash card, capacity: 512 MB
	QD81MEM-1GBC*4*7	CompactFlash card, capacity: 1 GB
	QD81MEM-2GBC*4	CompactFlash card, capacity: 2 GB
	QD81MEM-4GBC*4	CompactFlash card, capacity: 4 GB
	QD81MEM-8GBC*4	CompactFlash card, capacity: 8 GB

*1: General specifications and product guarantee conditions of jointly developed products are different from those of MELSEC products.
  For more information, please refer to the product manuals or contact your local Mitsubishi representative for details.
*2: For use with Q24DHCCPU-V/-VG
*3: For use with Q24DHCCPU-LS, Q26DHCCPU-LS
*4: For use with Q12DCCPU-V
*5: Operations other than Mitsubishi products are not guaranteed.
*6: Mountable only onto Multiple CPU high speed main base.
*7: Use with Q06CCPU-V supported.
*8: Multiple CPU high speed communications can not be used.

Base

Product	Model	Outline
Main base	Q33B	3 slots, 1 power supply module required, for Q series modules
	Q35B	5 slots, 1 power supply module required, for Q series modules
	Q38B	8 slots, 1 power supply module required, for Q series modules
	Q312B	12 slots, 1 power supply module required, for Q series modules
Multiple CPU high speed main base	Q35DB	5 slots, power supply module required, for Q series modules
	Q38DB	8 slots, 1 power supply module required, for Q series modules
	Q312DB	12 slots, 1 power supply module required, for Q series modules
Redundant power main base	Q38RB	8 slots, 2 redundant power supply module required, for Q series modules
Extension base	Q63B	3 slots, 1 power supply module required, for Q series modules
	Q65B	5 slots, 1 power supply module required, for Q series modules
	Q68B	8 slots, 1 power supply module required, for Q series modules
	Q612B	12 slots, 1 power supply module required, for Q series modules
	Q52B	2 slots, power supply module not required, for Q series modules
	Q55B	5 slots, power supply module not required, for Q series modules
Extension cable	QC05B	0.45 m cable for connecting extension base unit
	QC06B	0.6 m cable for connecting extension base unit
	QC12B	1.2 m cable for connecting extension base unit
	QC30B	3 m cable for connecting extension base unit
	QC50B	5 m cable for connecting extension base unit
	QC100B	10 m cable for connecting extension base unit

Power supply

Product	Model	Outline
Power supply	Q61P	Input voltage: 100 to 240 V AC, output voltage: 5 V DC, output current: 6 A
	Q62P	Input voltage: 100 to 240 V AC, output voltage: 5/24 V DC, output current: 3/0.6 A
	Q63P	Input voltage: 24 V DC, output voltage: 5 V DC, output current: 6 A
	Q64PN	Input voltage: 100 to 240 V AC, output voltage: 5 V DC, output current: 8.5 A
Power Supply with Life Detection	Q61P-D	Input voltage: 100 to 240 V AC, output voltage: 5 V DC, output current: 6A

Engineering tool for C Controller module

Product	Model	Outline
CW Workbench[1]	SW1DND-CWWLQ24-E	C Controller engineering tool software package, product with license for Q24DHCCPU-V/-VG
	SW1DND-CWWLQ24-EZ	Additional license product for Q24DHCCPU-V/-VG
	SW1DND-CWWLQ24-EVZ	Update license product for Q24DHCCPU-V/-VG
	SW1DND-CWWLQ12-E	C Controller engineering tool software package, product with license for Q12DCCPU-V
	SW1DND-CWWLQ12-EZ	Additional license product for Q12DCCPU-V
	SW1DND-CWWLQ12-EVZ	Update license product for Q12DCCPU-V
CW-Sim	SW1DNC-CWSIM-E	CW Worbench simulation evironment, license product
	SW1DNC-CWSIM-EZ	CW Workbench simulation environment, additional license product[2]
	SW1DNC-CWSIMSA-E	CW Workbench simulation environment, standalone product[3]

[1]: CW Workbench is available as a one month trial version. For more information, please contact your local Mitsubishi Electric office or sales representative.
[2]: This product is an additional license for SW1DNC-CWSIM-E.
[3]: CW-Sim standalone does not require a license file.

Setting/monitoring tools for C Controller module

Product	Model	Outline
Setting/monitoring tools for C Controller module	SW4PVC-CCPU-E	A tool for setting/monitoring C Controller module, CC-Link, MELSECNET/H, CC-Link IE Controller network, CC-Link IE Field network
	SW3PVC-CCPU-E	A tool for setting/monitoring C Controller module, CC-Link, MELSECNET/H, CC-Link IE Controller network

Line up

Development environment

Application Solution

Features

3rd Party Partner Products

Total control

Specifications

Support

Product List

Software selection (for Q24DHCCPU-V/-VG, Q12DCCPU-V)

Refer to the following table and select the software.

