

MELSEC iQ-R Series
iQ Platform-compatible PAC



Bridging the next generation of automation

MELSEC iQ-R
series



evolutionary

iQ Platform

Revolutionary, next-generation controllers building a new era in automation

MELSEC iQ-R series

As the core for next-generation automation environment, realizing an automation controller with added value while reducing TCO*

To succeed in highly competitive markets, it's important to build automation systems that ensure high productivity and consistent product quality. The MELSEC iQ-R Series has been developed from the ground up based on common problems faced by customers and rationalizing them into seven key areas: Productivity, Engineering, Maintenance, Quality, Connectivity, Security and Compatibility. Mitsubishi Electric is taking a three-point approach to solving these problems: **Reducing TCO***, increasing **Reliability** and **Reuse** of existing assets.

As a bridge to the next generation in automation, the MELSEC iQ-R Series is a driving force behind **revolutionary** progress in the future of manufacturing.

*TCO: Total cost of ownership



Productivity



Improve productivity through advanced performance/ functionality

- New high-speed system bus realizing shorter production cycle
- Super-high-accuracy motion control utilizing advanced multiple CPU features
- Inter-modular synchronization resulting in increased processing accuracy

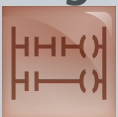
Maintenance



Reduce maintenance costs and downtime utilizing easier maintenance features

- Visualize entire plant data in real-time
- Extensive preventative maintenance functions embedded into modules

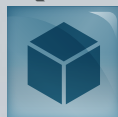
Engineering



Reducing development costs through intuitive engineering

- Intuitive engineering environment covering the product development cycle
- Simple point-and-click programming architecture
- Understanding globalization by multiple language support

Quality

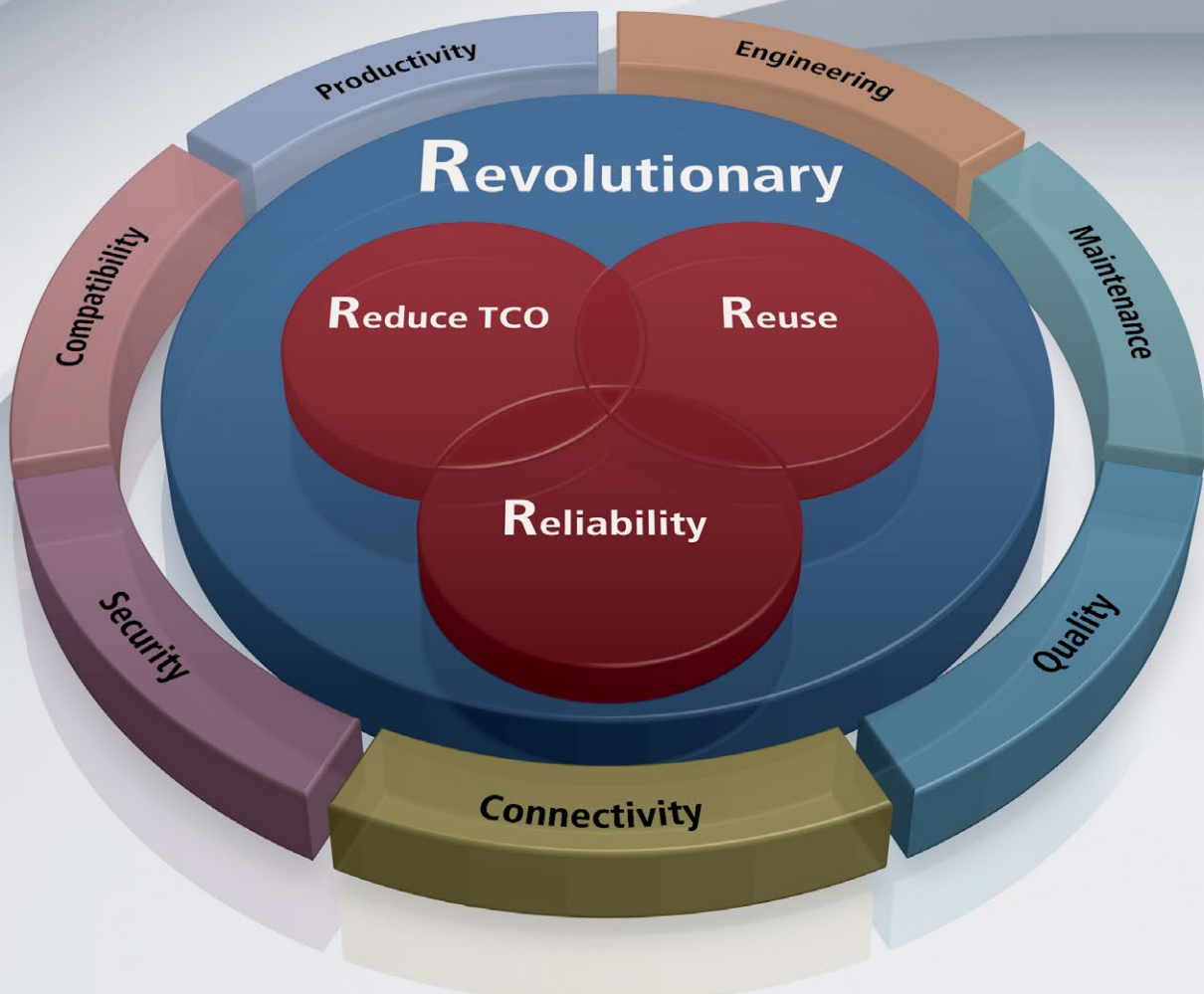


Reliable and trusted MELSEC product quality

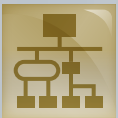
- Robust design ideal for harsh industrial environments
- Improve and maintain actual manufacturing quality
- Conforms to main international standards



Mitsubishi Electric PAC MELSEC iQ-R
Promotion Movie



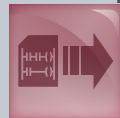
Connectivity



Seamless network reduces system costs

- Seamless connectivity within all levels of manufacturing
- High-speed and large data bandwidth ideal for large-scale control systems
- Easy connection of third-party components utilizing device library

Compatibility



Extensive compatibility with existing products

- Utilize existing assets while taking advantage of cutting-edge technology
- Compatible with most existing MELSEC-Q Series I/O

Security



Robust security that can be relied on

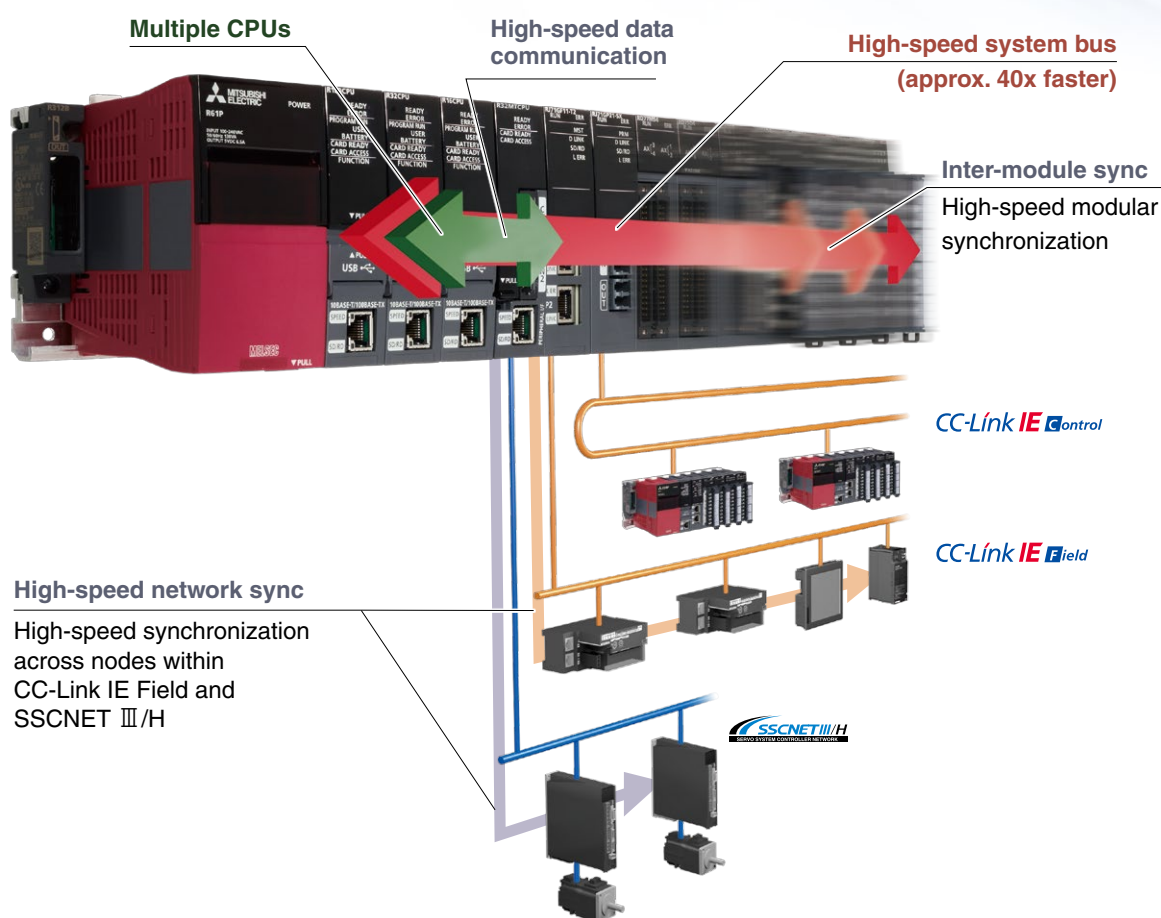
- Protect intellectual property
- Unauthorized access protection across distributed control network



Productivity

Improve productivity through advanced performance/functionality

Integrating high-performance capabilities based on the high-end iQ-R system bus, high-speed network, and an advanced motion control system; applications requiring these characteristics can be easily realized using the MELSEC iQ-R Series as the core of the automation system.



New high-speed system bus realizes improved production cycle

The newly developed high-speed system bus is 40-times faster compared to existing models, realizing very fast and large-capacity data processing between modules (network, I/O, multi-CPU, etc.), enabling the optimum utilization of MELSEC iQ-R Series performance and functionality.

High-speed system bus

40x faster*

Multi-CPU system realizes very accurate motion control

By supporting synchronized data communications between the programmable controller CPU and motion CPU via the high-speed system bus, performance is improved by up to four times compared to existing models, easily realizing super-high motion control accuracy.

Synchronized data exchange with motion CPU

4x faster*2

*1: Compared to MELSEC-Q Series.

*2: Compared to Q173DSCPU/Q172DSCPU.



Mitsubishi Electric PAC MELSEC iQ-R
"Productivity" Movie

Inter-modular synchronization realizes increased processing accuracy

More flexible control over performance

Realizing high processing accuracy could not be any simpler when utilizing the inter-modular synchronization feature, which enables precise data synchronization between controller CPUs and various interface modules via the high-speed system bus (backplane). In addition, network level synchronization

(both CC-Link IE Field and SSCNET Ⅲ/H) is now possible, realizing deterministic performance by ensuring synchronization between nodes without being influenced by varying network transmission delays.

New controller performance architecture further reduces H/W costs

High-speed processing of structured programs

The processing performance of the controller CPU has been substantially enhanced thanks to the newly designed CPU engine. The memory consumption for program and internal devices used in function block (FB) and structured text (ST) programs have been improved. This results in one CPU being able to do the job that used to require several CPUs in order to achieve the expected performance level and memory capacity.

Built-in database eliminates the need for a PC-based database server

Recipe data and production results data, previously managed using a database server, can now be managed via the database in the programmable controller. Use of dedicated commands for the built-in database makes it easy to search, add and update data on the fly.

Furthermore, the import/export correlation with spreadsheet software is made easier.

Realize high-speed system performance

Approx. **8X** faster than QCPU*3



- Realizes high-speed control performance
- Inherits MELSEC-Q Series functions
- Large-capacity memory ideal for large-scale control



Data management realized with built-in database



- Easy to switch between recipes
- Realize product batch control
- Efficiently switch between systems

LD instruction speed	PC MIX*4 (instructions/μs)	Fixed-cycle interrupt program	ST instruction (IF text, bit condition)	Program capacity
0.98 ns	419	50 μs	8 ns	1200K steps

*3: Based on a typical application example, the system benchmark test measures the CPU scan time, taking into consideration the network refresh time and monitoring processing time with external devices as compared to Universal model QCPU (QnUDEHCPU).

*4: Average number of instructions such as for basic instructions and data processing executed in 1μs (the larger the value, the faster the processing speed).



Engineering

Reducing development costs through intuitive engineering

The engineering software is sometimes considered a fundamental part of the control system in addition to the hardware components. The core of the system, it includes various steps of the product life cycle, from the design stage all the way to commissioning and maintenance of the control system. Today, intuitive, easy-to-use software suites are expected as a standard for modern manufacturing needs. GX Works3 is the latest generation of programming and maintenance software offered by Mitsubishi Electric specifically designed for the MELSEC iQ-R Series control system. It includes many new features and technologies to ensure a trouble-free engineering environment solution.

Intuitive engineering software covering the product development cycle

Graphic-based configuration realizing easier programming

Various intuitive features such as graphic-based system configuration and an extensive module library (module label/FB) provided as standard.

Integrated motion-control system configuration

From setting simple motion module parameters and positioning data setup to servo amplifier configuration, everything is packaged into an easy-to-use engineering environment.

Conforms to IEC 61131-3

GX Works3 realizes structured programming such as ladder and ST, making project standardization across multiple users even easier.

Simple point and click programming architecture

System design / Programming / Debug/maintenance

Straightforward graphic based system configuration design

- Simply drag and drop from the module list to easily create system configuration
- Directly setup parameters for each module
- Automatically reflect changes in the layout to the module parameters

System design / Programming / Debug/maintenance

MELSOFT library enables efficient programming through “Module Label/FB”

- Assign convenient label names to internal devices, rather than manually entering a device name every time.
- Simply drag & drop module FBs from the MELSOFT Library directly into the ladder program, making programming even easier.

System design / Programming / Debug/maintenance

Extensive version control features

- Flexibly register program change (historical) save points
- Easily visualize and confirm program changes

Simple motion setting tool

Easily configure the simple motion module with this convenient integrated tool.

Tab view multiple editors

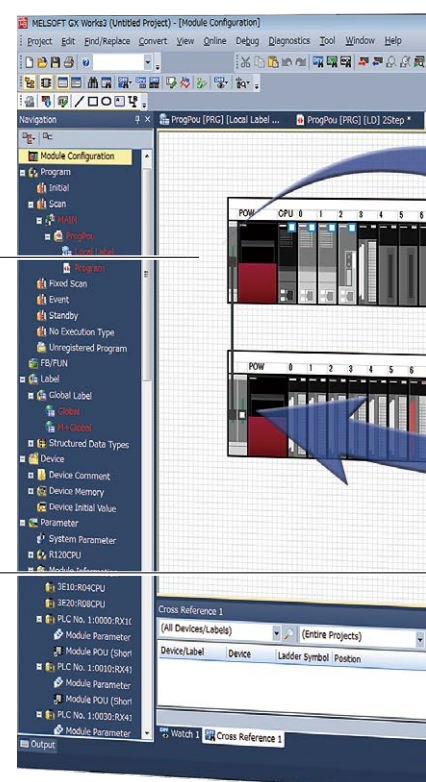
Conveniently work on multiple editors without having to switch between software screens.

Module configuration

Easily parameterize each module directly from the configuration editor.

Module list

Simply drag & drop modules directly into the module configuration.





Mitsubishi Electric PAC MELSEC iQ-R
"Engineering" Movie

GX Works3

One Software, Many Possibilities

Reduce engineering time by 60%*1

Global realization by multi-language support

To adhere to today's global production needs, GX Works3 supports multi-language features at various levels, from the multiple language software menu system to device comment language switching features.

Module label/FB

Automatically generate module function blocks simply by selecting one and placing it directly into the ladder editor.

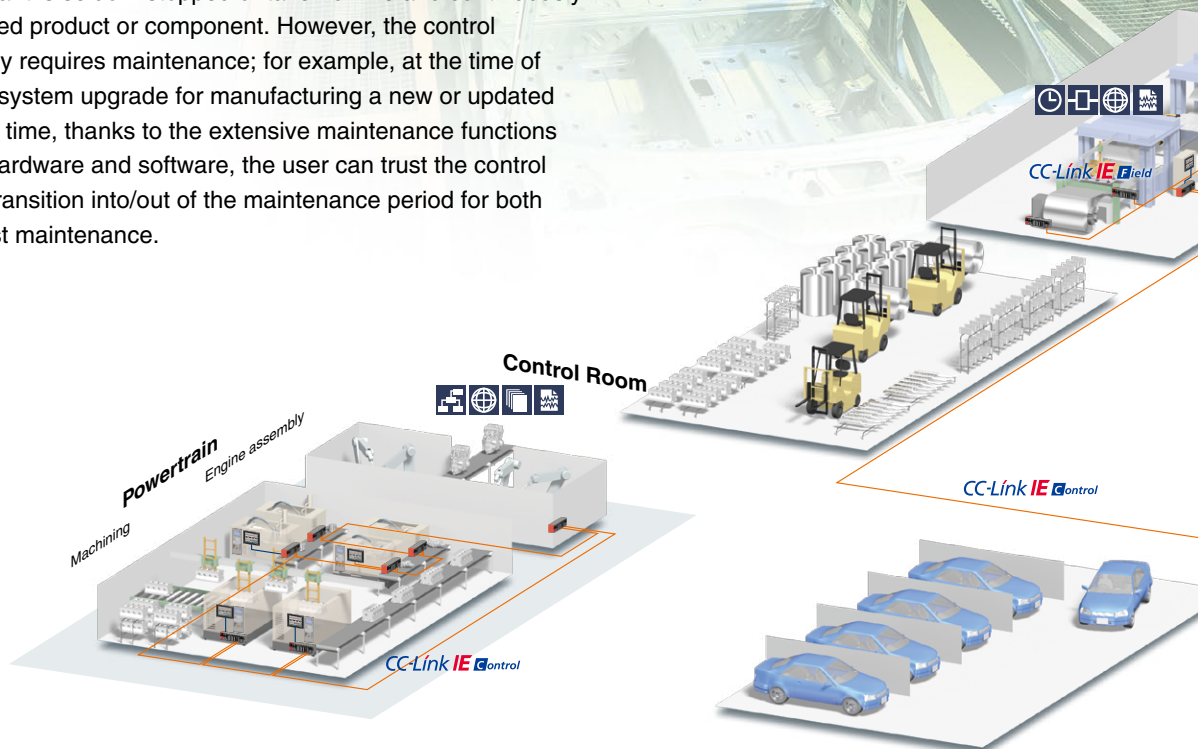
*1 Based on new project test benchmarks between GX Works2 and GX Works3.



Maintenance

Reduce maintenance costs and downtime utilizing easier maintenance features

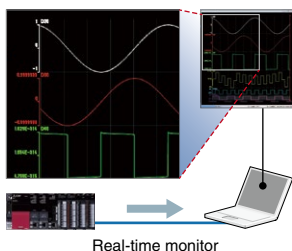
A manufacturing plant is seldom stopped or taken offline and continuously produces the desired product or component. However, the control system occasionally requires maintenance; for example, at the time of a faulty product or system upgrade for manufacturing a new or updated component. At that time, thanks to the extensive maintenance functions embedded in the hardware and software, the user can trust the control system to handle transition into/out of the maintenance period for both preventive and post maintenance.



Preventive maintenance CPU module

Visualize manufacturing data in real-time

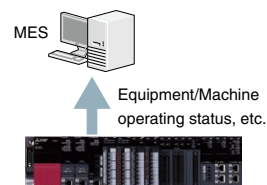
- Monitor live manufacturing process data across the plant
- Very easy setup using the dedicated GX LogViewer monitoring tool



Preventive maintenance MES interface module

Direct access to enterprise level

- Registers device values directly into database
- Visible shop floor data enables actions before event occurs



Preventive maintenance Output module

Prevent system downtime with relay monitoring

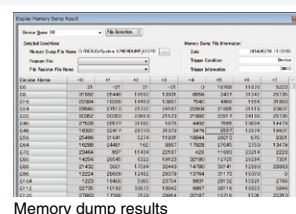
- Monitors relay switching amount
- Check relay condition from GOT (HMI)
- Plan module maintenance prior to malfunction of relay



Corrective maintenance CPU module

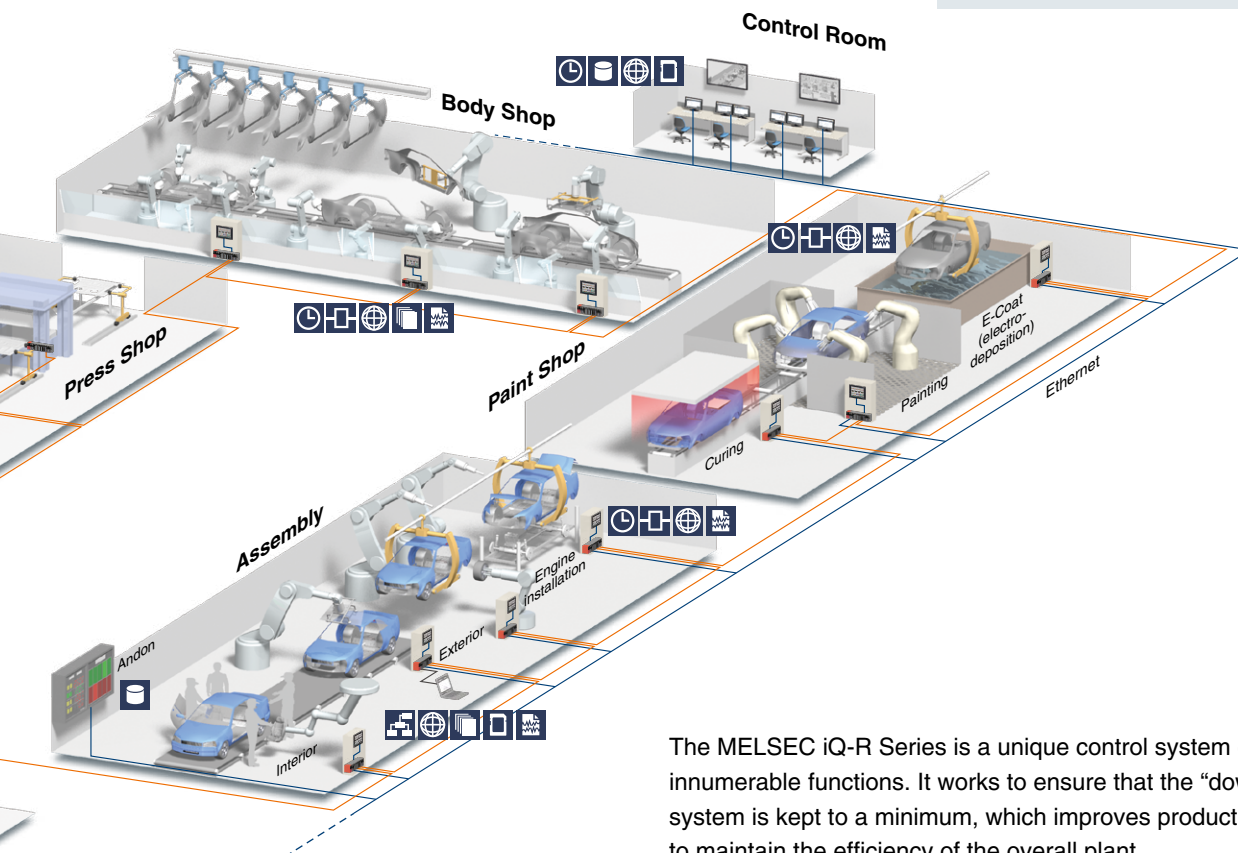
Memory dump enables confirmation of operation problems

- Saves block of device data when error occurs
- Root cause analysis by confirming data on device monitor screen





Mitsubishi Electric PAC MELSEC iQ-R
"Maintenance" Movie



The MELSEC iQ-R Series is a unique control system equipped with innumerable functions. It works to ensure that the “down-time” of the system is kept to a minimum, which improves productivity and helps to maintain the efficiency of the overall plant.



Corrective maintenance CPU module

Efficient diagnostics with extensive event logging

- Logging of program change events, errors and when the power is turned off
- Event logging displayed in list form
- Quickly detect problems due to operating mistakes by multiple users

Event log list

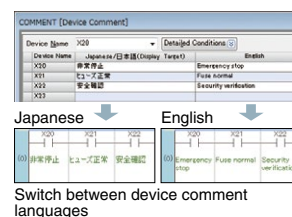
No.	Occurrence Date	Event Type	Status	Event Code	Comment
00002	2015/06/09 16:23:15.740	System	OK	00000	Power-on and reset
00003	2015/06/09 14:26:03.027	System	OK	00001	Initial module
00004	2015/06/09 14:26:03.788	System	OK	00002	Power-on and reset
00005	2015/06/09 14:26:04.026	System	OK	00003	Power-shutoff
00006	2015/06/09 14:11:03.100	Operation	OK	24000	Creation of new tables
00007	2015/06/09 14:09:50.412	Operation	OK	24000	Creation of new tables



Corrective maintenance GX Works3

Multi-language software improves global support

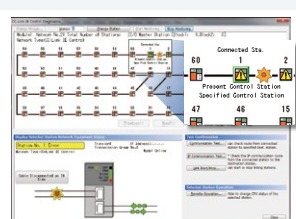
- Comment/label names can be registered in multiple languages
- Easy to switch between languages
- No need for multiple programs to satisfy regional requirements



Corrective maintenance GX Works3

Quickly find network errors

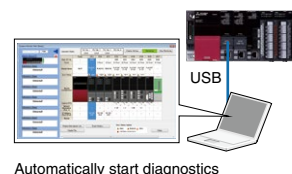
- Visualize error location from network system image
- Easy network error corrective measures



Corrective maintenance GX Works3

Simple troubleshooting, even for novice users

- Start diagnostics screen on GX Works3 just by connecting via USB
- Display detailed error information and corrective procedures





Quality

Reliable and trusted

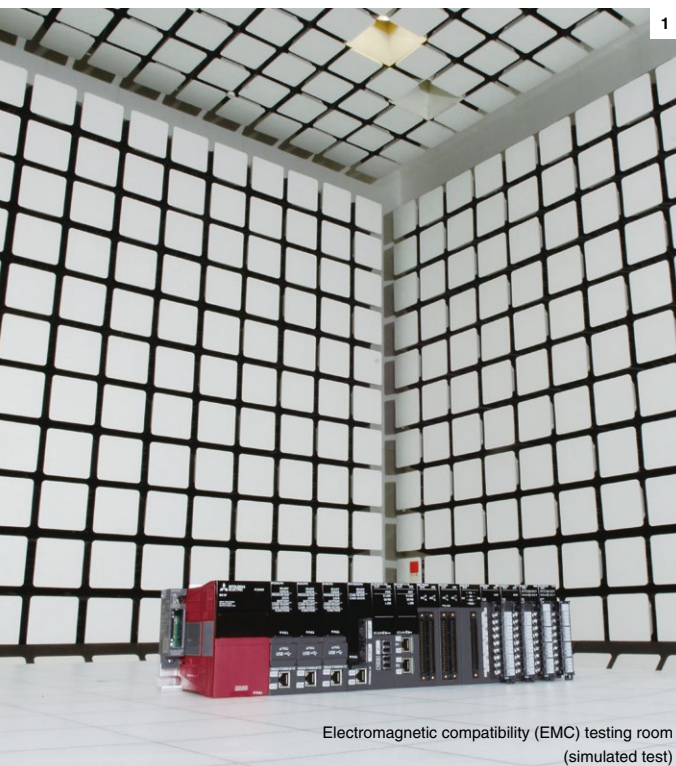
MELSEC iQ-R product quality

The MELSEC iQ-R Series is based on two fundamental aspects of quality.

“Quality of product”

“Quality for application”

These two characteristics are part of the main principle behind the MELSEC iQ-R Series. This new control system includes various features designed-in to provide a solution that not only improves the overall manufacturing productivity, but also maintains a high level of industrial quality that is ideal for the harsh and rugged environments that it is subjected to on a daily basis.



Electromagnetic compatibility (EMC) testing room
(simulated test)



Robust design ideal for harsh industrial environments

Synonymous with the Mitsubishi Electric name, the MELSEC iQ-R Series is designed with high quality and reliability, which is a prerequisite for industrial applications. In addition, the overall aesthetics and usability enable easier maintenance that customers routinely expect.

Classification according to IEC 60721-3-3 Class 3C2

For protection against aggressive atmosphere and gases, products with a conformal coating (IEC 60721-3-3 Class 3C2) are available on request^{*1}

^{*1}: Please contact your local Mitsubishi Electric office or representative for further details.

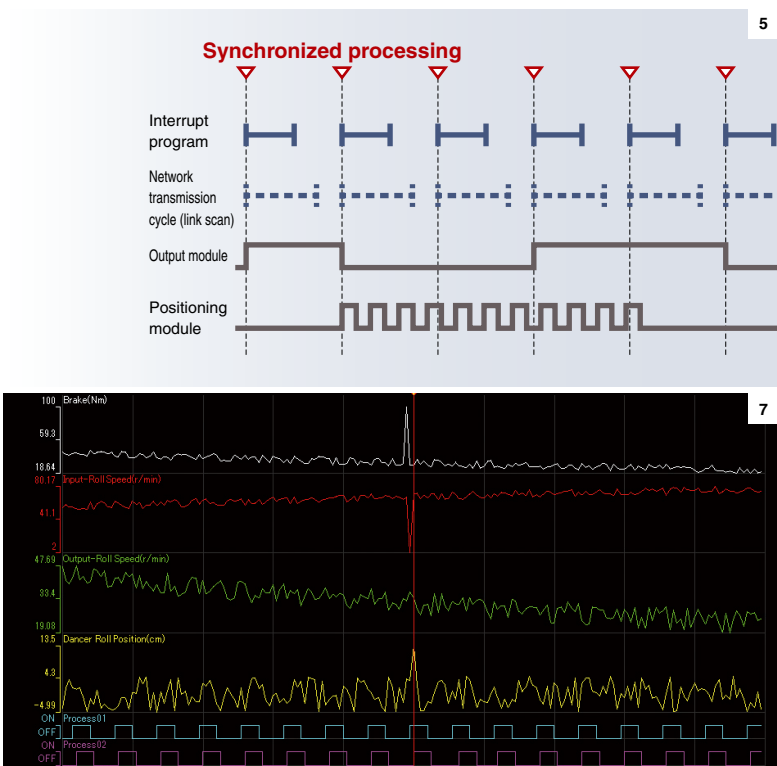
1. Conforms to stringent quality evaluations and tests that are based on robust industrial environments including EMC, LSI, temperature, vibration and HALT tests.
2. High manufacturing quality control through QR code based quality management system.
3. The front face has a wide and open design with an easy-to-use front cover.
4. The base rack design includes a dedicated earth rail to prevent noise interference in low power supply conditions and a robust structure that enables easy installation without extensive damage to bus connectors.



Mitsubishi Electric PAC MELSEC iQ-R
"Quality" Movie

Conforms to main international quality standards

The MELSEC iQ-R Series conforms to most of the main international standards that realizes applications requiring multiple global locations.



5 6

- Parts inventory
- Production data
- Operations log
- Inspection record
- Quality data



Improve and maintain actual manufacturing quality

Maintains product quality during manufacturing

With inter-module synchronization, it is now possible to precisely synchronize interrupt programs with the network communications cycle (link scan).

Any variations in data transmission response time (network transmission delay time) between the controller and other devices on the network are eliminated, realizing high integrity between manufacturing processes that are dependent on each other, ensuring high performance and processing.

Realizes traceability through data logging

Simple settings enable the collection of production data needed for traceability. Furthermore, collected data can be analyzed easily using a dedicated viewer. Analyzing various data on production processes provides an indicator for quality improvements and manufacturing cost reductions, thereby supporting optimization of the production system.

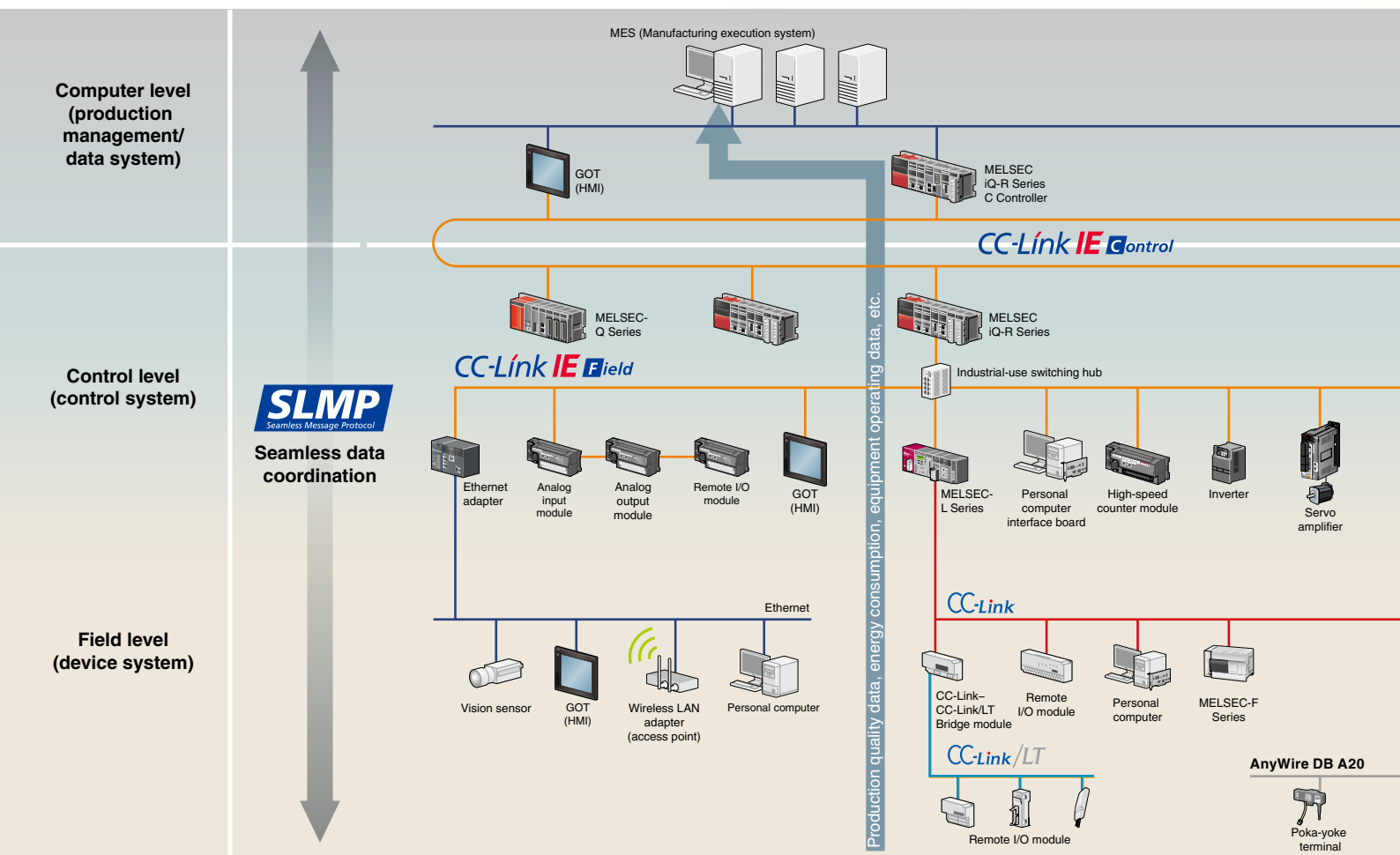
5. Graph showing the signal synchronization between several modules.
6. Data required for traceability is collected on the SD memory card.
7. Collected data is analyzed using a dedicated viewer.



Connectivity

Seamless network reduces system costs

The MELSEC iQ-R Series is part of a family of products all interconnected across various levels of automation. Based on the seamless message protocol (SLMP^{*1}), data flows transparently between the sensor level and the management level across multiple industry-standard automation networks. CC-Link IE, Asia's No. 1 industrial network, realizes fast gigabit data transmission speeds, further optimizing the manufacturing cycle. In addition, the SSCNET III/H high-speed motion control network further enhance the factory-wide connectivity solution. In parallel to this, production data is visible from the shop floor directly into MES database servers via the MES interface.



Seamless connectivity within all levels of manufacturing

Utilizing SLMP^{*1}, it is possible to access production management systems, programmable controllers and other devices seamlessly using the same method without having to worry about network hierarchies or boundaries. Monitoring machines and collecting data can be performed easily from virtually anywhere on the network.

^{*1}: Seamless Message Protocol (SLMP): A simple client-server common protocol that enables communication between Ethernet products and CC-Link IE-compatible machines.

High-speed and large bandwidth ideal for large-scale control systems

The Ethernet-based open network CC-Link IE is an industry-leading 1 Gbps high-speed, large-capacity network. The division of 1 Gbps broadband into uses for distributed control and field data communications secures the reliability of control communications and realizes real-time data collection, which can be difficult with standard Ethernet.



Mitsubishi Electric PAC MELSEC iQ-R
"Connectivity" Movie

Optimal network proposals for each level

CC-Link IE Control

CC-Link IE Control is a high-reliability distributed control network designed to handle very large data communications (128K word) over a high-speed (1 Gbps) dual-loop optical cable topology.

CC-Link IE Field

CC-Link IE Field is a versatile gigabit Ethernet-based network integrating controller, I/O control, safety control, and motion control in a flexible wiring topology supporting star, ring, and line configurations.

CC-Link CC-Link Safety CC-Link/LT

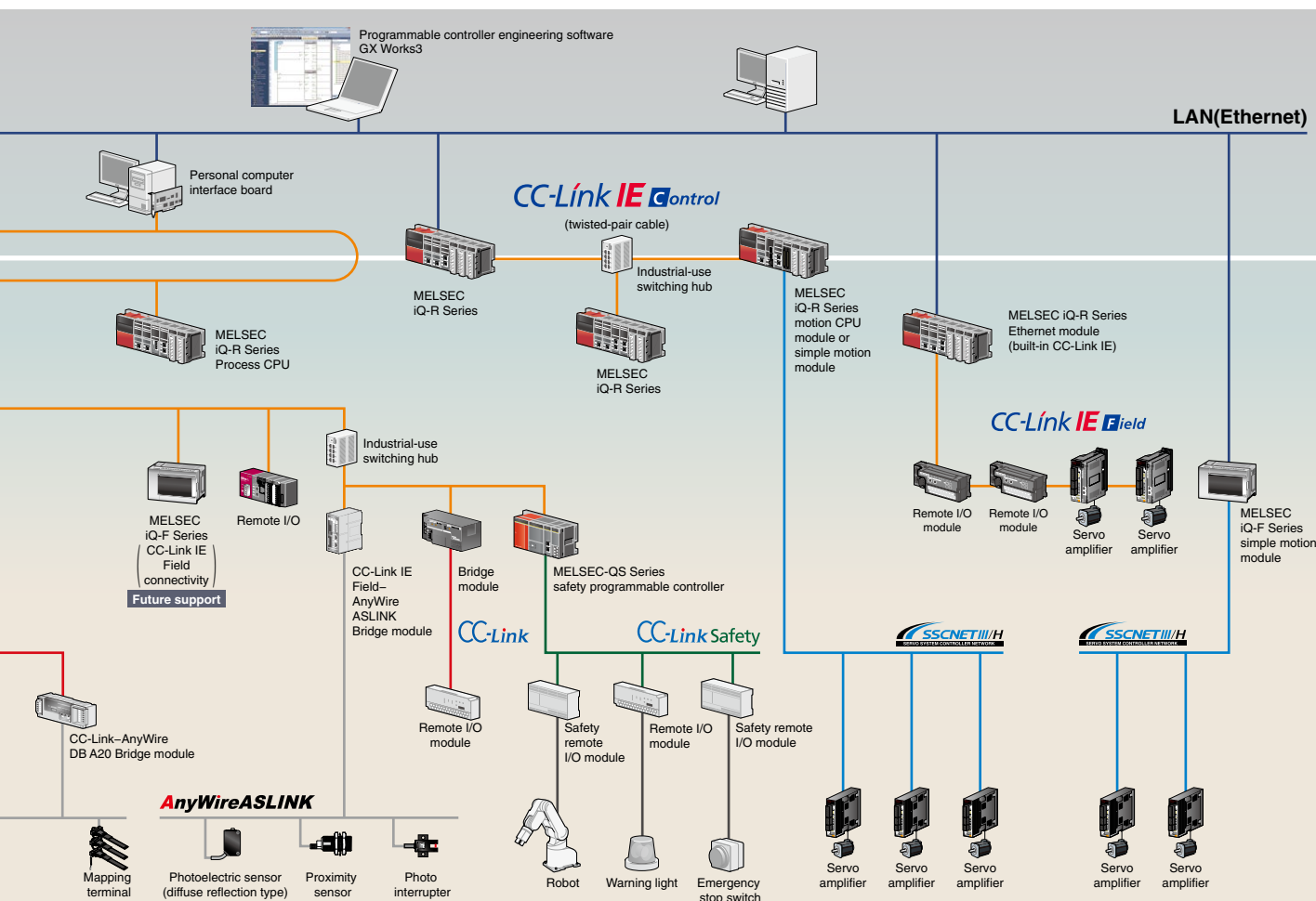
CC-Link is a high-speed and highly reliable deterministic I/O control network that realizes reduced wiring while offering multi-vendor compatible products. This open field network is a global standard, originating from Japan and Asia. In addition, CC-Link Safety, is a dedicated fail-safe network that is used as a safety risk management solution. CC-Link/LT is a sensor-level network that is ideal for compact and complicated wiring installations.

AnyWire

AnyWire is a sensor level distributed control network that is designed to reduce installation costs by utilizing general-purpose wiring and robot cables.



SSCNET III/H is a dedicated high-speed, high-performance, highly reliable servo system control network that offers flexible long-distance wiring capabilities based on optical-fiber cable topology.



Simple connection to external devices using MELSOFT library

Utilizing the GX Works3 Predefined Protocol support function, simply select the protocol to be used and the data to transmit/receive to communicate easily with external devices such as vision sensors and temperature controllers. Engineering time can be substantially reduced as it is no longer necessary to create separate communications programs.

CC-Link IE Control (twisted-pair cable)

Utilizing a system architecture that has no constraints and enables one to choose freely such as star/line/ring topologies, adding and removing equipment is easier. Moreover, compatibility with standard twisted-pair cabling means that wiring costs can be reduced.

Connect to two different types of networks with the same module

Ethernet and CC-Link IE network communications can be realized with the same network module. Since multiple network types can use one module, equipment costs can be further reduced.



Security

Robust security that can be relied on

As technology becomes more complex and the distribution of manufacturing systems more global, the protection of intellectual property is even more significant. When shipping a finished product overseas, the last thing an OEM needs to consider is unauthorized copying or changing of the original project data. In addition to this, unauthorized access to the control system can have very serious implications to the control system and the end user, which can compromise the overall safety of the plant.

The MELSEC iQ-R Series has a number of embedded features that help to maintain these requirements, such as hardware and software keys to protect intellectual property, and multi-level user access password hierarchy to protect the project at the design stage.



Mitsubishi Electric PAC MELSEC iQ-R
"Security" Movie

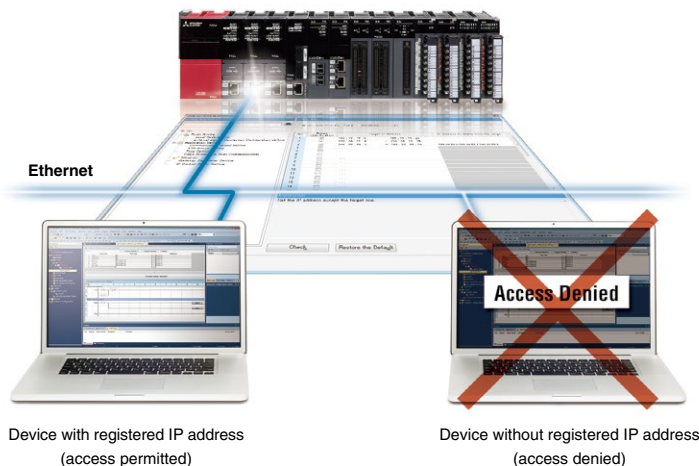
Powerful security features protecting intellectual property

Security key authentication protecting project data

The security key authentication prevents programs from being opened on personal computers where the security key has not been registered. Furthermore, because programs cannot be executed by CPU modules where the security key has not been registered, the integrity of customer technologies and other intellectual property is not compromised. The security key can also be registered on an extended SRAM cassette. Therefore, when replacing the CPU module, there is no need to re-register the security key, making replacement very simple.



Prevent unauthorized access across the network



The IP filter can be used to register the IP addresses of devices permitted to access the CPU module. As a result, access from non-registered devices can be blocked, thereby lowering the risk of program hacking and unauthorized access by a third party. Another feature is a remote password function for password-based security. Passwords of up to 32 characters can be set to prevent unauthorized access to the CPU module via networks such as Ethernet.



Compatibility

Extensive compatibility with existing products

Whenever introducing a new system or technology into an existing manufacturing plant or control system, utilization of existing assets as much as feasibly possible is a mandatory requirement with today's manufacturing needs. The MELSEC iQ-R Series addresses these subtle but substantial needs with various system hardware support and engineering project compatibility to achieve an easy path to higher technology and improved performance capabilities.



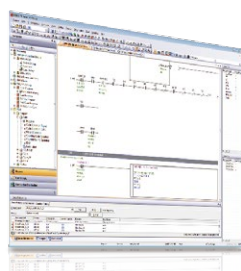
Mitsubishi Electric PAC MELSEC iQ-R
"Compatibility" Movie

Utilize existing MELSEC-Q Series assets

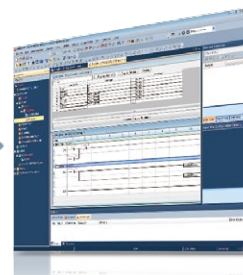
Current programs can be fully utilized

A simply conversion process*1 is all it takes to enable the use of MELSEC-Q Series programs with the MELSEC iQ-R Series. Customers can effectively use the program assets they have accumulated, thereby reducing the overall engineering time.

*1: For detailed information about converting to GX Works3 programs, please refer to the "GX Works3 Operating Manual".



MELSEC Q series



MELSEC iQ-R series



Variety of compatible modules

By utilizing the dedicated extension base, most MELSEC-Q Series modules*2 can be re-used. This makes it possible to introduce the high-performance MELSEC iQ-R Series while controlling the cost of supplementary equipment.