		C Controller setting and monitoring tool		C Controller engineering tool CW Workbench		Wind River Workbench 3.2	Wind River Workbench 2.6.1
		SW4PVC-CCPU	SW3PVC-CCPU	Q24DHCCPU-V/-VG license[1]	Q12DCCPU-V license[2]		
Use Q24DHCCPU-V/-VG	To suppress implementation costs and easily develop applications	○	–	○	–	–	–
	To use a tool that provides advanced analysis of tasks and interrupt process execution order, etc.			Use as necessary.	–	○	–
Use both Q24DHCCPU-V/-VG and Q12DCCPU-V	To suppress implementation costs and easily develop applications	○	○	○[3]	○[4]	–	–
	To use a tool that provides advanced analysis of tasks and interrupt process execution order, etc.			Use as necessary.	Use as necessary.	○[5]	○[6]
Use Q12DCCPU-V	To suppress implementation costs and easily develop applications	○[7]	○	–	○	–	–
	To use a tool that provides advanced analysis of tasks and interrupt process execution order, etc.			–	Use as necessary.	–	○

*1: Q24DHCCPU-V/-VG license set product SW1DND-CWWLQ24-E, additional license product SW1DND-CWWLQ24-EZ.
*2: Q12DCCPU-V license set product SW1DND-CWWLQ12-E, additional license product SW1DND-CWWLQ12-EZ.
*3: Update license product SW1DND-CWWLQ24-EVZ is available to add Q24DHCCPU-V/-VG license to computer equipped Q12DCCPU-V license
*4: Update license product SW1DND-CWWLQ12-EVZ is available to add Q12DHCCPU-V/-VG license to computer equipped Q24DCCPU-V/-VG license
*5: Q12DCPPU-V not supported.
*6: Q24DHCCPU-V/-VG not supported.
*7: Can not be connected to Q12DCCPU-V (Basic mode).

Software selection (for Q24DHCCPU-LS, Q26DHCCPU-LS)

Refer to the following table.

Item	Specification	
OS	Lineo uLinux[8]: kernel2.6.35	eT-Kernel/compact[9][10]
Required software	Lineo uLinux ELITE[8]	eBinder®[9][10]

*8: Lineo uLinux and Lineo uLinux ELITE are Lineo Solutions, Inc. products. Please contact Lineo Solutions, Inc. for further product details.
*9: eT-Kernnel and eBinder® R are eSOL, Inc. products. Please contact eSOL, Inc. for further product details.
*10: Q26DHCCPU-LS not supported.

Precautions before use

This publication explains the typical features and functions of the products herein and does not provide restrictions or other information related to usage and module combinations. Before using the products, always read the product user manuals. Mitsubishi Electric will not be held liable for damage caused by factors found not to be the cause of Mitsubishi Electric; opportunity loss or lost profits caused by faults in Mitsubishi Electric products; damage, secondary damage, or accident compensation, whether foreseeable or not, caused by special factors; damage to products other than Mitsubishi Electric products; or any other duties.

⚠ For safe use

- To use the products given in this publication properly, always read the relevant manuals before beginning operation.
- The products have been manufactured as general-purpose parts for general industries, and are not designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the products for special purposes such as nuclear power, electric power, aerospace, medicine or passenger-carrying vehicles, consult with Mitsubishi Electric.
- The products have been manufactured under strict quality control. However, when installing the products where major accidents or losses could occur if the products fail, install appropriate backup or fail-safe functions in the system.

YOUR SOLUTION PARTNER
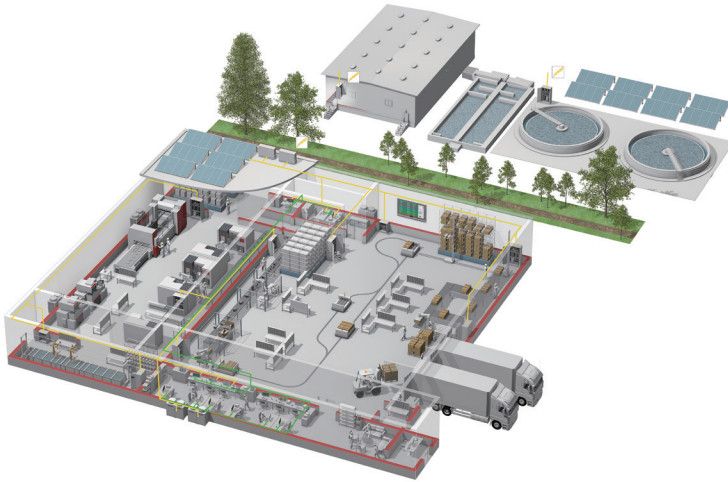
Mitsubishi Electric offers a wide range of automation equipment from PLCs and HMIs to CNC and EDM machines.