*2: For further details, please refer to the "MELSEC iQ-R Module Configuration Manual".

Possible to divert external device wiring

The MELSEC iQ-R Series I/O module, analog module, and counter module pin layouts and connectors are the same as those of the MELSEC-Q Series. Accordingly, existing external device wiring (connectors, terminal blocks) can be diverted without changes and wiring costs can be reduced.



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. Enhanced further with the arrival of the new iQ-R Series Programmable Automation Controller (PAC), reducing costs and improving productivity can be realized even easier.

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. Seamless integration is the core part of the iQ Platform, having a highly intelligent controller platform that caters to different aspects of control all on the same base rack, and maximizing productivity by taking advantage of the high-speed iQ-R system bus, which further reduces operation cycle times. Transparent communications are achieved by supporting the industry-leading gigabit Ethernet-based open network, CC-Link IE. Seamless data flow is realized no matter what point on the network, ensuring the free flow of production data across the manufacturing site.

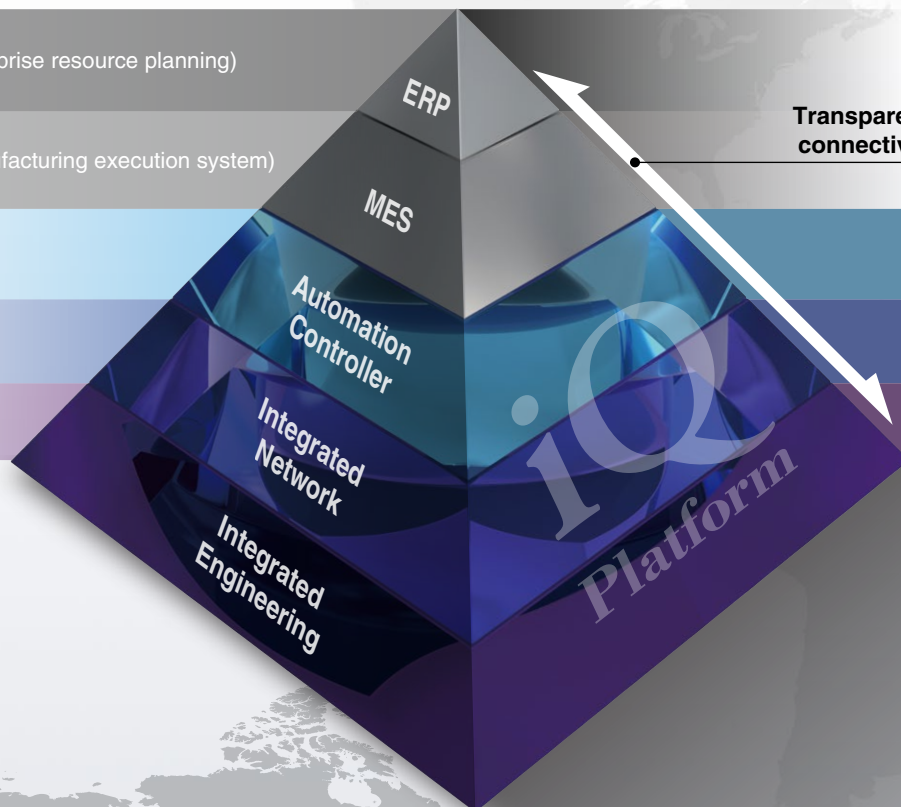
Taking these aspects and applying the new iQ-R Series controller into the mix, the iQ Platform raises processing capabilities to the next level for future intelligent manufacturing plants.



ERP (Enterprise resource planning)

MES (Manufacturing execution system)

Transparent connectivity





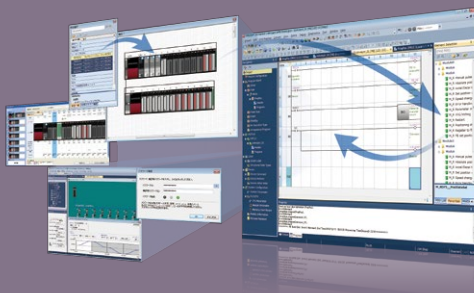
PAC & HMI

- 1 The new high-speed MELSEC iQ-R Series system bus is 40-times faster realizing improved system performance
- 2 Program standardization through function blocks and module labels
- 3 Powerful and robust security features



Network

- 1 CC-Link IE, 1Gbps high-speed and large bandwidth communications network (40-times faster link refresh)
- 2 Seamless connectivity within all levels of manufacturing with SLMP



Engineering

- 1 Automatic generation of network configuration diagram
- 2 Share parameters across multiple engineering software via MELSOFT Navigator
- 3 Changes to system labels shared between PAC and HMI

Mitsubishi Electric
FA Integrated Controller **iQ** Platform

Lineup

Power supply P.19

R61P..... AC input

R62P..... AC input
(inc. 24 V DC output)

R64P..... AC input (large capacity)

R63P..... DC input

Base P.19

Main base

R35B..... 5-slot

R38B..... 8-slot

R312B..... 12-slot

Extension base

R65B..... 5-slot

R68B..... 8-slot

R612B..... 12-slot

RQ extension base (MELSEC-Q Series)

RQ65B..... 5-slot

RQ68B..... 8-slot

RQ612B..... 12-slot

Extension cable

RC06B..... 0.6 m

RC12B..... 1.2 m

RC30B..... 3 m

RC50B..... 5 m

CPU P.21

Programmable controller CPU

R04CPU..... 40K steps

R08CPU..... 80K steps

R16CPU..... 160K steps

R32CPU..... 320K steps

R120CPU..... 1200K steps

Motion CPU

R16MTCPU..... 16-axis

R32MTCPU..... 32-axis

Process CPU

R08PCPU..... 80K steps

R16PCPU..... 160K steps

R32PCPU..... 320K steps

R120PCPU..... 1200K steps

C Controller

R12CCPU-V..... Memory capacity
256 MB

I/O P.35

AC input

RX10..... 16-point

DC input

RX40C7..... 16-point

RX41C4..... 32-point

RX42C4..... 64-point

Relay output

RY10R2..... 16-point

Transistor (sink) output

RY40NT5P..... 16-point

RY41NT2P..... 32-point

RY42NT2P..... 64-point

Transistor (source) output

RY40PT5P..... 16-point

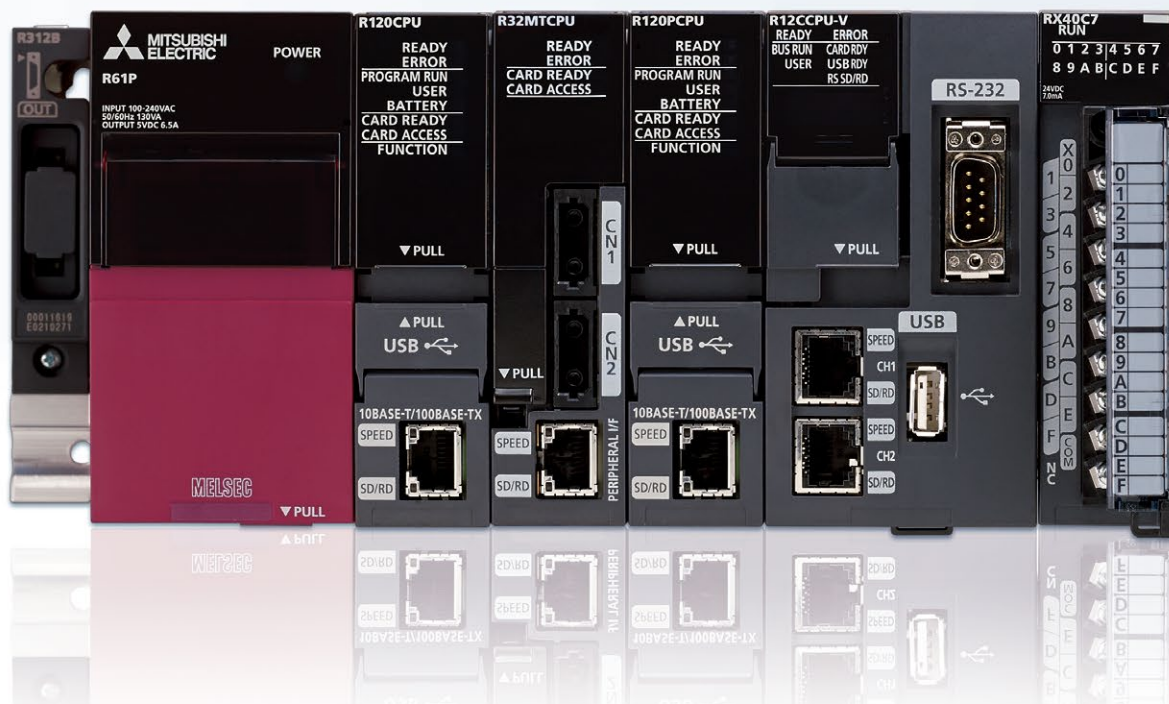
RY41PT1P..... 32-point

RY42PT1P..... 64-point

I/O combined module

DC Input, transistor (sink) output

RH42C4NT2P..... 32-point/32-point



Analog

P.38

Analog input

R60AD4	4-channel
	(voltage or current)
R60ADV8	8-channel (voltage)
R60ADI8	8-channel (current)

Analog input (channel isolated)

NEW

R60AD8-G	8-channel
	(voltage or current)
R60AD16-G	16-channel
	(voltage or current)

Temperature input

R60TD8-G	8-channel
	(thermocouple)
R60RD8-G	8-channel (RTD)

Analog output

R60DA4	4-channel
	(voltage or current)
R60DAV8	8-channel (voltage)
R60DAI8	8-channel (current)

Analog output (channel isolated)

NEW

R60DA8-G	8-channel
	(voltage or current)
R60DA16-G	16-channel
	(voltage or current)

Motion, Positioning, High-speed counter

P.43

Simple motion

RD77MS2	2-axis
RD77MS4	4-axis
RD77MS8	8-axis
RD77MS16	16-axis

Positioning

Transistor output

RD75P2	2-axis
RD75P4	4-axis

Differential driver output

RD75D2	2-axis
RD75D4	4-axis

High-speed counter

DC input/Transistor (sink) output

RD62P2	2-channel
--------------	-----------

DC input/Transistor (source) output

RD62P2E	2-channel
---------------	-----------

Differential input/Transistor (sink)

output

RD62D2	2-channel
--------------	-----------

Network

P.49

Ethernet

RJ71EN71	1 G/100 M/10 Mbps
	Multiple network type
	(Ethernet/CC-Link IE)

CC-Link IE Control network

RJ71GP21-SX	Control/Normal
	station optical cable

CC-Link IE Field network

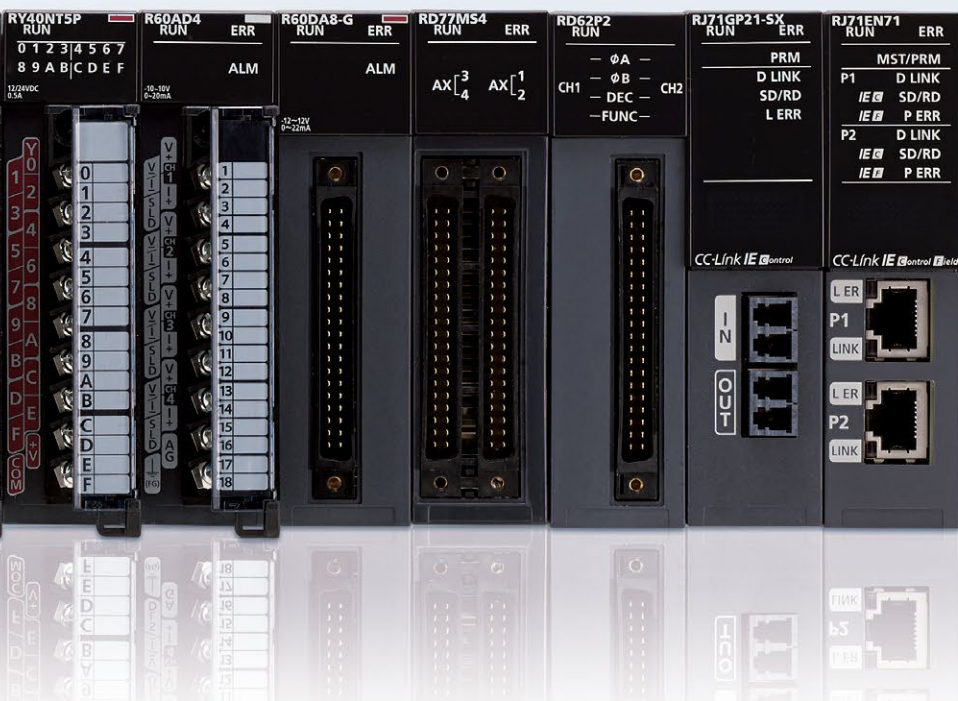
RJ71GF11-T2	Master/Local
	station

CC-Link

RJ61BT11	Master/Local station
	CC-Link Ver.2

Serial communication

RJ71C24	RS-232, RS-422/485
RJ71C24-R2	RS-232 x2ch
RJ71C24-R4	RS-422/485 x2ch

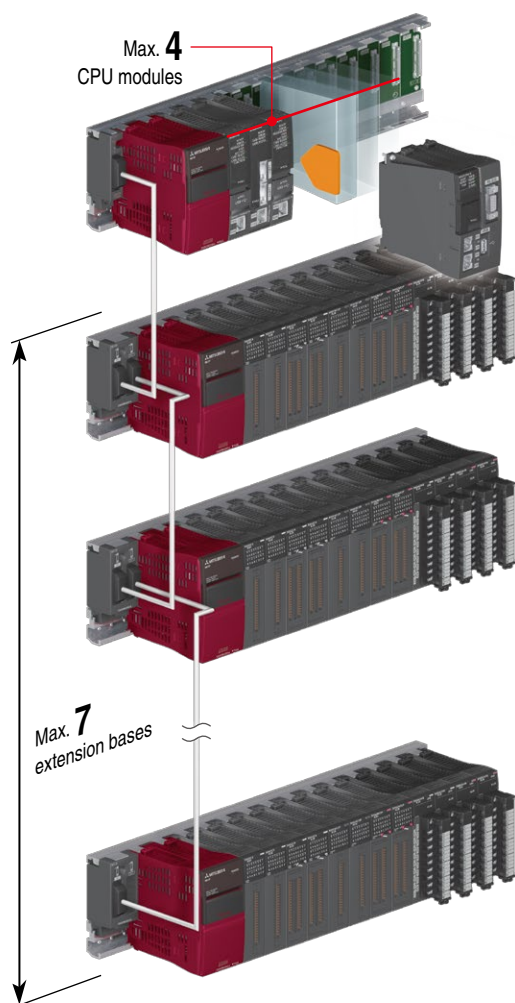


Flexible, interchangeable system architecture

The MELSEC iQ-R Series is a modular control system equipped with various modules such as CPUs, power supply, digital I/O, analog I/O and base unit and intelligent function modules, each having its own responsibility in the system. The core of the system is a base unit that interconnects all of the modules together and enables high-speed communications between each module. From small to large systems, scalability is simple. Up to seven extension bases can be connected and a maximum of 64 modules installed at any one time. An RQ extension base is also available, ensuring compatibility with existing MELSEC-Q Series modules.

Multiple CPU modules

- Install up to four CPU modules together
- Programmable controller CPU module
 - Motion CPU module
 - Process CPU module
 - C Controller module



Base units

- Main base unit



- Extension base unit

An extension base strictly for I/O and intelligent function modules.



- RQ extension base unit

An extension base for MELSEC-Q Series modules (further extensions requiring the MELSEC-Q Series extension base version).



Power supply module

- Power supply module

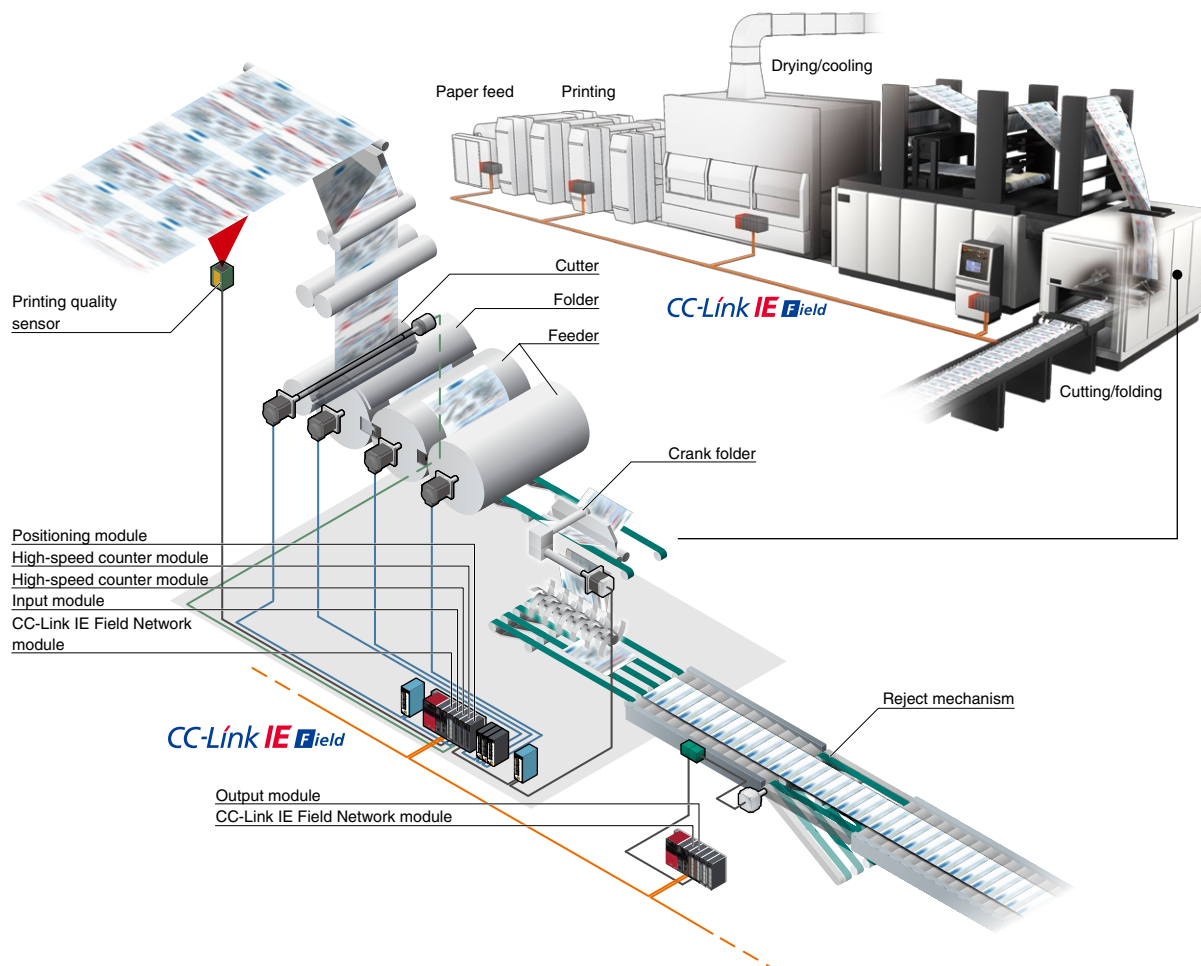


I/O & Intelligent function modules

- | | |
|-----------------------------|--|
| • Input module | • Ethernet interface module |
| • Output module | • CC-Link IE Control Network module |
| • I/O combined module | • CC-Link IE Field Network master/local module |
| • Analog input module | • CC-Link system master/local module |
| • Temperature input module | • Serial communication module |
| • Analog output module | |
| • Simple motion module | |
| • Positioning module | |
| • High-speed counter module | |

Highly accurate synchronization

The MELSEC iQ-R Series system provides highly accurate synchronization between modules on the control system, which is realized through inter-modular synchronization. Additionally, use of the CC-Link IE Field Network realizes network-level synchronization, providing node-level synchronization that ensures deterministic data flow void of any influence from data transmission delays. This is ideal for applications such as "cutting and folding" inside an offset printer, which requires synchronization between the printing quality sensor, high-speed rotary cutter, folding roller and conveyor.



Power supply module

Item	R61P	R62P	R64P	R63P
Input power supply voltage	100...240 V AC (85...264 V AC)	100...240 V AC (85...264 V AC)	100...240 V AC (85...264 V AC)	24 V DC (15.6...31.2 A DC)
Input frequency	50/60 Hz $\pm 5\%$	50/60 Hz $\pm 5\%$	50/60 Hz $\pm 5\%$	-
Max. input apparent power (VA)	130	120	160	-
Max. input power (W)	-	-	-	50
Rated output current (5 V DC)	6.5 A	3.5	9	6.5 A
Rated output current (24 V DC)	-	0.6	-	-

Main base unit

Item	R35B	R38B	R312B
Number of I/O modules installed	5	8	12
DIN rail mounting adapter type	R6DIN1	R6DIN1	R6DIN1
External dimensions (H x W x D, mm)	101 x 245 x 32.5	101 x 328 x 32.5	101 x 439 x 32.5

Extension base unit/RQ extension base unit

Item	Extension base unit			RQ extension base unit		
	R65B	R68B	R612B	RQ65B	RQ68B	RQ612B
Number of I/O modules installed	5	8	12	5	8	12
Applicable module	MELSEC iQ-R Series module			MELSEC-Q Series module		
DIN rail mounting adapter type	R6DIN1	R6DIN1	R6DIN1	Q6DIN2	Q6DIN1	Q6DIN1
External dimensions (H x W x D, mm)	101 x 245 x 32.5	101 x 328 x 32.5	101 x 439 x 32.5	98 x 245 x 44.1	98 x 328 x 44.1	98 x 439 x 44.1

Extension cable

Item	RC06B	RC12B	RC30B	RC50B
Cable length*1 (m)	0.6	1.2	3.0	5.0

*1: Overall cable distance 20 m. 13.2 m with the RQ extension base.

System
configuration

CPU

I/O

Analog

Motion, Positioning,
High-speed counter

Network

Software

The MELSEC iQ-R Series includes a wide range of programmable automation controllers capable of catering to diversified automation control needs. Concentrating on two fields, the lineup consists of a high-performance, general-purpose controller capable of variable memory capacities and a high-precision motion controller with variable controllable axes. The architecture has been redesigned around the new MELSEC iQ-R high-speed system bus to ensure high performance and intelligent processing power. In addition, application-specific CPUs have been added; the Process Control CPU (supporting up to 500 PID loops and hot-swap of I/O modules) and the C Controller CPU, which provides C language programming ideal for converting from personal computer or micro-controller based systems.



Focus points

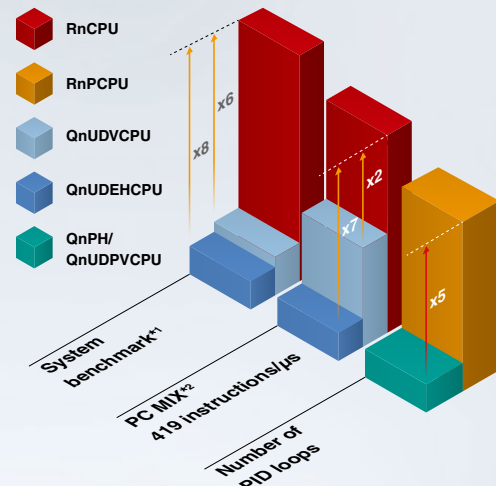
- ▶ Program capacity of up to 1200K steps
- ▶ Choose between 16- and 32-axis motion controller
- ▶ Internal DB for simple batch recipe control
- ▶ Improved multi-CPU controller architecture
- ▶ Security embedded in hardware SRAM cassette
- ▶ Various motion control possible (position, speed, torque, advanced sync, etc.)
- ▶ High-speed medium to large-scale process controller CPUs
- ▶ Improved PID loop capacity and hot-swap I/O capability
- ▶ C/C++ programming ideal for PC/micro-controller based systems

Improved performance

Controller performance has been improved, resulting in increased processing power and the ability to handle larger amounts of data. The multi-CPU architecture has been further improved, enabling faster data exchange across the backplane. The core instruction processing speed has also been improved tenfold, helping to reduce the production cycle time. High-speed and large process control systems can be realized, supporting up to 500 PID loops.

Finely balanced control

Balancing of various different control needs can be balanced effectively by utilizing the multi-CPU feature of the MELSEC iQ-R Series. Up to 96 servo axes can be controlled by incorporating three separate motion CPUs on the base unit, with a spare CPU slot required for controlling the general aspects of the system.



*1: Based on a typical application example, the system benchmark test measures the CPU scan time taking into consideration the network refresh time and processing time using external devices, and as compared to universal model QCPU (QnUDEHCPU).

*2: Average number of instructions, such as for basic instructions and data processing, executed in 1 μs (the larger the value, the faster the processing speed).

Programmable Controller CPU Modules

R04CPU

Program capacity 40K steps

R08CPU

Program capacity 80K steps

R16CPU

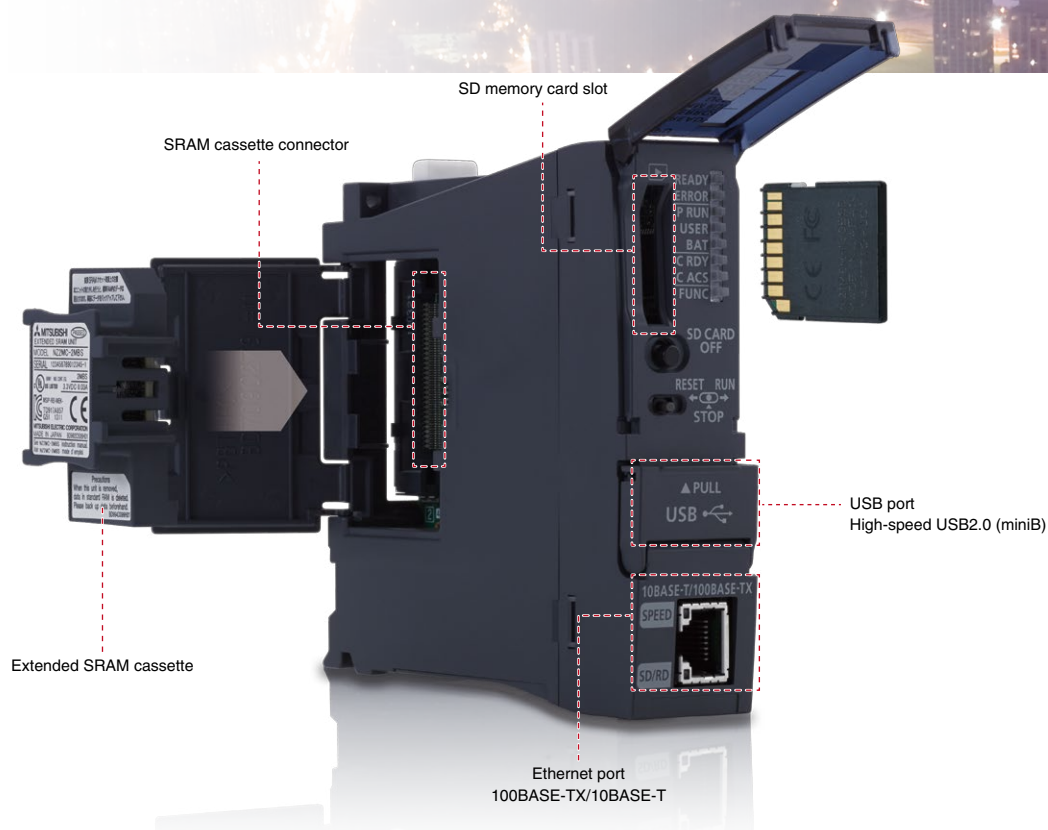
Program capacity 160K steps

R32CPU

Program capacity 320K steps

R120CPU

Program capacity 1200K steps



At the core of the MELSEC iQ-R Series is a programmable controller CPU. This CPU is the heart of the control system and includes various features for different applications. The most common CPU is the programmable controller CPU, into which various features are embedded, enabling it to perform a wide range of control tasks. The different CPUs are highly scalable with five types available, based on program capacity needs (40K to 1200K steps).

Built-in hardware features

Programmable controller CPUs are equipped with a built-in USB port (high-speed Ver. 2.0 Mini-B) and an Ethernet port (up to 100 Mbps) as standard, enabling connection to a general LAN network*1 or MELSOFT software. Two memory options are included as well, an external SRAM cassette that enables device/label memory to be increased and doubling up as a hardware security key, and an SD memory card which can be used for logging data, troubleshooting device values or as a memory database for recipe storage.

*1: General LAN connection supported by the Ethernet port only.

System
configuration

CPU

I/O

Analog

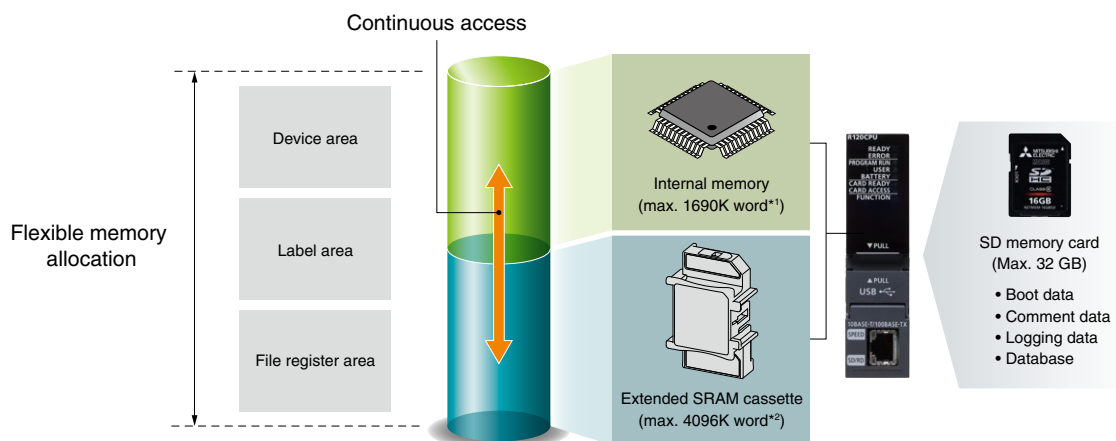
Motion, Positioning,
High-speed counter

Network

Software

Flexible, large-capacity data storage

The MELSEC iQ-R Series programmable controller CPU is designed to allow an external SRAM cassette to be installed directly into the CPU module. This option makes it possible to increase internal device memory to an impressive 5786K words, expanding device/label memory even further. An SD memory card can be used at the same time, expanding data logging memory and the capacity of the internal database, which is ideal for large-scale systems. In general, management of programmable controller internal data is quite flexible, making programming even easier by allowing various data area allocations to be changed within the CPU memory and SRAM cassette.



*1: Based on R120CPU.

*2: Based on NZ2MC-8MBS (8 MB).

Data management utilizing internal database (DB)

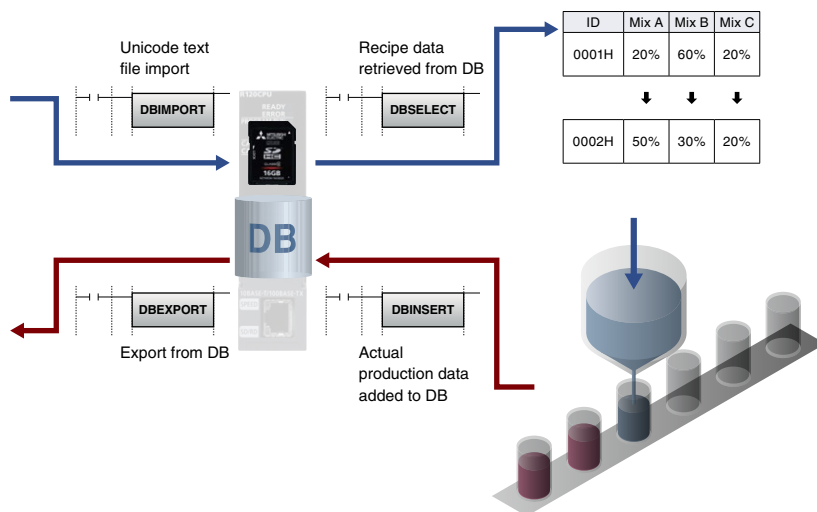
The CPU includes an internal database that can be installed into the SD memory card. This feature allows, for example, a selection of database commands that can add/delete/change records to be utilized for simple recipe functions. It is also much easier to import/export Unicode files for use in spreadsheets. This is a very useful feature, especially for the food and beverage industry where multiple product variations are produced using the same machine process.

Database (recipe table)

ID	Name	Mix A (%)	Mix B (%)	Mix C (%)
0001H	Red	20	60	20
0002H	Blue	50	30	20

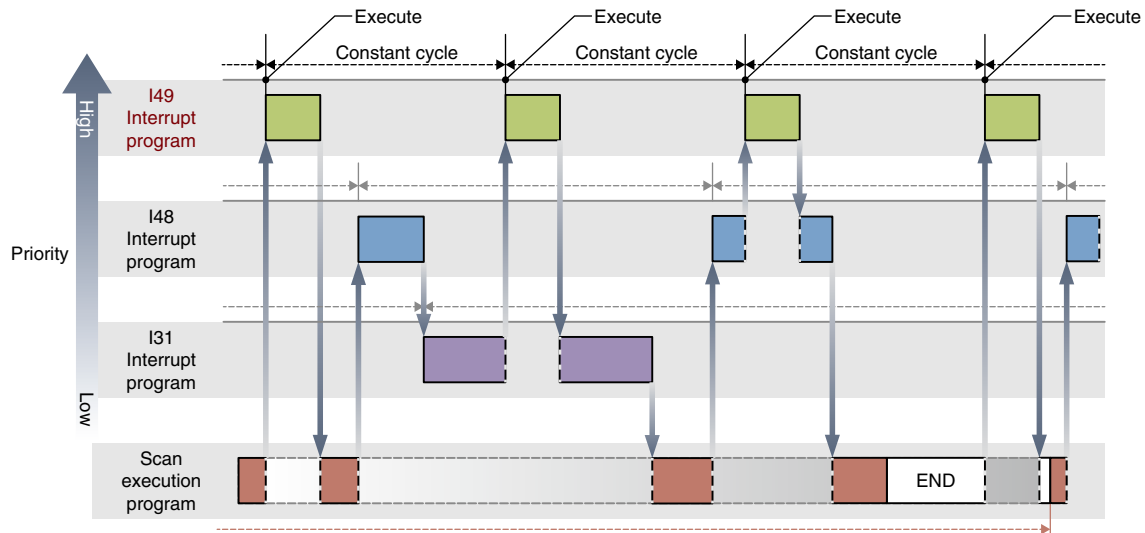
Database (reporting tool)

Serial no.	ID	Date/time	Amount
00001234H	0001H	DD/MM/20YY 15:40:30	81
00001235H	0002H	DD/MM/20YY 15:41:15	79

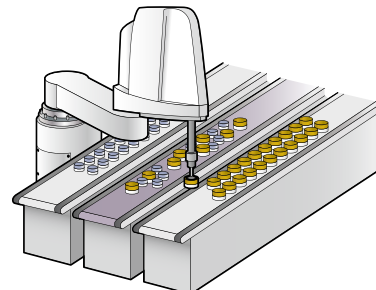
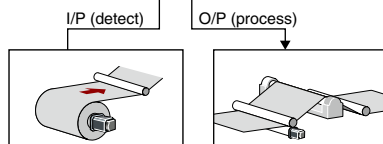


High-speed, event driven programs

Further improvements to CPU performance have resulted in the interval time between event driven programs (interrupt programs) reduced to 50 us. This has been realized by having multiple event driven programs able to be nested within other event driven programs and being triggered from already executing programs. This kind of performance is available with a standard input module and programmable controller CPU, without requiring a dedicated interrupt type input module, which helps to further reduce hardware costs while realizing a high-precision control system.



I/P module + ABS encoder accurately detect variable high-speed I/P signals.



CPU program management data

Operation and system historical events are automatically recorded in the CPU module, allowing quick root cause analysis of system errors or management of program changes. Actual changes to the program, parameters and system errors are viewable using GX Works3 or can be exported as a CSV file for use by other third-party software.

Event History(CPU: PLC No. 1) Start I/O No. 3E00

Refresh(CU)Number of Events:1681Refine(ID)

Refine

Match All the Conditions

Match Any One of the Conditions

1Event TypeIncluding Next

2

3

Start Refine

Clear Refine Conditions

No.	Occurrence Date	Event Type	Status	Event Code	Overview
00004	2014/06/06 14:25:56.798	System	↓	00400	Power-on and reset
00005	2014/06/06 14:16:34.026	System	⚠	01000	Power shutdown
00006	2014/06/06 14:11:09.100	Operation	↓	24200	Creation of new folders, writes to file
00007	2014/06/06 14:04:39.417	Operation	↓	24200	Creation of new folders, writes to file
00008	2014/06/06 13:59:53.360	Operation	↓	24100	Operating status change (RUN)
00009	2014/06/06 13:59:51.431	System	↓	00400	Power-on and reset
00010	2014/06/06 9:58:33.942	System	⚠	02000	Invalid module

Legend

⚠ Major

⚠ Moderate

⚠ Minor

Jump

Clear All

Detailed Information

Operation initiator information

Drive and file information

Connection port :USB	Drive name :Data memory
	File name :MAIN.PRG

Cause

Corrective Action

- A new folder was created. A new file was created or data was written to a file.

Create File...

Close

View operations and system events with corresponding event/error codes, data can be sorted according to various attributes.

Corresponding explanatory text

Detailed Information		Operation initiator information	Drive and file information
		Connection port :USB	Drive name :Data memory
			File name :MAIN.PRG
Cause		- A new folder was created. A new file was created or data was written to a file.	
Corrective Action			

System configuration

CPU

I/O

Analog

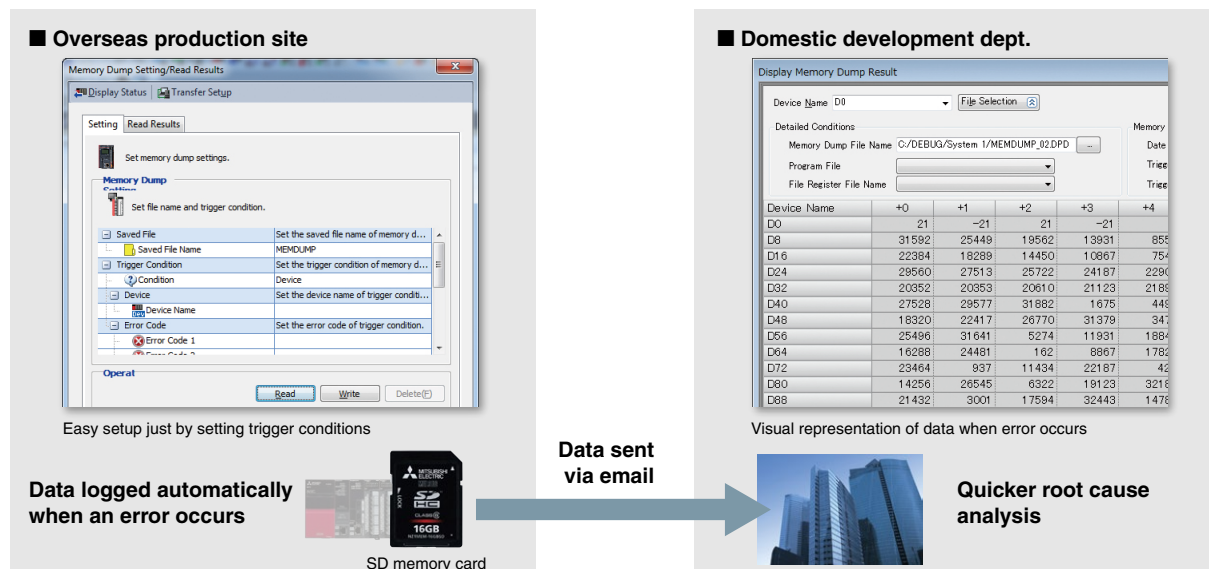
Motion, Positioning, High-speed counter

Network

Software

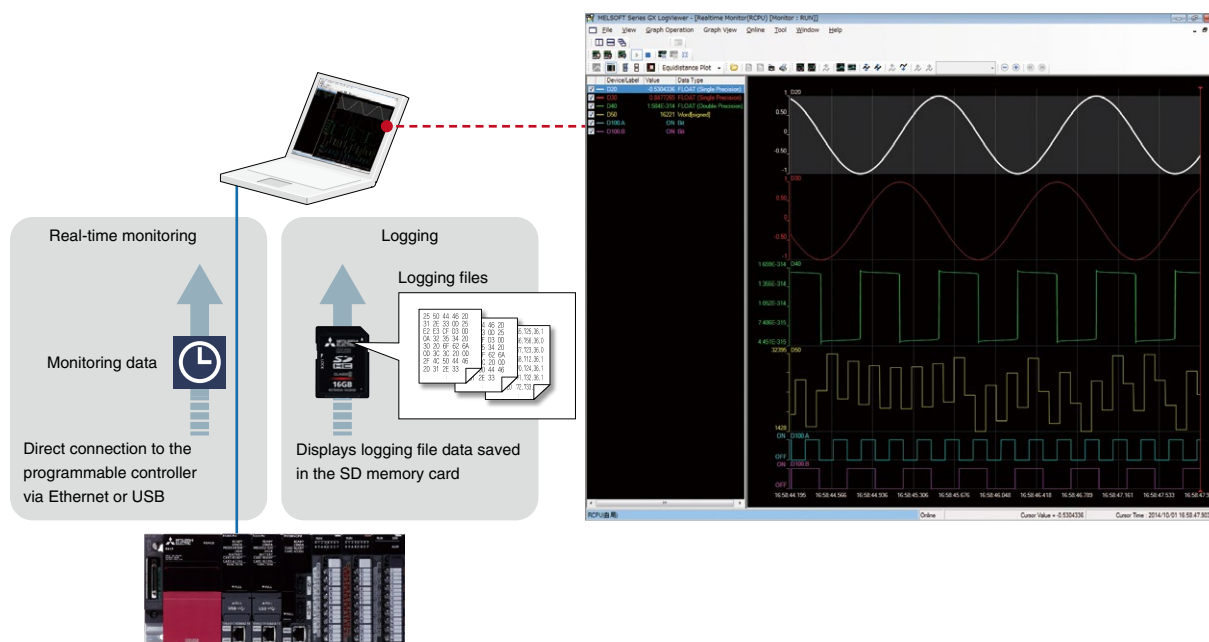
Intuitive root cause analysis

When the SD memory card is installed, device data is saved automatically to the SD memory at the time of system failure. This data is useful for investigating the cause of the failure, enabling various data collected before and during the event to be analyzed. The data can be used in a situation such as when the origin of a machine is different than where the machine was actually being used, and the data can simply be sent by e-mail (for example) as a data file for analysis.



Easily collect manufacturing data

Utilizing the installed SD memory card or a direct live connection to the CPU module, logging data can be easily realized just by simply registering the parameters. Logged data can be utilized in a number of ways, such as using third-party spreadsheet software or as a real-time feed of data for analyzing various manufacturing processes. The real-time feature enables live feeds showing data as they happen in addition to historical trending. Logged historical trend files support the Unicode text file format, which is especially useful for Asian based applications as most languages in the region require Unicode compatibility for information to be legible.



Programmable controller CPU module specifications

Item	R04CPU	R08CPU	R16CPU	R32CPU	R120CPU
Control method	Stored program cyclic operation				
I/O control mode	Refresh mode (Direct access I/O is available by specifying direct access I/O (DX, DY).)				
Programming language	Ladder diagram (LD), structured text (ST)				
Extended programming language	Function block (FB), label programming (system/local/global)				
Program execution type	Initial, scan, fixed scan, interrupt, standby type				
Number of I/O points [X/Y] (point)	4096	4096	4096	4096	4096
Constant scan (ms)	0.2...2000				
(Function for keeping regular scan time)	(Setting available in 0.1 ms increments)				
Memory size					
Program size (step)	40K	80K	160K	320K	1200K
Program memory (byte)	160K	320K	640K	1280K	4800K
Device/label memory*1 (byte)	400K	1188K	1720K	2316K	3380K
Data memory (byte)	2M	5M	10M	20M	40M
Instruction processing time					
LD instruction (ns)	0.98	0.98	0.98	0.98	0.98
MOV instruction (ns)	1.96	1.96	1.96	1.96	1.96
E + instruction (floating-point addition) (ns)	9.8	9.8	9.8	9.8	9.8
Structured text IF instruction*2 (ns)	1.96	1.96	1.96	1.96	1.96
Structured text FOR instruction*2 (ns)	1.96	1.96	1.96	1.96	1.96
PC MIX value*3 (instructions/μs)	419	419	419	419	419
Interface connection port					
USB 2.0 High Speed (miniB)	●	●	●	●	●
Ethernet (100 BASE-TX/10 BASE-T)	●	●	●	●	●
Memory interface					
SD memory card	●	●	●	●	●
Extended SRAM cassette	●	●	●	●	●
Function					
Multiple interrupt	●	●	●	●	●
Standard PID control	●	●	●	●	●
Internal database	●	●	●	●	●
Memory dump	●	●	●	●	●
Data logging	●	●	●	●	●
Real-time monitor	●	●	●	●	●
Security	●	●	●	●	●
Inter-modular synchronization	●	●	●	●	●
SLMP communication	●	●	●	●	●

*1: An extended SRAM cassette expands the device/label memory area.

*2: The IF or FOR sentence of the structured text consists of several instructions, which may increase the processing time period.

*3: Average number of instructions such as for basic instructions and data processing executed in 1 μs. The larger the value, the faster the processing speed.