Low voltage: MCCB, MCB, ACB

Medium voltage: VCB, VCC

Power monitoring, energy management

Compact and Modular Controllers

Inverters, Servos and Motors

Visualisation: HMIs, Software, MES connectivity

Numerical Control (NC)

Robots: SCARA, Articulated arm
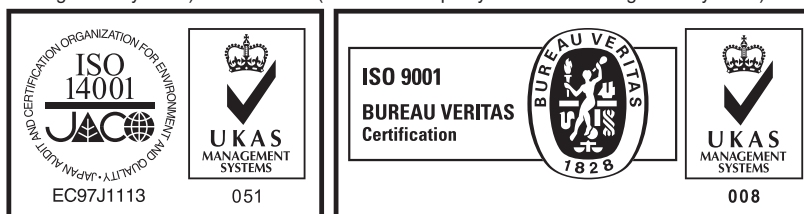
Processing machines: EDM, Lasers, IDS

Transformers, Air conditioning, Photovoltaic systems

A NAME TO TRUST

Since its beginnings in 1870, some 45 companies use the Mitsubishi name, covering a spectrum of finance, commerce and industry.

The Mitsubishi brand name is recognized around the world as a symbol of premium quality.

Mitsubishi Electric Corporation is active in space development, transportation, semi-conductors, energy systems, communications and information processing, audio visual equipment and home electronics, building and energy management and automation systems, and has 237 factories and laboratories worldwide in over 121 countries.

This is why you can rely on Mitsubishi Electric automation solution - because we know first hand about the need for reliable, efficient, easy-to-use automation and control in our own factories.

As one of the world's leading companies with a global turnover of over 4 trillion Yen (over $40 billion), employing over 100,000 people, Mitsubishi Electric has the resource and the commitment to deliver the ultimate in service and support as well as the best products.

* All products are not available in all countries.