SD memory card specifications

Item	NZ1MEM-2GBSD	NZ1MEM-4GBSD	NZ1MEM-8GBSD	NZ1MEM-16GBSD
Type	SD memory card	SDHC memory card	SDHC memory card	SDHC memory card
Capacity (byte)	2G	4G	8G	16G

Extended SRAM cassette specifications

Item	NZ2MC-1MBS	NZ2MC-2MBS	NZ2MC-4MBS	NZ2MC-8MBS
Capacity (byte)	1M	2M	4M	8M

System
configuration

CPU

I/O

Analog

Motion, Positioning,
High-speed counter

Network

Software

Motion CPU Modules

R16MTCPU

Up to 16-axis control

R32MTCPU

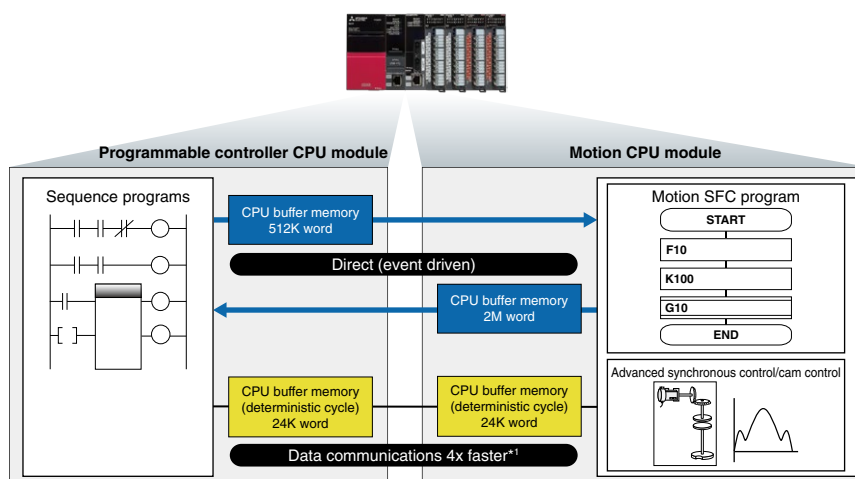
Up to 32-axis control



The motion CPU module is a dedicated high-precision control CPU module, designed solely for applications that require advanced motion control such as positioning control, synchronous control, and speed-torque control at a very high accuracy. The motion CPU is incorporated into the multiple CPU architecture of the MELSEC iQ-R Series complementing the programmable controller CPU.

High-speed data communication between CPUs

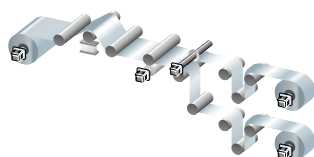
High-speed communication is realized between the two CPUs via a large bandwidth data buffer memory exchange. There are two types of buffer memory for data exchange: one that provides cyclic exchange at a cycle time as fast as 0.222 ms; and one for direct data exchange of event-driven buffer memory, which is useful for large data bandwidth requirements. High-speed communications are very useful when there is a need to instantaneously transfer a large amount of information such as cam data, thereby simplifying programming even further.



*1: As compared to current Mitsubishi Electric products.

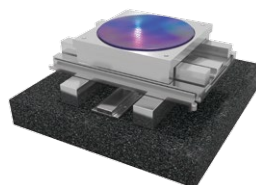
Various different applications easily realized

Tension control can be maintained constantly enabling the unwinding of various rolled sheets, for example, with line synchronization realized via speed and advanced synchronous control.



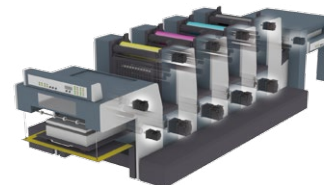
Converting equipment

The combination of a machine vision system and high-speed motion control enables highly accurate positional alignment.



Positional alignment

Synchronization between different print heads has been achieved by speed and advanced synchronous control.

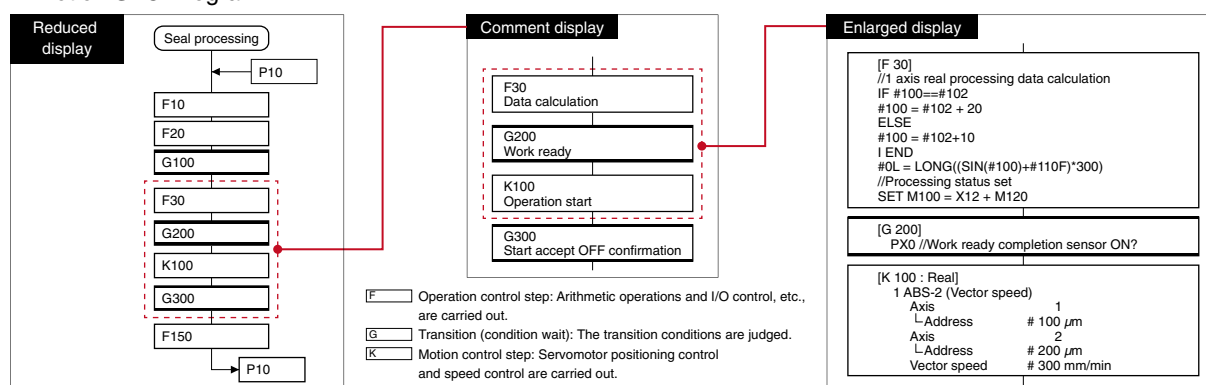


Offset printing

Multiple machine processes by SFC programming

The motion CPU module is programmed using the SFC (Sequential Function Chart) type language which enables programming in clearly identifiable steps. This is extremely useful where multiple machine processes have to be performed simultaneously.

■ Motion SFC Program



Motion CPU module specifications

Item	R16MTCPU	R32MTCPU
Number of control axes	16 axes	32 axes (16 axes x 2 lines)
Operation cycle (ms)	0.222, 0.444, 0.888, 1.777, 3.555, 7.111	0.222, 0.444, 0.888, 1.777, 3.555, 7.111
Programming language	Motion SFC, dedicated instruction	Motion SFC, dedicated instruction
Servo program capacity (step)	32K	32K
Number of positioning points (point)	6400 (positioning data can be designated indirectly)	6400 (positioning data can be designated indirectly)
Servo amplifier network	SSCNET III/H (1 line)	SSCNET III/H (2 lines)
Max. distance between stations (m)	100	100
Interpolation		
Linear interpolation (axis)	2, 3, 4	2, 3, 4
Circular interpolation (axis)	2	2
Helical interpolation (axis)	3	3
Control mode		
PTP (Point To Point) control	●	●
Speed-position switching control	●	●
Continuous path control	●	●
Position follow-up control	●	●
Advanced synchronous control	●	●
Speed-torque control	●	●
Acceleration/deceleration control		
Trapezoidal acceleration/deceleration	●	●
S-curve acceleration/deceleration	●	●
Advanced S-curve acceleration/deceleration	●	●
Interface		
PERIPHERAL I/F	●	●
SD memory card	●	●
Function		
Absolute positioning system*1	●	●
Mark detection function	●	●
Security function	●	●
Digital oscilloscope function	●	●
Driver communication function	●	●

*1: A battery needs to be installed in the servo amplifier for home position backup.

System
configuration

CPU

I/O

Analog

Motion, Positioning,
High-speed counter

Network

Software

Process CPU Modules

R08PCPU **NEW**

Program capacity 80K steps

R16PCPU **NEW**

Program capacity 160K steps

R32PCPU **NEW**

Program capacity 320K steps

R120PCPU **NEW**

Program capacity 1200K steps



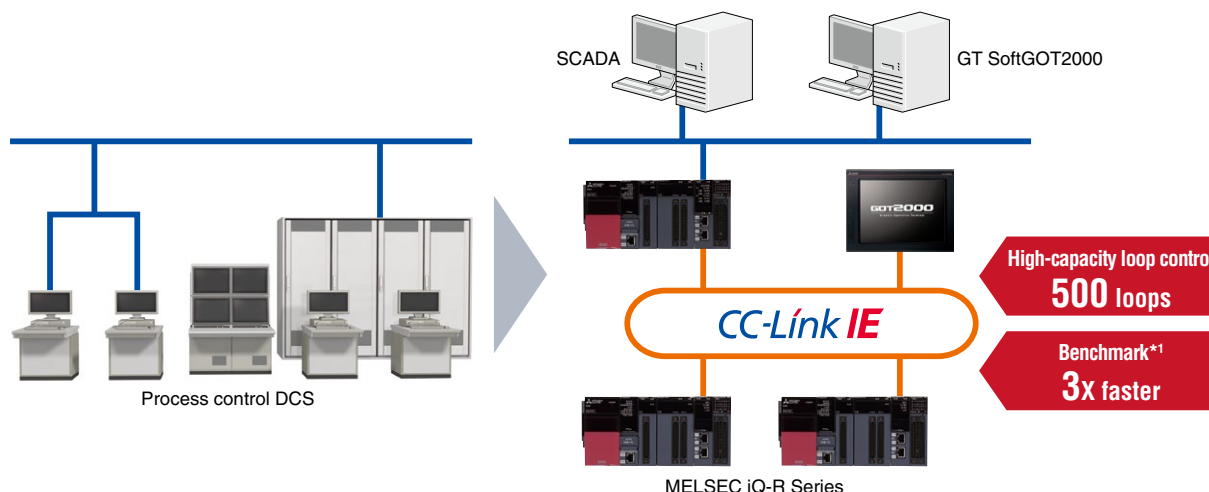
The Process CPU module is part of the application-specific range in the MELSEC iQ-R Series and has four CPUs available with memory sizes from 80K to 1200K steps. Designed specifically for medium- to large-scale process control systems requiring high-speed performance coupled with the handling of large PID loops. General control is possible with these modules, however, this range of CPUs also enables the hot-swapping of I/O modules, which adds further reliability to the control system.

DCS style features in a cost-efficient automation control system

The specialized CPU inherits its high performance from the MELSEC iQ-R Series when used together with the centralized programming suite GX Works3 and iQ Works. The process control system incorporates a dedicated instruction set (such as two-degree-of-freedom PID, sample PI, and auto-tuning) realizing algorithmic PID and highly reliable features such as being able to interchange (hot-swap) I/O modules while the system is still online. The maximum amount of PID loops has been increased to an impressive 500 loops, closely bringing it in line with DCS capabilities without the financial burdens.

High-capacity, high-speed loop control realizing the cost lower than DCS

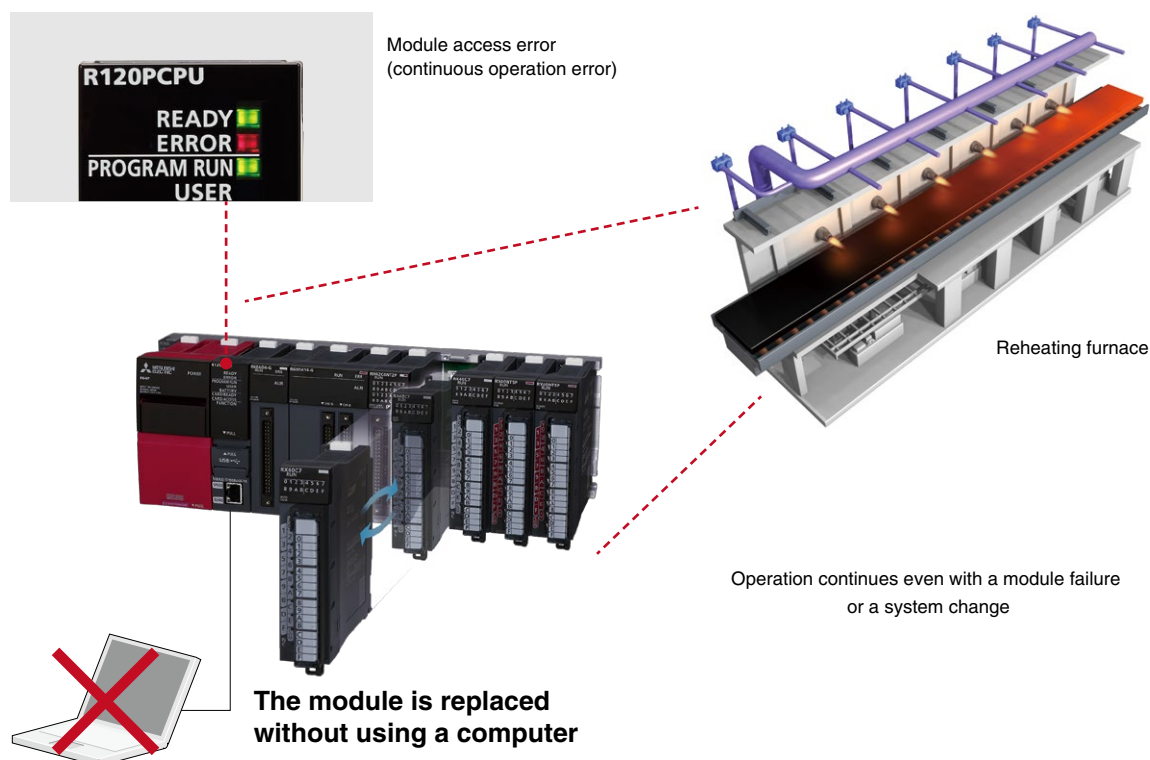
When large-scale process control is required, the MELSEC iQ-R Series Process CPU offers a high-performance CPU module that has a programming memory of 1200K steps and is capable of handling up to 500 PID loops, nearly five-fold that of the MELSEC-Q Series. Based on standard modules that are highly scalable as compared to DCS systems, the MELSEC automation system enables the control system to be streamlined. Utilizing the MELSEC iQ-R Series platform, the processing time has been improved as well.



*1: Based on a typical application example, the benchmark test measures the scan time taking into consideration the network refresh time and processing time of basic instructions and loop control, etc., and as compared to MELSEC-Q Series Process CPU (QnPHCPU).

Hot-swapping of I/O modules ensures highly reliable system

Utilizing the Process CPU, the MELSEC iQ-R Series supports the interchangeability (hot-swap) of I/O modules without having to initiate a hot-swap with GX Works3. In addition, new modules can be easily added to an operating system by uploading the new parameters from the GX Works3 programming software. This kind of feature is essential in process control, where the entire control system cannot be stopped even if a module develops a fault and must be changed.



System
configuration

CPU

I/O

Analog

Motion, Positioning,
High-speed counter

Network

Software

Process CPU module specifications

Item	R08PCPU	R16PCPU	R32PCPU	R120PCPU
Control method	Stored program cyclic operation			
I/O control mode	Refresh mode (Direct access I/O is available by specifying direct access I/O (DX, DY).)			
Programming language	Ladder diagram (LD), structured text (ST), function block diagram (FBD)			
Extended programming language	Function block (FB), label programming (system/local/global)			
Program execution type	Initial, scan, fixed scan, interrupt, standby type			
Number of I/O points [X/Y](point)	4096	4096	4096	4096
Constant scan (ms)	0.2...2000			
(Function for keeping regular scan time)	(Setting available in 0.1 ms increments)			
Memory size				
Program size (step)	80K	160K	320K	1200K
Program memory (byte)	320K	640K	1280K	4800K
Device/label memory (ECC type)*1 (byte)	1188K	1720K	2316K	3380K
Data memory (byte)	5M	10M	20M	40M
Instruction processing time				
LD instruction (ns)	0.98	0.98	0.98	0.98
MOV instruction (ns)	1.96	1.96	1.96	1.96
E + instruction (floating-point addition) (ns)	9.8	9.8	9.8	9.8
Structured text IF instruction*2 (ns)	1.96	1.96	1.96	1.96
Structured text FOR instruction*2 (ns)	1.96	1.96	1.96	1.96
PC MIX value*3 (instructions/μs)	419	419	419	419
Interface connection port				
USB2.0 High Speed (miniB)	●	●	●	●
Ethernet (100BASE-TX/10BASE-T)	●	●	●	●
Memory interface				
SD memory card	●	●	●	●
Extended SRAM cassette	●	●	●	●
Function				
Multiple interrupt function	●	●	●	●
Standard PID control function	●	●	●	●
Process control function	●	●	●	●
Database function	●	●	●	●
Data logging function	●	●	●	●
Security function	●	●	●	●
Inter-modular synchronization function	●	●	●	●
SLMP communication function	●	●	●	●
Online module change	●	●	●	●

*1: An extended SRAM cassette expands the device/label memory area. (NZ2MC-8MBSE expands the device/label memory area conforming to ECC type memory.)

*2: The IF or FOR sentence of the structured text consists of several instructions, which may increase the processing time period.

*3: Average number of instructions such as for basic instructions and data processing executed in 1 μs. The larger the value, the faster the processing speed.

SD memory card specifications

Item	NZ1MEM-2GBSD	NZ1MEM-4GBSD	NZ1MEM-8GBSD	NZ1MEM-16GBSD
Type	SD memory card	SDHC memory card	SDHC memory card	SDHC memory card
Capacity (byte)	2G	4G	8G	16G

Extended SRAM cassette specifications

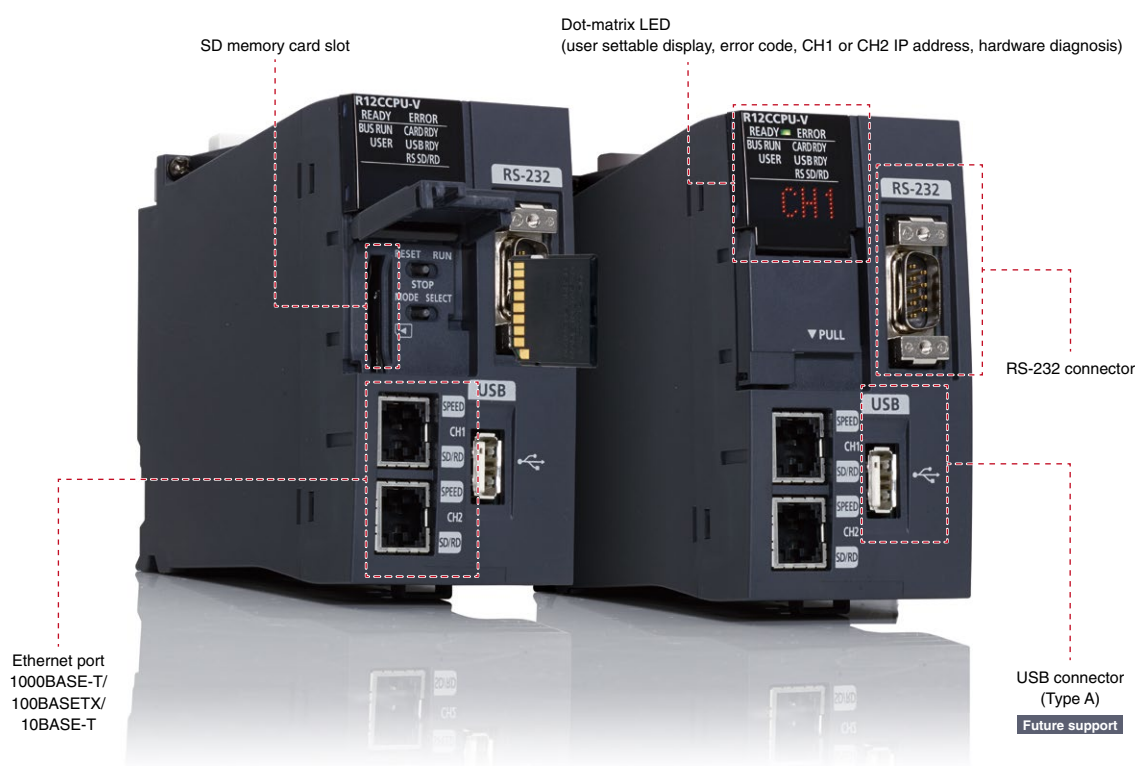
Item	NZ2MC-1MBS	NZ2MC-2MBS	NZ2MC-4MBS	NZ2MC-8MBS(E)*4
Capacity (byte)	1M	2M	4M	8M

*4: NZ2MC-8MBSE is for Process CPU modules only.

C Controller Module

R12CCPU-V NEW

Memory capacity 256 MB



System
configuration

CPU

I/O

Analog

Motion, Positioning,
High-speed counter

Network

Software

The C Controller module is part of the application-specific range in the MELSEC iQ-R Series. The multi-core ARM®-based controller pre-installed with VxWorks® Version 6.9, realizes the simultaneous execution of programs, thereby providing a robust and deterministic alternative to computer based systems. Utilizing a fan-less hardware design, the C Controller is ideal for clean fab-based applications where dust circulation can be detrimental to the production environment. The C Controller utilizes the high-performance, flexible, and robust features of the MELSEC iQ-R Series to provide an industrial-grade automation control system.

Easy setup using three simple tools

Setup of the C Controller couldn't be simpler as the CPU is shipped with a pre-installed real-time OS with various drivers embedded. This eliminates the need to setup and install a separate OS and develop drivers, which can substantially add to the cost of implementation. The C Controller allows C language programming by using CW Workbench programming software, easy configuration using MELSOFT CW Configurator, and VxWorks® emulation using CW-Sim.

Programming without considering MPU

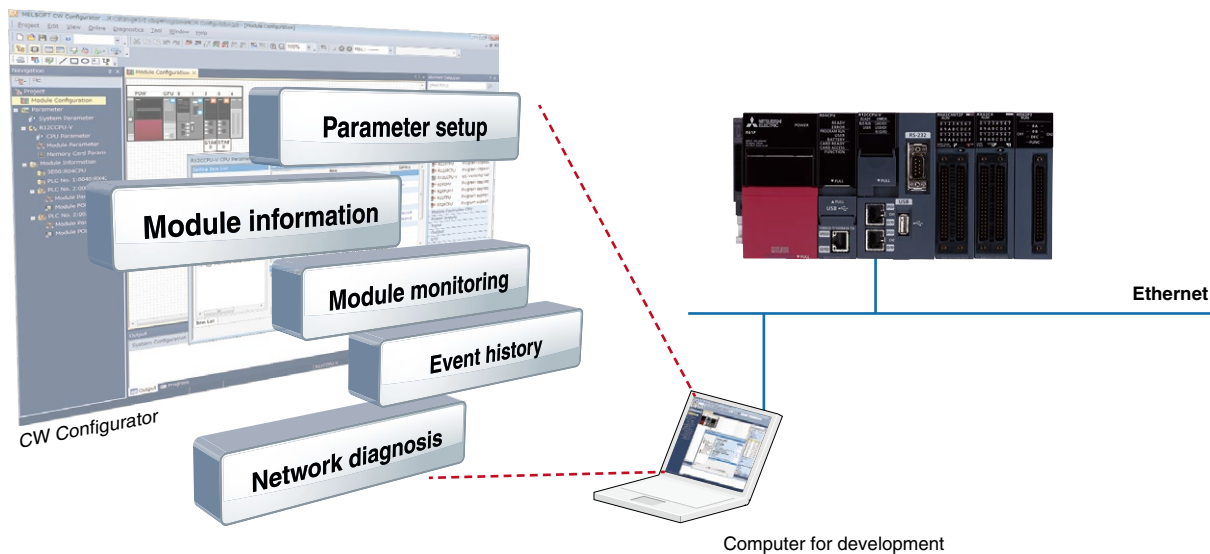
C Controller dedicated functions (CCPU functions) and MELSEC communication functions (MD functions) realize easy access to the C Controller, I/O, intelligent function, network, and programmable controller/motion CPU modules. Applications involving programmable controllers can be easily created using these functions.



Parameter setup/diagnosis/monitoring with CW Configurator

CW Configurator enables parameter setup, module diagnosis and monitoring of various MELSEC iQ-R/Q Series intelligent, network and I/O modules*1 modules including the C Controller module. Using CW Configurator is as easy as using the MELSEC iQ-R engineering software GX Works3, which shares similar interfaces.

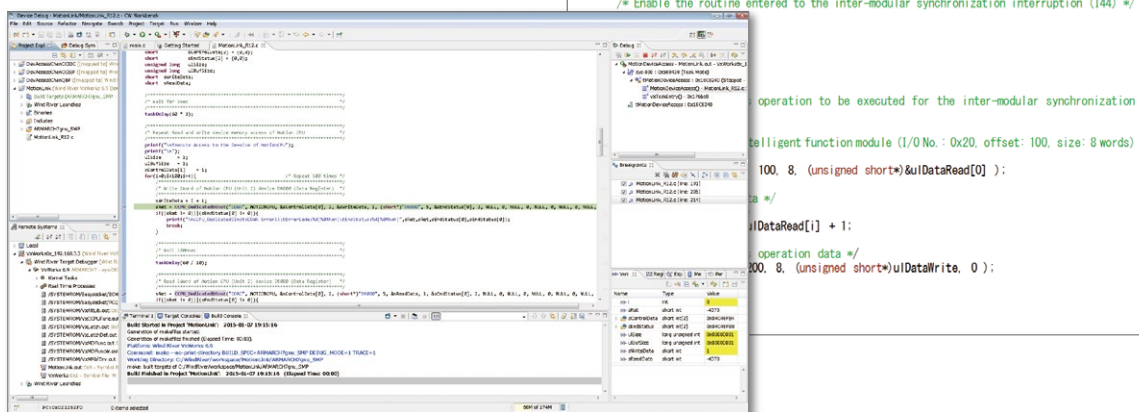
*1: For supported modules, please refer to the relevant manual of that module.



Application development in simple steps

Developing applications with the MELSEC C Controller is easy as no additional driver development is required, whilst providing a full-scale embedded development environment at a relatively low cost. CW Workbench is used as the main programming software in C/C++ with a VxWorks® emulator, CW-Sim/CW-Sim standalone, which allows debugging without requiring any hardware.

**No need to generate OS or drivers.
This program does it all.**



Engineering tool for C Controller
CW Workbench

C Controller module specifications

Item	R12CCPU-V
Hardware	
Endian format	Little endian
MPU	ARM® Cortex-A9 Dual Core
Working RAM	256 MB
ROM	12 MB
Backup RAM	4 MB
Software	
OS	VxWorks® Version 6.9
Programming language	C language (C/C++)
Programming development environment	CW Workbench/Wind River Workbench3.3
C Controller module setting/monitoring tool	CW Configurator (SW1DND-RCCPU)
Communication interface	
USB	Future support
Ethernet	2CH (1000BASE-T/100BASE-TX/10BASE-T)
RS-232	1CH (9600...115200 bps)
SD memory card slot	●

System
configuration

CPU

I/O

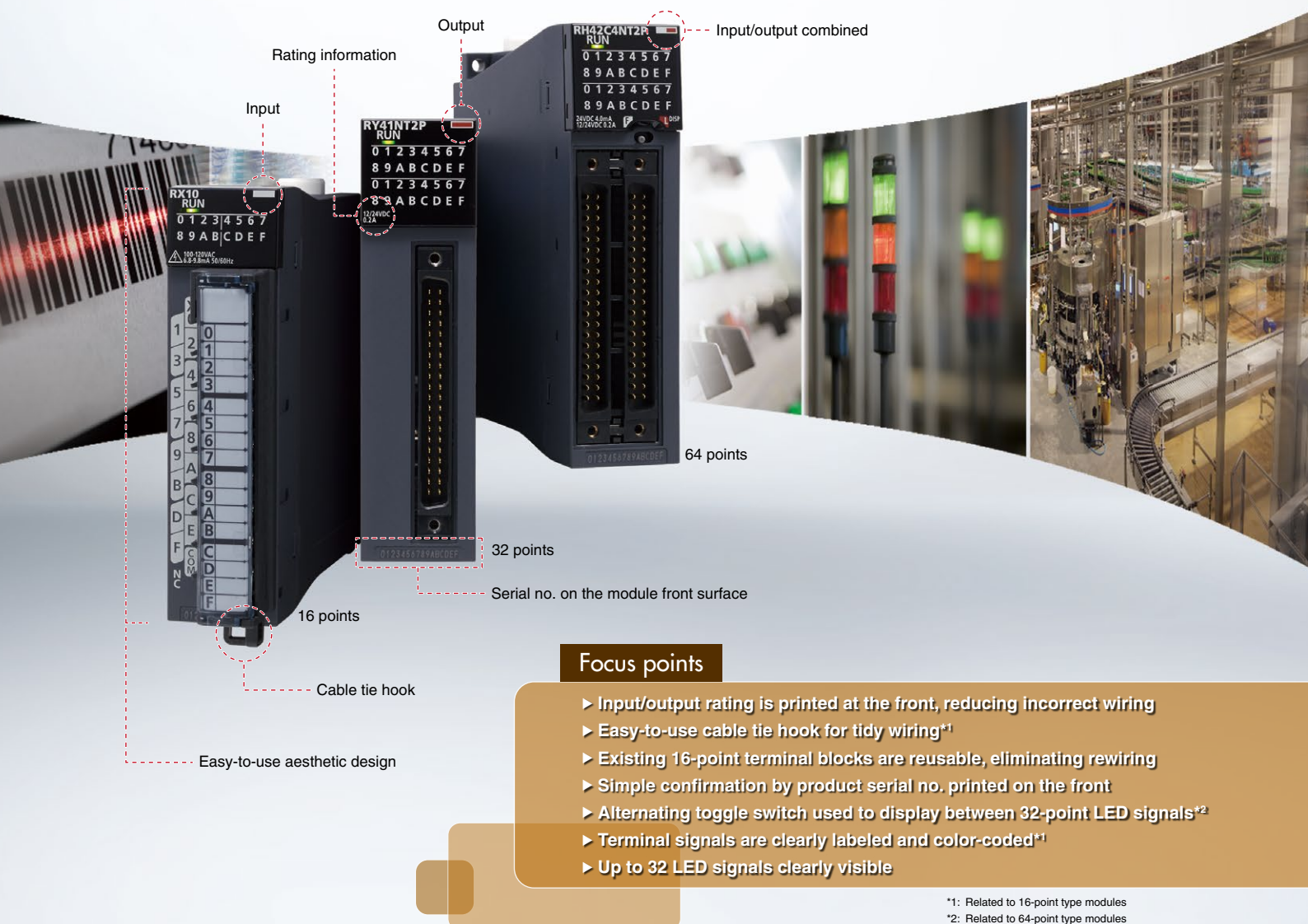
Analog

Motion, Positioning,
High-speed counter

Network

Software

Digital I/O modules are the senses of the automation system and provide an interface of various processes to the controller. Devices such as switches, indicator lamps, and sensors can be easily connected to the control system. The high-density terminal connections (up to 64 points) results in space-saving designs within the control cabinet further reducing installation costs. In addition, input interrupt functions and output relay health diagnosis are additional features embedded in this intelligent, yet small, compact module.



Focus points

- ▶ Input/output rating is printed at the front, reducing incorrect wiring
- ▶ Easy-to-use cable tie hook for tidy wiring*¹
- ▶ Existing 16-point terminal blocks are reusable, eliminating rewiring
- ▶ Simple confirmation by product serial no. printed on the front
- ▶ Alternating toggle switch used to display between 32-point LED signals*²
- ▶ Terminal signals are clearly labeled and color-coded*¹
- ▶ Up to 32 LED signals clearly visible

*1: Related to 16-point type modules

*2: Related to 64-point type modules

Clear and easily legible

White and red labels clearly differentiate the input and output modules from each other, further improving safety awareness. The LED signal displays also labeled with clearly visible and easy to read I/O signal numbers printed on the cover. The wiring terminals of the 16-point modules are labeled with signal names, further reducing the possibility of wiring mistakes. Up to 32 LED signals can be displayed at one time, and a toggle switch enables alternation between the first- and second-half signal displays for the high-density 64-point modules. The input and output ratings are also clearly printed on the front and the serial number is at the bottom, making it easy to confirm product model and version.

Simple wiring and high-density I/O

I/O modules are available in a wide range of densities (16-, 32- and 64-points) depending on the I/O requirements and minimum use of space in the control cabinet. A module with a 40-pin connector is available for high-density I/O wiring. The terminal block is interchangeable with MELSEC-Q Series I/O terminals and can save on the cost of upgrading from existing control systems.

Input Modules

AC input

RX10

16 points
100 to 120 V AC (50/60 Hz)

DC input

RX40C7

16 points
24 V DC, 7.0 mA

RX41C4

32 points
24 V DC, 4.0 mA

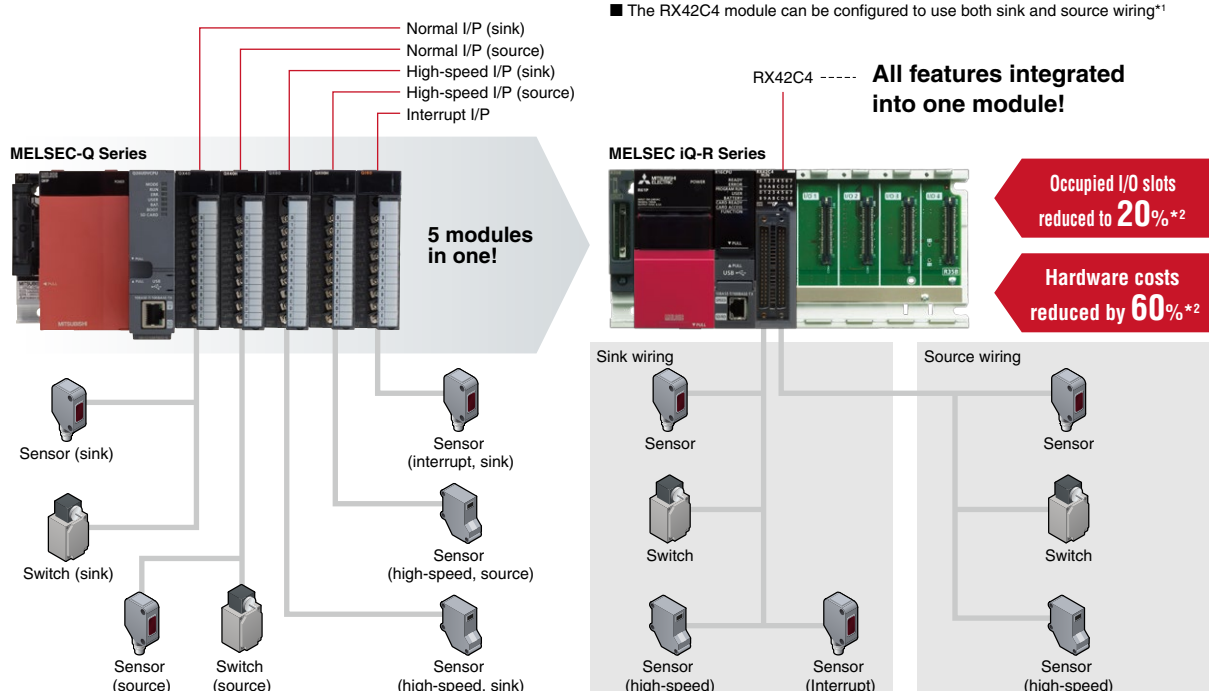
RX42C4

64 points
24 V DC, 4.0 mA

Digital input modules like the 24 V direct-current (DC) power supply are among the most used input signals in the control industry. The robust design of the various modules in this diversified lineup makes them ideal for industrial use.

Multiple features integrated

A single MELSEC iQ-R input module can handle input response devices as fast as 0.1 ms, interrupt input devices and can be wired using either positive or negative (sink or source) common terminals. Since multiple modules are no longer required, a substantial reduction in overall footprint of up to 20% and a reduction in total system costs of up to 60% can be realized.



*1: The RX42C4 module can be configured to use both sink and source wiring (between the left and right sides of 32 point terminal).
*2: Based on a comparison with the MELSEC-Q Series

Input module specifications

Item	AC input		DC input	
	RX10	RX40C7	RX41C4	RX42C4
Number of input points	16	16	32	64
Rated input voltage, frequency	100...120 V AC, 50/60 Hz	24 V DC	24 V DC	24 V DC
Rated input current	8.2 mA (100 V AC, 60 Hz) 6.8 mA (100 V AC, 50 Hz)	7.0 mA TYP.	4.0 mA TYP.	4.0 mA TYP.
Response time (ms)	≤ 20	0.1...70	0.1...70	0.1...70
Common terminal arrangement (points/common)	16	16	32	32
Interrupt function	●	●	●	●
External interface	18-point screw terminal block	18-point screw terminal block	40-pin connector	40-pin connector (2x)

System configuration

CPU

I/O

Analog

Motion, Positioning, High-speed counter

Network

Software

Output Modules

Relay output

RY10R2

16 points
24 V DC, 240 V AC

Transistor (sink) output

RY40NT5P

16 points
12 to 24 V DC, 0.5 A

RY41NT2P

32 points
12 to 24 V DC, 0.2 A

RY42NT2P

64 points
12 to 24 V DC, 0.2 A

Transistor (source) output

RY40PT5P

16 points
12 to 24 V DC, 0.5 A

RY41PT1P

32 points
12 to 24 V DC, 0.1 A

RY42PT1P

64 points
12 to 24 V DC, 0.1 A

A variety of digital output modules are available including relay, transistor sink (wired as positive common) and transistor source (wired as negative common). Load voltages include 240 V AC and 12 V to 24 V DC, with various current ratings.

Relay health diagnostics for preventive maintenance

Output modules keep track of how many times they're turned on and off. Utilizing this data, preventive maintenance can be carried out based on the known service of the relay.

Output module specifications

Item	Relay output	Transistor (sink) output				Transistor (source) output	
	RY10R2	RY40NT5P	RY41NT2P	RY42NT2P	RY40PT5P	RY41PT1P	RY42PT1P
Number of input points (point)	16	16	32	64	16	32	64
Rated switching voltage, current	24 V DC/2 A 240 V AC/2 A	-	-	-	-	-	-
Rated load voltage (V DC)	-	12...24	12...24	12...24	12...24	12...24	12...24
Max. load current (A/point)	-	0.5	0.2	0.2	0.5	0.1	0.1
Response time (ms)	≤ 12	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1
Common terminal arrangement (points/common)	16	16	32	32	16	32	32
Protection function (overload, overheat)	-	●	●	●	●	●	●
External interface	18-point screw terminal block	18-point screw terminal block	40-pin connector	40-pin connector (2x)	18-point screw terminal block	40-pin connector	40-pin connector (2x)

I/O Combined Module

DC input, transistor (sink) output

RH42C4NT2P

32 points (input) 24 V DC, 4.0 mA
32 points (output) 12 to 24 V DC, 0.2 A

In addition to dedicated digital input and output modules, if only a few I/O points are required, a combined I/O module is available. This is an excellent alternative for cost-sensitive applications.

I/O combined module specifications

Item	RH42C4NT2P
DC input	
Number of input points (point)	32
Rated input voltage (V DC)	24
Rated input current (mA)	4.0 TYP.
Response time (ms)	0.1...70
Common terminal arrangement (points/common)	32
Interrupt function	●
Transistor (sink) output	
Number of output points (point)	32
Rated load voltage (V DC)	12...24
Max. load current (A/point)	0.2
Response time (ms)	≤ 1
Common terminal arrangement (points/common)	32
Protection function (overload, overheat)	●
Common specification	
External interface	40-pin connector (2x)

Focus points

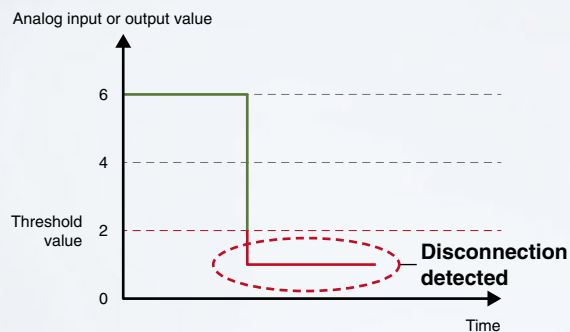
- ▶ 16-bit high resolution (1/32,000)
- ▶ Scaling and shifting operations using parameter settings
- ▶ Enhanced alarm and warning features
- ▶ Ideal for high-speed precision inspection applications
- ▶ Filtering of high-frequency noise
- ▶ Event driven performance asynchronous from main scan
- ▶ Generate or import pre-defined wave data
- ▶ Galvanic channel isolation



Similar to the digital I/O modules, analog modules are the main interface between the control process and the MELSEC iQ-R Series automation system. The main differences are that they have been designed to interface with sensors that process varying voltage and current signals instead of digital binary signals, and convert those signals into binary data that the control system can use. The MELSEC iQ-R Series range of analog modules includes features such as high-speed conversion (80 μ s/ch) coupled with 16 bit high-resolution (1/32,000) digital output signals, galvanic channel isolation and disconnection detection, thereby enabling highly precise and stable analog signal processing.

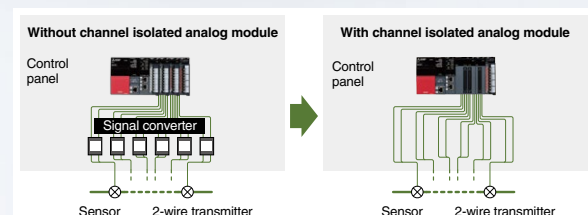
Save on downtime cost with 'channel disconnection detection'

Channel input or output error threshold values are easily settable within GX Works3 ensuring the detection of disconnected channel(s), reducing downtime and saving on maintenance costs.

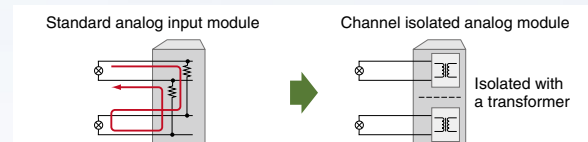


High signal integrity using galvanic isolation

The "-G" suffix modules include internal galvanic channel isolation that can improve noise interference capabilities without requiring an additional signal converter as well as protecting the internal module components from a short circuit.



Electric disturbances such as current and noise can be isolated.



System
configuration

CPU

I/O

Analog

Motion, Positioning,
High-speed counter

Network

Software

Analog Input Modules

R60AD4

4-channel (voltage or current)

R60ADV8

8-channel (voltage)

R60ADI8

8-channel (current)

R60AD8-G **NEW**

8-channel (voltage or current),
channel isolated

R60AD16-G **NEW**

16-channel (voltage or current),
channel isolated

R60TD8-G **NEW**

8-channel, temperature input (thermocouple)
channel isolated

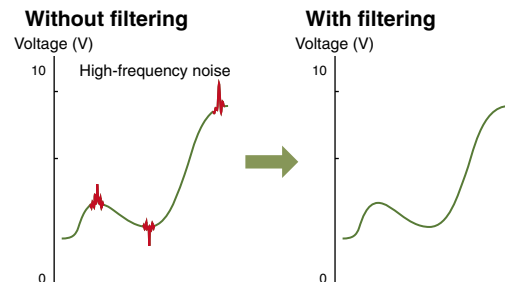
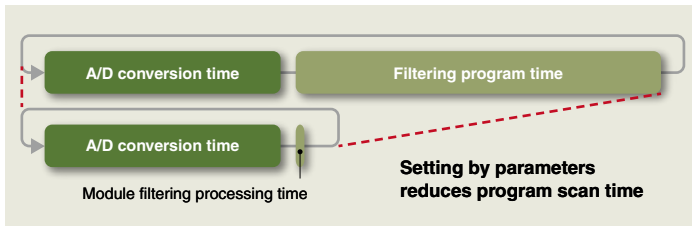
R60RD8-G **NEW**

8-channel, temperature input (RTD)
channel isolated

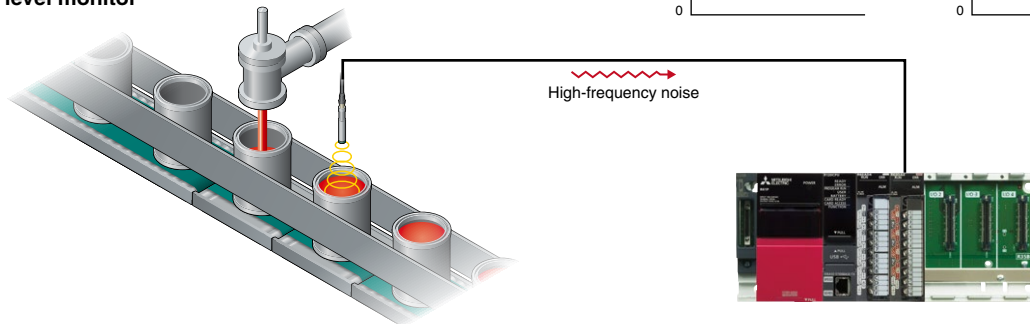
MELSEC iQ-R Series analog modules are ideal as the interface between external analog signals and the control system. Various modules are available to cover a wide range of requirements, such as galvanic isolation, thermocouple sensors, resistance temperature detectors (RTD), current, voltage and mixed channel applications.

High-frequency noise filtering

The analog modules include a first-order delay filter that eliminates high-frequency noise interference and improves the accuracy of input analog signals. This feature can be easily setup using the module's dedicated parameters, thereby improving the processing time as an additional setup program (ladder) is not required.

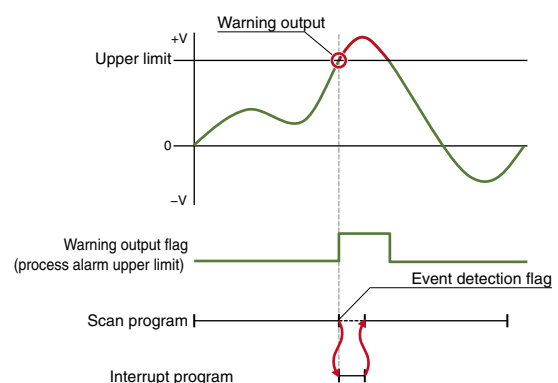


In-line level monitor



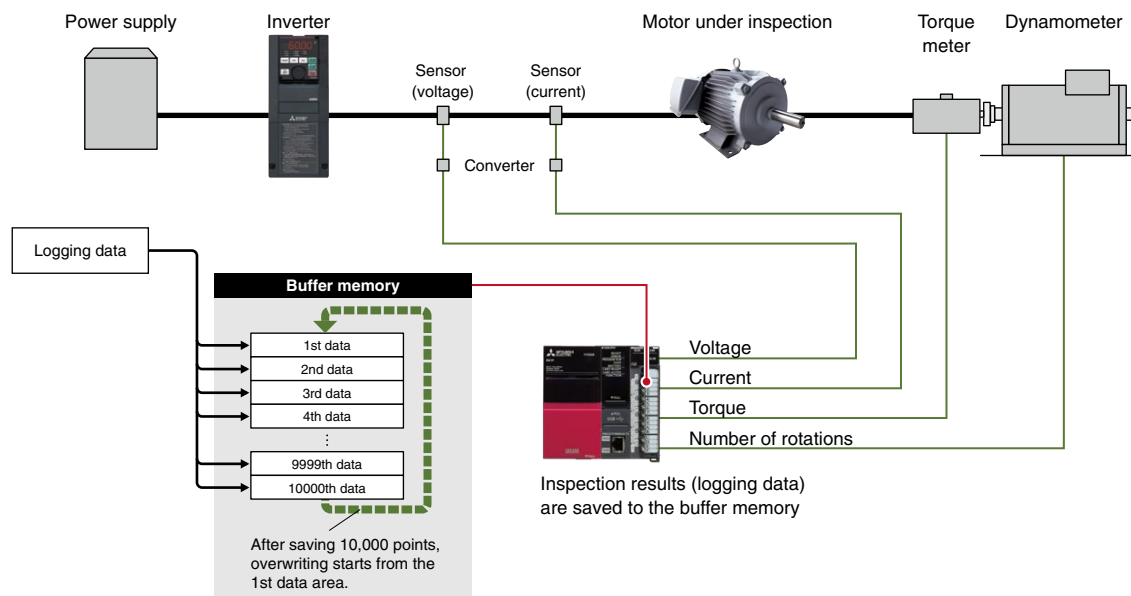
Enhanced alarm and warning features

Preventive maintenance procedures are simplified with the enhanced alarm and warning capabilities. Regardless of the program scan time, when an event such as the change rate of an analog signal exceeding the preset limit occurs, corrective interrupt procedures can be triggered or an alarm generated to notify responsible personnel or initiate proper countermeasures.