Country/Region	Sales office	Tel/Fax
USA	MITSUBISHI ELECTRIC AUTOMATION, INC. 500 Corporate Woods Parkway, Vernon Hills, IL 60061, U.S.A.	Tel : +1-847-478-2100 Fax : +1-847-478-2253
Mexico	MITSUBISHI ELECTRIC AUTOMATION, INC. Mexico Branch Mariano Escobedo #69, Col. Zona Industrial, Tlalnepantla Edo. Mexico, C.P.54030	Tel : +52-55-3067-7500
Brazil	MITSUBISHI ELECTRIC DO BRASIL COMÉRCIO E SERVIÇOS LTDA. Avenida Adelino Cardana, 293, 21 andar, Bethaville, Barueri SP, Brazil	Tel : +55-11-4689-3000 Fax : +55-11-4689-3016
Germany	MITSUBISHI ELECTRIC EUROPE B.V. German Branch Mitsubishi-Electric-Platz 1, 40882 Ratingen, Germany	Tel : +49-2102-486-0 Fax : +49-2102-486-1120
UK	MITSUBISHI ELECTRIC EUROPE B.V. UK Branch Travellers Lane, Hatfield, Hertfordshire, AL10 8XB, U.K.	Tel : +44-1707-28-8780 Fax : +44-1707-27-8695
Ireland	MITSUBISHI ELECTRIC EUROPE B.V. Irish Branch Westgate Business Park, Ballymount, Dublin 24, Ireland	Tel : +353-1-4198800 Fax : +353-1-4198890
Italy	MITSUBISHI ELECTRIC EUROPE B.V. Italian Branch Centro Direzionale Colleoni-Palazzo Sirio Viale Colleoni 7, 20864 Agrate Brianza(Milano) Italy	Tel : +39-039-60531 Fax : +39-039-6053-312
Spain	MITSUBISHI ELECTRIC EUROPE, B.V. Spanish Branch Carretera de Rubí, 76-80-Apdo. 420, 08190 Sant Cugat del Vallés (Barcelona), Spain	Tel : +34-935-65-3131 Fax : +34-935-89-1579
France	MITSUBISHI ELECTRIC EUROPE B.V. French Branch 25, Boulevard des Bouvets, 92741 Nanterre Cedex, France	Tel : +33-1-55-68-55-68 Fax : +33-1-55-68-57-57
Czech Republic	MITSUBISHI ELECTRIC EUROPE B.V. Czech Branch Avenir Business Park, Radlicka 751/113e, 158 00 Praha5, Czech Republic	Tel : +420-251-551-470 Fax : +420-251-551-471
Poland	MITSUBISHI ELECTRIC EUROPE B.V. Polish Branch ul. Krakowska 50, 32-083 Balice, Poland	Tel : +48-12-347-65-00 Fax : +48-12-630-47-01
Sweden	MITSUBISHI ELECTRIC EUROPE B.V. (Scandinavia) Fjelievägen 8, SE-22736 Lund, Sweden	Tel : +46-8-625-10-00 Fax : +46-46-39-70-18
Russia	MITSUBISHI ELECTRIC (RUSSIA) LLC St. Petersburg Branch 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
Turkey	MITSUBISHI ELECTRIC TURKEY A.Ş Ümraniye Branch Serifali Mahallesi Nutuk Sokak No:5, TR-34775 Umraniye/Istanbul, Turkey	Tel : +90-216-526-3990 Fax : +90-216-526-3995
UAE	MITSUBISHI ELECTRIC EUROPE B.V. Dubai Branch Dubai Silicon Oasis, P.O.BOX 341241, Dubai, U.A.E.	Tel : +971-4-3724716 Fax : +971-4-3724721
South Africa	ADROIT TECHNOLOGIES 20 Waterford Office Park, 189 Witkoppen Road, Fourways, South Africa	Tel : +27-11-658-8100 Fax : +27-11-658-8101
China	MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD. No.1386 Hongqiao Road, Mitsubishi Electric Automation Center, Shanghai, China	Tel : +86-21-2322-3030 Fax : +86-21-2322-3000
Taiwan	SETSUYO ENTERPRISE CO., LTD. 6F, No.105, Wugong 3rd Road, Wugu District, New Taipei City 24889, Taiwan	Tel : +886-2-2299-2499 Fax : +886-2-2299-2509
Korea	MITSUBISHI ELECTRIC AUTOMATION KOREA CO., LTD. 7F-9F, Gangseo Hangang Xi-tower A, 401, Yangcheon-ro, Gangseo-Gu, Seoul 07528, Korea	Tel : +82-2-3660-9530 Fax : +82-2-3664-8372
Singapore	MITSUBISHI ELECTRIC ASIA PTE. LTD. 307, Alexandra Road, Mitsubishi Electric Building, Singapore 159943	Tel : +65-6473-2308 Fax : +65-6476-7439
Thailand	MITSUBISHI ELECTRIC FACTORY AUTOMATION (THAILAND) CO., LTD. 12th Floor, SV.City Building, Office Tower 1, No. 896/19 and 20 Rama 3 Road, Kwaeng Bangpongpang, Khet Yannawa, Bangkok 10120, Thailand	Tel : +66-2682-6522 Fax : +66-2682-6020
Vietnam	MITSUBISHI ELECTRIC VIETNAM COMPANY LIMITED Hanoi Branch 6th Floor, Detech Tower, 8 Ton That Thuyet Street, My Dinh 2 Ward, Nam Tu Liem District, Hanoi, Vietnam	Tel : +84-4-3937-8075 Fax : +84-4-3937-8076
Indonesia	PT. MITSUBISHI ELECTRIC INDONESIA Gedung Jaya 11th Floor, JL. MH. Thamrin No.12, Jakarta Pusat 10340, Indonesia	Tel : +62-21-3192-6461 Fax : +62-21-3192-3942
India	MITSUBISHI ELECTRIC INDIA PVT. LTD. Pune Branch Emerald House, EL-3, J Block, M.I.D.C., Bhosari, Pune-411026, Maharashtra, India	Tel : +91-20-2710-2000 Fax : +91-20-2710-2100
Australia	MITSUBISHI ELECTRIC AUSTRALIA PTY. LTD. 348 Victoria Road, P.O. Box 11, Rydalmere, N.S.W 2116, Australia	Tel : +61-2-9684-7777 Fax : +61-2-9684-7245

Mitsubishi Electric Corporation Nagoya Works is a factory certified for ISO 14001 (standards for environmental management systems) and ISO 9001 (standards for quality assurance management systems).

ISO 14001
JACO
EC97J1113   051
UKAS MANAGEMENT SYSTEMS

ISO 9001
BUREAU VERITAS
Certification
1828
008
UKAS MANAGEMENT SYSTEMS

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE: TOKYO BLDG., 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
www.MitsubishiElectric.com