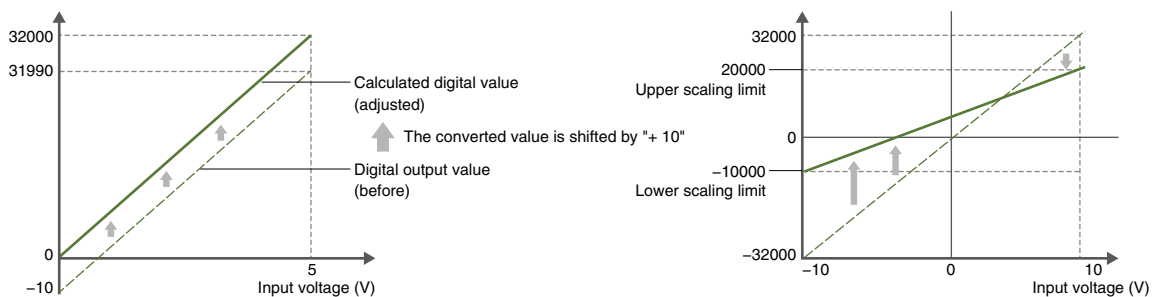
Data logging faster than scan time

Analog modules are equipped with a data logging feature that's useful when a large amount of data (up to 10k points) is required within a specified period of time. Coupled with the high-speed analog-to-digital conversion time, event-driven triggers enable continuous logging even after an event occurrence and fast data logging sampling that is asynchronous to the control scan time. Data logging can be used in applications such as a motor inspection line, where motor performance can be logged at high speed and certain values such as voltage, current, torque and rotational speed analyzed through comparisons with different test patterns.



Scaling and shifting digital values without any programs

Scaling and shifting can be easily setup from only using the parameters. There is no need for additional programming, thereby realizing reductions in engineering costs and overall program size.



Upper and lower limits of scaling can range from -32000 to 32000.

System configuration

CPU

I/O

Analog

Motion, Positioning, High-speed counter

Network

Software

Analog input module specifications

Item	R60AD4	R60ADV8	R60ADI8	R60AD8-G	R60AD16-G
Number of analog input points (ch)	4	8	8	8	16
Accuracy					
Ambient temperature 25 ±5°C	±0.1%	±0.1%	±0.1%	±0.1%	±0.1%
Ambient temperature 0...55°C	±0.3%	±0.3%	±0.3%	-	-
Temperature coefficient	-	-	-	±35 ppm/°C	±35 ppm/°C
Common					
Conversion speed (ch)	80 μs	80 μs	80 μs	10 ms	10 ms
Channel isolation	-	-	-	Transformer isolation	Transformer isolation
Absolute max. input	±15 V, 30 mA	±15 V	30 mA	±15 V, 30 mA	±15 V, 30 mA
External interface	18-point screw terminal block	18-point screw terminal block	18-point screw terminal block	40-pin connector	40-pin connector (2x)
Voltage input					
Analog input voltage (V DC)	-10...10	-10...10	-	-10...10	-10...10
Digital output value	-32000...32000	-32000...32000	-	-32000...32000	-32000...32000
Current input					
Analog input current (mA DC)	0...20	-	0...20	0...20	0...20
Digital output value	0...32000	-	0...32000	0...32000	0...32000

Temperature input module specifications

Item	R60TD8-G	R60RD8-G
Number of analog input points (ch)	8	8
Cold junction temperature compensation accuracy	±1.0°C	-
Usable thermocouple	B, R, S, K, E, J, T, N	-
Usable RTD	-	Pt100 (JIS C 1604-1997, IEC 751 1983) JPt100 (JIS C 1604-1981) Ni100 (DIN 43760 1987) Pt50 (JIS C 1604-1981)
Resolution	B, R, S, N: 0.3°C K, E, J, T: 0.1°C	0.1°C
Conversion speed (ch)	30 ms	10 ms
Channel isolation	Transformer isolation	Transformer isolation
Wire break detection	●	●
External interface	40-pin connector	40-pin connector
Output		
Measured temperature value (16-bit signed binary data)	-2700...18200	-2000...8500
Scaling value (16-bit signed binary data)	●	●
Measured temperature range		
B	0...1820°C	-
R	-50...1760°C	-
S	-50...1760°C	-
K	-270...1370°C	-
E	-270...1000°C	-
J	-210...1200°C	-
T	-270...400°C	-
N	-270...1300°C	-
Pt100	-	-200...850°C
JPt100	-	-180...600°C
Ni100	-	-60...250°C
Pt50	-	-200...650°C

Analog Output Modules

R60DA4

4-channel (voltage or current)

R60DAV8

8-channel (voltage)

R60DAI8

8-channel (current)

R60DA8-G **NEW**

8-channel (voltage or current),
channel isolated

R60DA16-G **NEW**

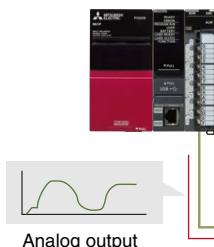
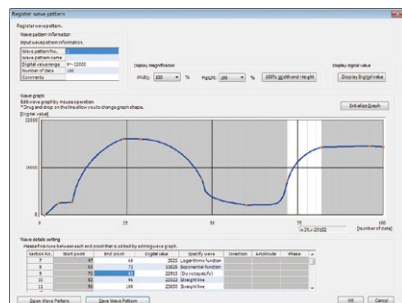
16-channel (voltage or current),
channel isolated

MELSEC iQ-R Series analog output modules reliably deliver accurate analog values to points where high-resolution digital inputs are required. A variety of modules (voltage, current, or mixed) are available to cover a wide range of application requirements, such as high-speed drive control or variable-speed control of the pressure applied to materials being fed into some kind of forming mechanism.

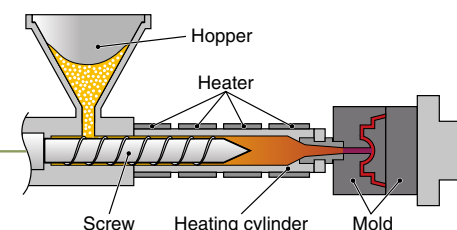
Faster, smoother predefined wave signal output

The analog output module enables pre-registration of waveforms easily using MELSOFT GX Works3, realizing a smoother continuous output that closely matches the precision required for the application, such as torque control for a press or injection molding machine. Registering the waveform in the module is simple and easy, and does not require a dedicated analog output program, such as for continuous line control, further reducing programming time.

GX Works3 wave output data setup



Pressure control of injection molding



Shift operation and scaling without programs

Shift operation and scaling can be used without creating programs; they can be simply set on parameters. This simple setting minimizes program development cost as well as the program size.

Analog output module specifications

Item	R60DA4	R60DAV8	R60DAI8	R60DA8-G	R60DA16-G
Number of analog output points (ch)	4	8	8	8	16
Accuracy					
Ambient temperature 25 ±5°C	±0.1%	±0.1%	±0.1%	±0.1%	±0.1%
Ambient temperature 0...55°C	±0.3%	±0.3%	±0.3%	-	-
Temperature coefficient	-	-	-	±50 ppm/°C	±50 ppm/°C
Conversion speed (ch)	80 μs	80 μs	80 μs	1 ms	1 ms
Channel isolation	-	-	-	Transformer isolation	Transformer isolation
Output short-circuit protection	●	●	●	●	●
External supply power (V DC)	24	24	24	-	-
External interface	18-point screw terminal block	18-point screw terminal block	18-point screw terminal block	40-pin connector	40-pin connector (2x)
Voltage output					
Digital input value	-32000...32000	-32000...32000	-	-32000...32000	-32000...32000
Analog output voltage (V DC)	-10...10	-10...10	-	-12...12	-12...12
Current output					
Digital input value	0...32000	-	0...32000	0...32000	0...32000
Analog output current (mA DC)	0...20	-	0...20	0...20	0...20

System
configuration

CPU

I/O

Analog

Motion, Positioning,
High-speed counter

Network

Software



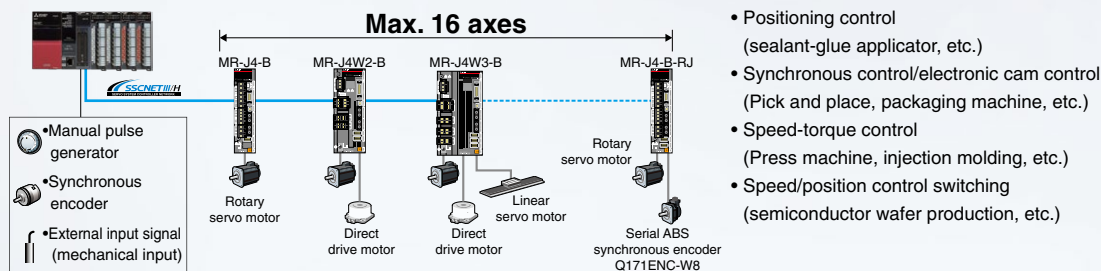
Focus points

- ▶ Wide range of modules for best-fit motion control needs
- ▶ Motion control programming simplified
- ▶ Software-based gear, shaft, transmission, and cam control
- ▶ 3-axis helical interpolation for large-diameter thread milling
- ▶ Normal, fast or multi-axis startup
- ▶ High-accuracy pulse measurement

MELSEC iQ-R Series simple motion, positioning, and high-speed counter modules are a distinct set of high-accuracy and fast control response intelligent modules that are ideal for applications requiring high-speed and precision.

Simple motion module

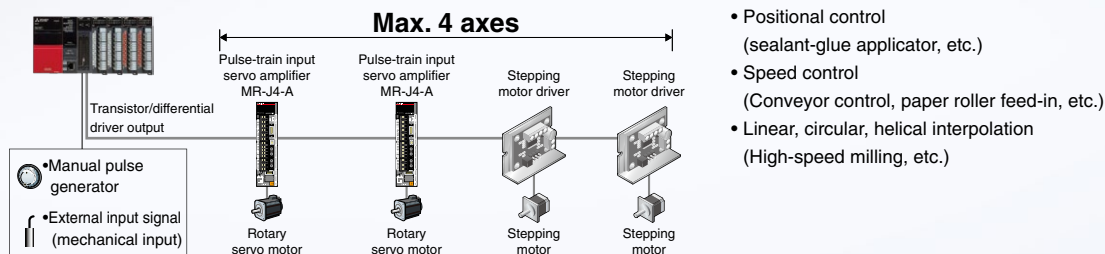
Simple motion modules are easy to setup similar to positional modules and offer high-precision motion controller performance. This is an easy-to-use module specifically designed for highly precise motion control applications in a high-speed servo control network (SSCNET III/H) over a fiber-optic cable.



Positioning module

Capable of high-speed transmission (5M pulses/s^{*1}), the positioning module can control up to four axes. This versatile module supports connection to a wide range of motion devices, such as pulse-train input servo amplifiers or stepping motor with a transistor (open collector), or differential driver input interface.

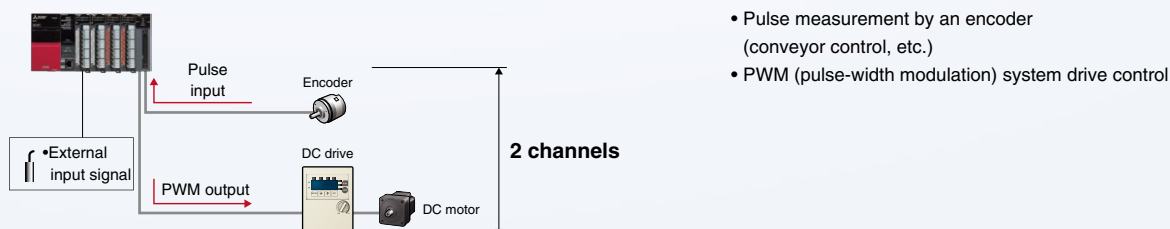
^{*1}: Differential driver output



High-speed counter module

Capable of measurements at up to 8M pulses/s^{*2}, the high-speed counter module is an ideal low-cost position control solution that provides precise positional tracking when used in combination with an incremental encoder.

^{*2}: Differential input



Simple Motion Modules

RD77MS2

Up to 2-axis control

RD77MS4

Up to 4-axis control

RD77MS8

Up to 8-axis control

RD77MS16

Up to 16-axis control

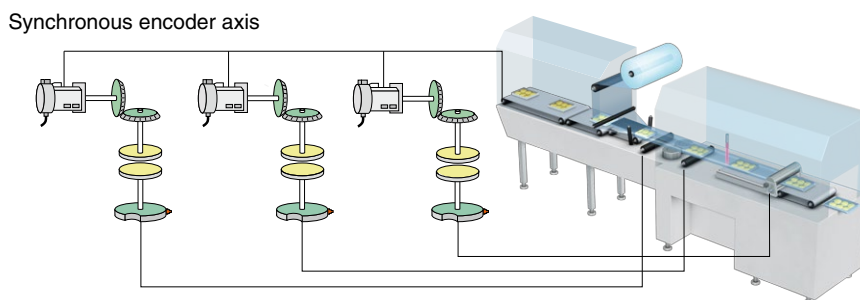
Similar to positioning modules, simple motion modules are capable of a wide range of high-precision control such as positional control, advanced synchronous control, cam control, and speed-torque control. The module line-up includes 2-, 4-, 8-, and 16-axis models, with setup being done easily by parameters and programming.

Advanced synchronous control

Software-based synchronous control can be used as an alternative to mechanical control, such as gear, shaft, transmission and cam. In addition, cam control is even easier with cam auto-generation. Synchronous control can be simply operated (start/stop) for each axis, allowing synchronous and positional control axes within the same program.

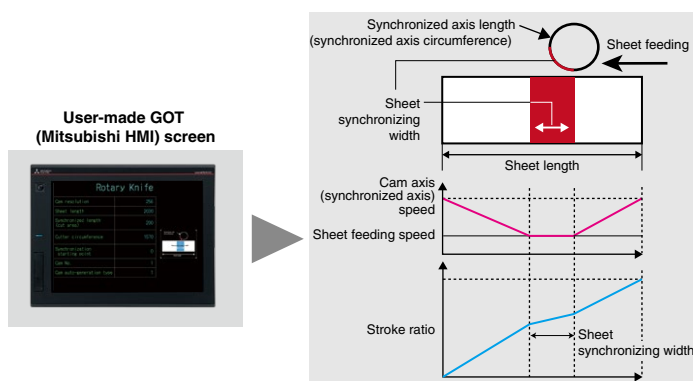
■ Synchronous control

All axes are synchronized using a synchronous encoder or servo input axes. Up to 16 control axes can be synchronized when using the synchronous encoder, such as that used for packaging machines, for example.



■ Cam auto-generation

Cam data for a rotary cutter can be generated automatically simply by registering the sheet length, synchronization width, rotary cutter axis dimensions, etc.



System configuration

CPU

I/O

Analog

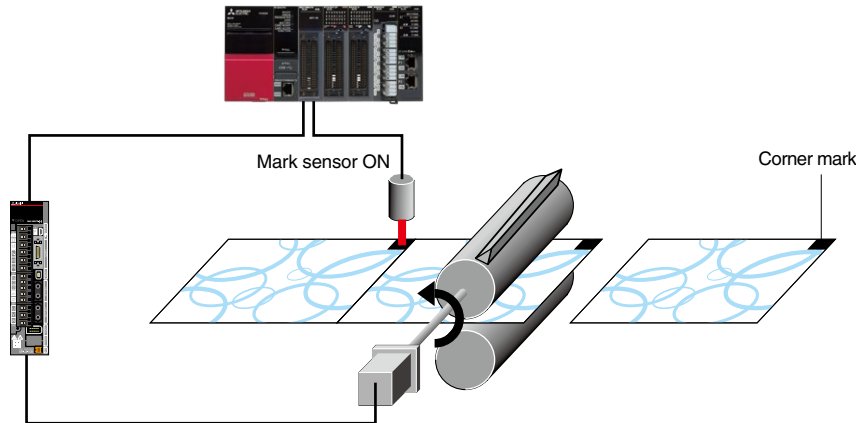
Motion, Positioning, High-speed counter

Network

Software

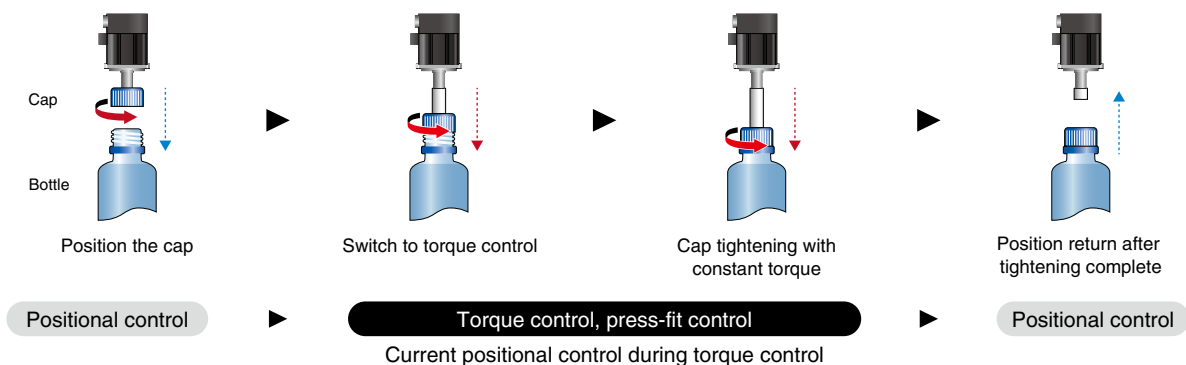
Mark detection

The actual position of the servo motor can be obtained based on the registration mark printed on the high-speed moving film. Compensation of the cutter axis position, based on the registration marks, keeps the constant cutting position.



Speed-torque control (press-fit control)

The motor can be switched to torque control (press-fit mode) without stopping it during positioning. The current position is controlled during the speed/torque control. Therefore the positioning can be done smoothly even after switching back to position control.



Simple motion module specifications

Item	RD77MS2	RD77MS4	RD77MS8	RD77MS16
Number of control axes (axis)	2	4	8	16
Operation cycle (ms)	0.444, 0.888, 1.777, 3.555	0.444, 0.888, 1.777, 3.555	0.444, 0.888, 1.777, 3.555	0.444, 0.888, 1.777, 3.555
Control unit	mm, inch, degree, pulse	mm, inch, degree, pulse	mm, inch, degree, pulse	mm, inch, degree, pulse
Positioning data (data/axis)	600	600	600	600
Startup time				
(operation cycle 0.444 ms, 1 axis) (ms)	0.7	0.7	0.7	0.7
Servo amplifier connection system	SSCNET III/H	SSCNET III/H	SSCNET III/H	SSCNET III/H
Max. distance between stations (m)	100	100	100	100
External interface	40-pin connector	40-pin connector (2x)	40-pin connector (2x)	40-pin connector (2x)
Interpolation function				
Linear interpolation (axis)	2	2, 3, 4	2, 3, 4	2, 3, 4
Circular interpolation (axis)	2	2	2	2
Control system				
PTP (Point To Point) control	●	●	●	●
Path control (linear, arc)	●	●	●	●
Speed control	●	●	●	●
Speed-position switching control	●	●	●	●
Position-speed switching control	●	●	●	●
Speed-torque control	●	●	●	●
Advanced synchronous control	●	●	●	●
Acceleration/deceleration process				
Trapezoidal acceleration/deceleration	●	●	●	●
S-curve acceleration/deceleration	●	●	●	●
Function				
Absolute positioning system*1	●	●	●	●
Mark detection function	●	●	●	●
Digital oscilloscope function	●	●	●	●
Driver communication function	●	●	●	●

*1: A battery needs to be installed in the servo amplifier for home position backup.

Positioning Modules

Transistor output

200k pulse/s

RD75P2

Up to 2-axis (linear/circular interpolation)

RD75P4

Up to 4-axis (linear/circular/helical interpolation)

Differential driver output

5M pulse/s

RD75D2

Up to 2-axis (linear/circular interpolation)

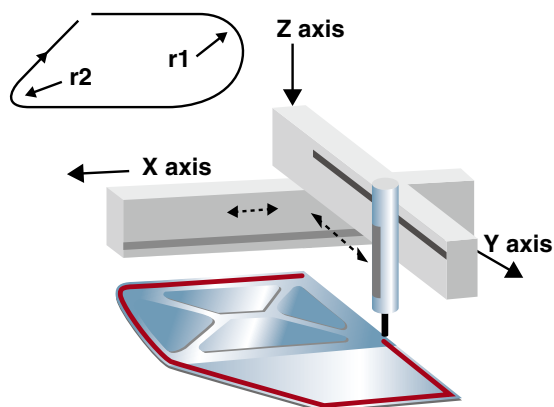
RD75D4

Up to 4-axis (linear/circular/helical interpolation)

The MELSEC iQ-R Series offers a choice of two positioning modules, transistor output or differential drive output, depending on the connected amplifier. The modules are capable of transmission speeds up to 5M pulses/s, and the differential driver output module supports wiring up to a distance of 10 m. It can be used in positional control or speed control, and features include linear, circular, and helical interpolation, which is a complex control required for deep-thread milling applications.

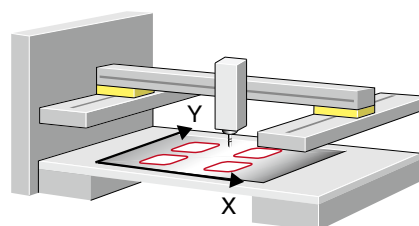
Various positional control

Various different positional control is performed by the module, from manual control, advanced control, to zero return control where it is required for the process position to return to its starting point. Automated sealing and gluing applicators tend to require extensive positional control as the interpolation may require a profile consisting of linear and circular paths that need to be followed accurately, such as in the automotive industry when glues are applied to the sealing portions of the doors.

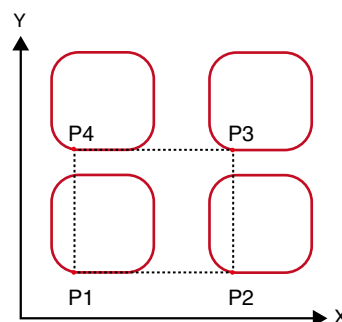


Multiple startup options

Positioning modules are capable of multiple different position-start options such as normal startup where the starting trigger command is activated from the command pulse; fast-start, where an event-driven trigger is asynchronous to the execution program data analysis; and multi-axis startup, where multiple axes can be executed simultaneously from an output pulse. In addition, block-start is where multiple sequential positioning data are executed by a single start trigger, which is used in control that follows the same repetitive path.



4 path profiles (P1...P4) being drawn in sequence.



System
configuration

CPU

I/O

Analog

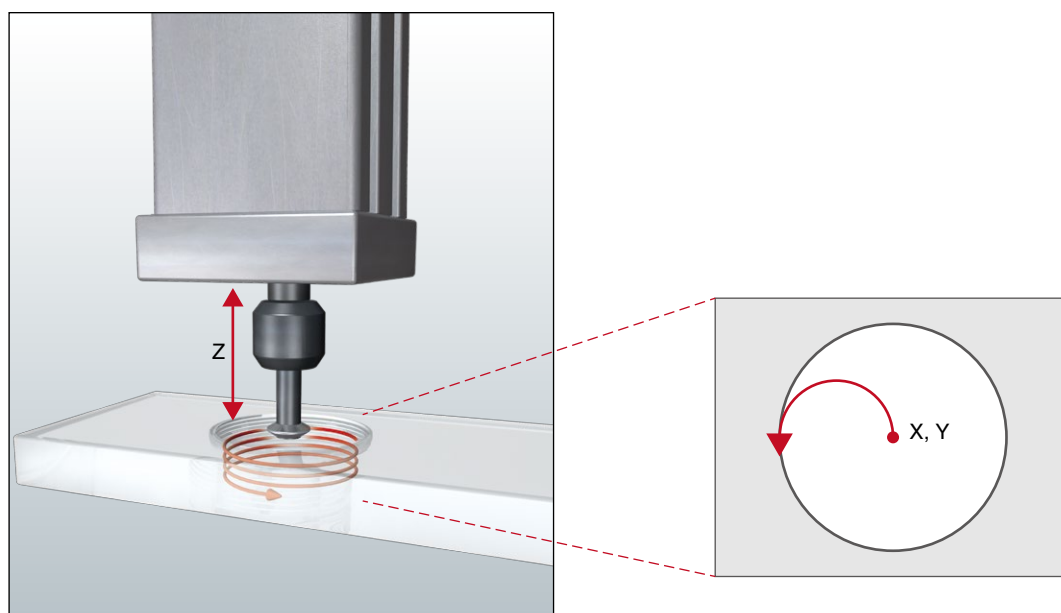
Motion, Positioning,
High-speed counter

Network

Software

Realize helical interpolation

For applications that require the boring of deep, large holes, usually multiple interpolation control of three axes (X, Y and Z) or more must be taken into consideration. In such cases, the actual milling is done in a circle, with the X and Y axes synchronized to achieve the pre-set size. The depth of the hole is simultaneously controlled along the Z axis, ensuring minimal deviation in the cutting bit position. This type of positioning is usually quite difficult as the interpolation of the three axes can introduce some deviation when not utilizing a full-scale numerical control system.



Positioning module specifications

Item	Transistor output		Differential driver output	
	RD75P2	RD75P4	RD75D2	RD75D4
Number of control axes (axis)	2	4	2	4
Control unit	mm, inch, degree, pulse	mm, inch, degree, pulse	mm, inch, degree, pulse	mm, inch, degree, pulse
Positioning data (data/axis)	600	600	600	600
Module backup function	Positioning data, and block start data can be saved on flash ROM (battery-less backup)			
Starting time (1 axis linear control) (ms)	0.3	0.3	0.3	0.3
Max. output pulse (pulse/s)	200,000	200,000	5,000,000	5,000,000
Max. connection distance between servos (m)	2	2	10	10
External interface	40-pin connector	40-pin connector (2x)	40-pin connector (2x)	40-pin connector (2x)
Interpolation				
Linear interpolation (axis)	2	2, 3, 4	2	2, 3, 4
Circular interpolation (axis)	2	2	2	2
Helical interpolation (axis)	-	3	-	3
Control system				
PTP (Point To Point) control	●	●	●	●
Path control (linear, arc, helical)	●	●	●	●
Speed control	●	●	●	●
Speed-position switching control	●	●	●	●
Position-speed switching control	●	●	●	●
Acceleration/deceleration process				
Trapezoidal acceleration/deceleration	●	●	●	●
S-curve acceleration/deceleration	●	●	●	●
Fast-start function				
Positioning start signal (μs)	8	8	8	8
External command signal (μs)	20	20	20	20

High-Speed Counter Modules

DC input,
transistor (sink) output

RD62P2

2-channel

DC input,
transistor (source) output

RD62P2E

2-channel

Differential input,
transistor (sink) output

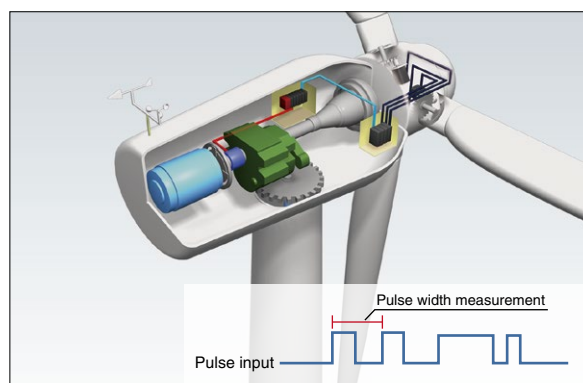
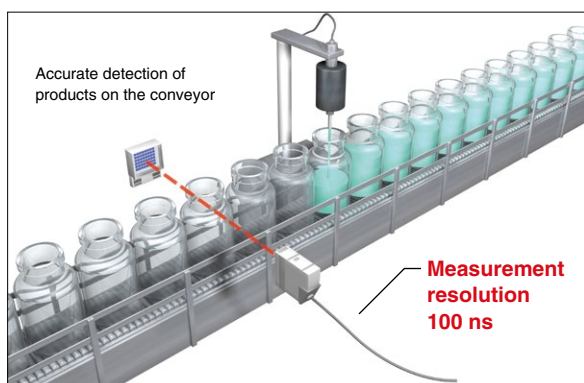
RD62D2

2-channel

The MELSEC iQ-R Series counter modules are capable of 200k pulse/s for the DC input type, and 8M pulse/s for differential input. When used with a high-accuracy incremental encoder, positional tracking can also be realized. It also features a PWM output, which is ideal for applications requiring a measurement of pulse cycles.

Pulse measurement

The pulse measurement feature enables measuring of the pulse cycle, which is ideal for various applications such as in the food and beverage industry where proximity sensors are used to control flask position on the conveyor, or the renewable energy industry where the wind vane angle is controlled on a wind turbine.



High-speed PWM output

The PWM output frequency can support up to 200 kHz with a minimum 100 ns pulse width (proportion to 'on' time) during the required duty cycle. The set values can be changed during operation without having to stop the system, such as in industrial-scale fan control.

High-speed counter module specifications

Item	RD62P2	RD62P2E	RD62D2
Number of channels (ch)	2	2	2
External interface	40-pin connector	40-pin connector	40-pin connector
Count input signal			
1-phase input (1 multiple/2 multiples)	●	●	●
2-phase input (1 multiple/2 multiples/4 multiples)	●	●	●
CW/CCW input	●	●	●
Signal level (ϕA , ϕB)	2...5 mA at 5/12/24 V DC	2...5 mA at 5/12/24 V DC	EIA Standard RS-422-A Differential line driver level
Counter			
Counting speed (pulse/s)	10k...200k	10k...200k	10k...8M
Counting range (32-bit signed binary)	-2147483648...2147483647	-2147483648...2147483647	-2147483648...2147483647
External input			
Preset, function start	7...10 mA at 5/12/24 V DC	7...10 mA at 5/12/24 V DC	7...10 mA at 5/12/24 V DC
Digital filter (ms)	0, 0.1, 1, 10	0, 0.1, 1, 10	0, 0.1, 1, 10
Pulse measurement			
Resolution*1 (ns)	100	100	100
Number of points per channel	1	1	1
External output			
Coincidence output (2 points/channel)	Transistor (sink type) output, 12/24 V DC, 0.5 A/point	Transistor (source type) output, 12/24 V DC, 0.1 A/point	Transistor (sink type) output, 12/24 V DC, 0.5 A/point
PWM output			
Output frequency range (kHz)	0...200	0...200	0...200
Duty ratio	Optional (in 0.1 μs increments)	Optional (in 0.1 μs increments)	Optional (in 0.1 μs increments)
Number of output points per channel	2	2	2
Setting change during operation	●	●	●

*1: Pulse measurement can be performed in the range of 2000 to 2147483647 (0.2 ms to approx. 214 s).

System
configuration

CPU

I/O

Analog

Motion, Positioning,
High-speed counter

Network

Software

Focus points

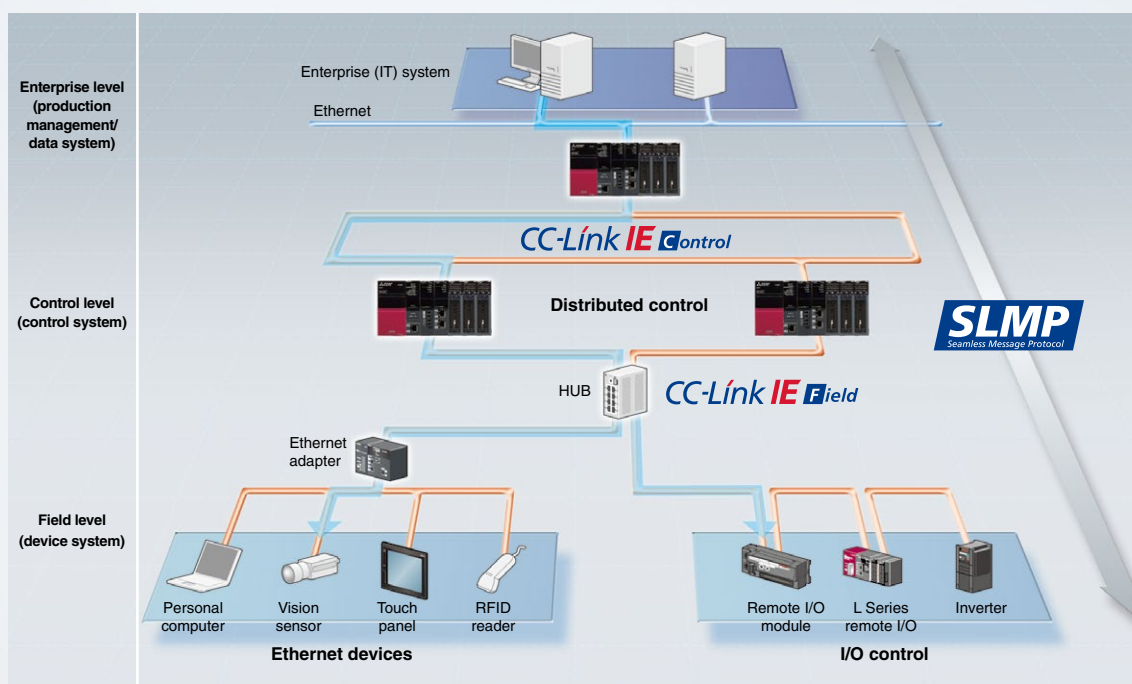
- ▶ Various network-specific modules available
- ▶ 1 Gbps high-speed, large bandwidth of 128K word for CC-Link IE
- ▶ Connect to two separate networks using a single module
- ▶ Seamless networking (SLMP)
- ▶ Loop-back function ensures continuous communications
- ▶ Auto-return when faulty station is replaced
- ▶ Supports standard interfaces such as RS-232 and RS-422/485



The network and interface modules of the MELSEC iQ-R Series ensure a vast selection of interconnectivity possibilities with various protocols and network topologies providing the best-fit solution for various applications. At the core of the Series is the CC-Link IE network family which is a high-speed 1 Gbps control level and field level Ethernet topology industrial open network.

Seamless message protocol (SLMP^{*1}) network communications

With SLMP, it is possible to seamlessly access production management systems, programmable controllers and other devices using the same method, eliminating concerns about network hierarchies and boundaries. Tasks such as machine monitoring, data collection and maintenance can be performed from virtually anywhere on the network. Used together with the Ethernet module, SLMP-ready Ethernet devices such as a machine vision sensor or RFID controller can be interfaced to the CC-Link IE Field Network without further adding another network.



^{*1}: SLMP (Seamless Message Protocol): Is a client/server protocol that enables communications between Ethernet-ready and CC-Link IE compatible devices.

Ethernet Interface Module

RJ71EN71

1 Gbps, 100/10 Mbps multiple network type

CC-Link IE Field
CC-Link IE Control

The MELSEC iQ-R Series Ethernet module is equipped with two ports that can be used as either a generic Ethernet, CC-Link IE Field or Control Network module. The module design incorporates an easy-to-read display and a dot-matrix LED providing a quick way to assess network conditions using the module.

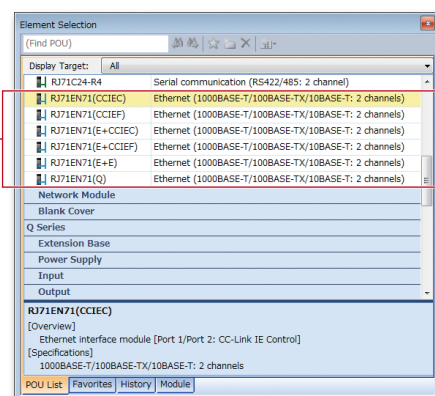
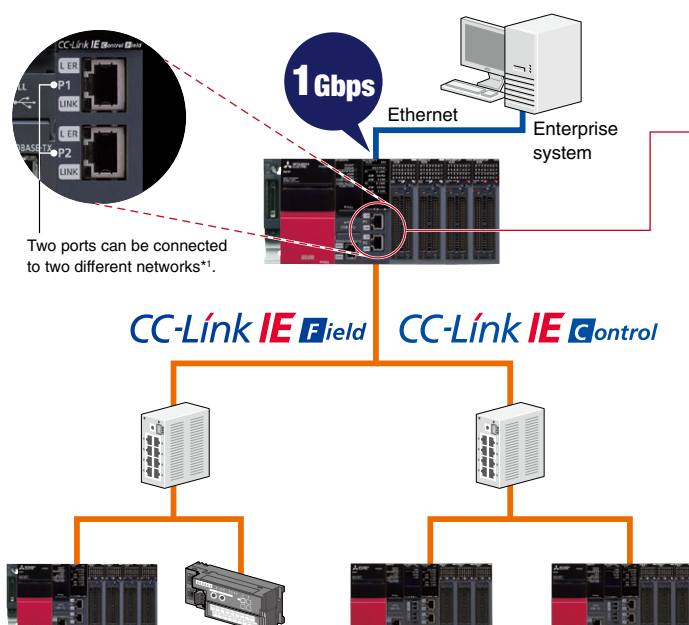


Ethernet port (P1)

Ethernet port (P2)

Dual gigabit Ethernet ports

The number of connectable ports on the Ethernet module has been doubled and the number of connections per channel increased. By increasing the number of ports the module can be used effectively as a gateway, simultaneously connecting a generic Ethernet network to one port and using the second port for the CC-Link IE Field or Control network. Additionally, the number of connections per channel has been increased from 64 to 128, doubling the bandwidth for even more connectable devices.



Select network combination from within GX Works3.

Network combination*1

P1	C	F	E	E	E
P2	C	F	C	F	E

C : CC-Link IE Control Network
F : CC-Link IE Field Network
E : Ethernet

*1: The CC-Link IE Field and CC-Link IE Control networks cannot be used together.

Ethernet interface module specifications

Item	RJ71EN71*2
Transmission specifications	
Data transmission speed	1 Gbps/100 Mbps/10 Mbps
Interface	RJ45 connector (Auto MDI/MDI-X)
Max. frame size (byte)	1518/9022 (when jumbo frames are used)
IP version	Compatible with IPv4
Sending/receiving data storage memory	
Number of simultaneous open connections	128
Fixed buffer	5K words x 16
Socket communications	• 5K words x 48 (when only P1 is used) • 5K words x 112 (when only P1/P2 is used)
Random access buffer	6K words x 1
CC-Link IE Field/Control cable specifications	
Communication cable	Ethernet cable that meets 1000 BASE-T standard: Category 5e or higher, straight cable (double shielded, STP)

*2: The specifications differ for the Q Series compatible Ethernet mode.

System
configuration

CPU

I/O

Analog

Motion, Positioning,
High-speed counter

Network

Software

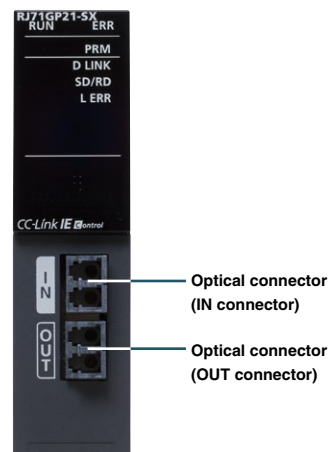
CC-Link IE Control Network Module

RJ71GP21-SX

1 Gbps optical cable, control/normal station

CC-Link IE Control

CC-Link IE Control is a high-reliability distributed control network designed to handle very large data communications (128K word) over a high-speed (1 Gbps) dual-loop optical cable topology.

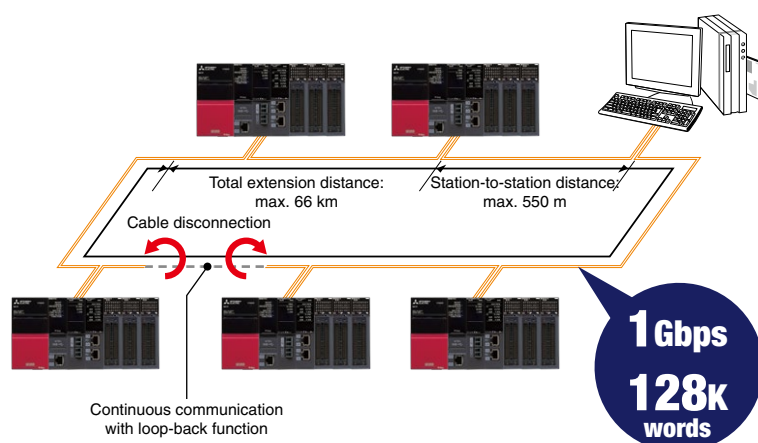


Optical connector (IN connector)

Optical connector (OUT connector)

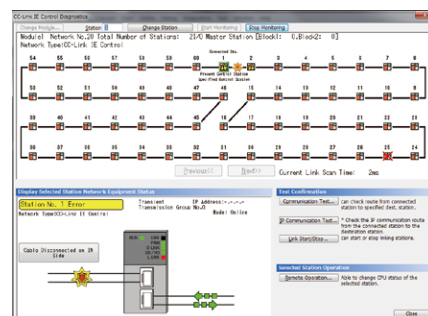
Continuous communications even when cable or stations are faulty

Utilizing a high-speed, noise resistant fiber-optic topology, the CC-Link IE Control Network supports a loop-back function that guarantees continuous communications even when a cable is disconnected or a station falls into a fault status. The dual-loop topology of the cable ensures that the data will find another route along the network without affecting overall network communications.



Extensive real-time network monitoring

The network status can be easily monitored directly from GX Works3 software enabling intuitive troubleshooting of network errors or viewing the operation of the network while in communications. This makes it possible to see the actual fault occurring in the network, thereby helping to reduce the overall downtime. In addition, error messages related to the faulty network module station can be viewed for further network diagnosis. All stations within the network can be monitored regardless of which station the software is connected too.



CC-Link IE Control monitoring window

CC-Link IE Control Network module specifications

Item	RJ71GP21-SX
Communication speed	1 Gbps
Transmission path	Duplex loop
Communication cable	Optical fiber cable which satisfies 1000 BASE-SX standard: Multi-mode optical fiber (GI)
Max. station-to-station distance (m)	550 (when the core outer diameter is 50 μ m) 275 (when the core outer diameter is 62.5 μ m)
Overall cable distance (m)	66,000 (when 120 stations are connected and the core outer diameter is 50 μ m) 33,000 (when 120 stations are connected and the core outer diameter is 62.5 μ m)
Max. number of connectable stations	120 (control station: 1, normal station: 119)
Max. number of link points per network	
Link relay (LB)	32K points (32768 points, 4K bytes)
Link register (LW)	128K points (131072 points, 256K bytes)
Link input (LX), link output (LY)	8K points (8192 points, 1K bytes)

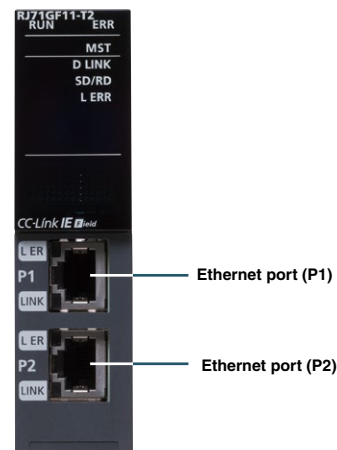
CC-Link IE Field Network Module

RJ71GF11-T2

1 Gbps, master/local station

CC-Link IE Field

CC-Link IE Field is a versatile gigabit Ethernet-based network integrating controller, I/O control, safety control, and motion control in a flexible wiring topology supporting star, ring, and line configurations.



Multiple topology variations

■ Star topology

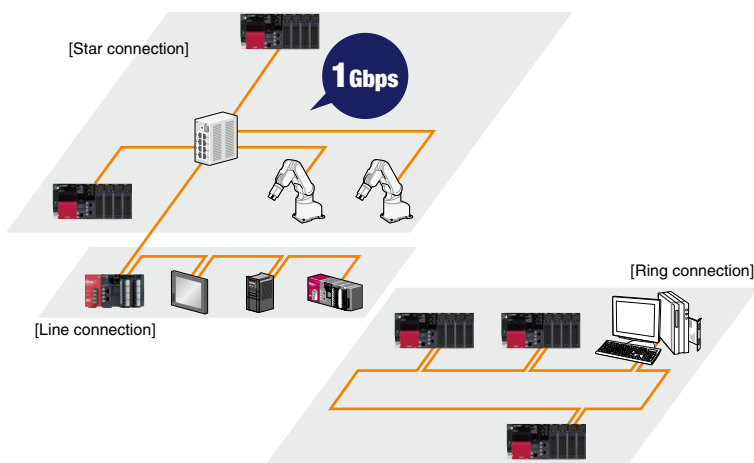
Devices are connected via a switching hub allowing local stations to be added easily.

■ Line topology

Continuous connection of devices along the Ethernet line.

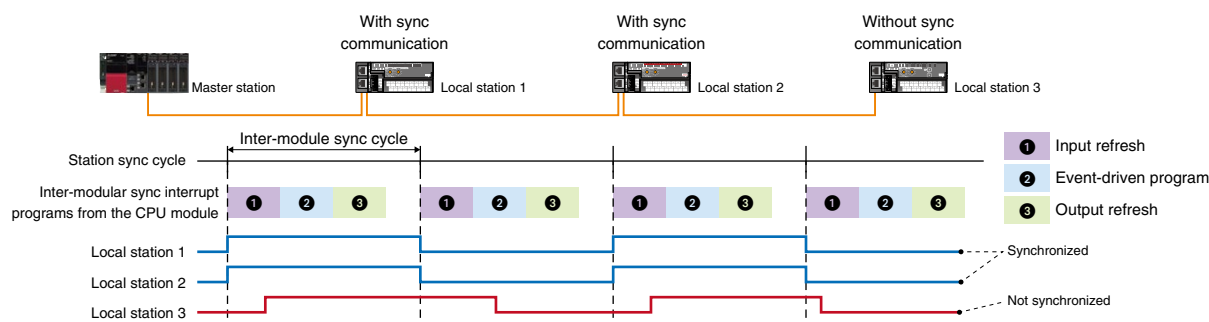
■ Ring topology

Connection is done in a continuous loop, which guarantees communications by isolating the faulty network station.



Synchronized network communications

The control cycle of local stations on the network can be synchronized with the master station.



CC-Link IE Field Network module specifications

Item	RJ71GF11-T2
Transmission speed	1 Gbps
Network topology	Line topology, star topology (both types can be on the same line), and ring topology
Communication cable	Ethernet cable that meets 1000 BASE-T standard: Category 5e or higher, straight cable (double shielded, STP)
Max. station-to-station distance (m)	100
Overall cable distance (m)	Line topology: 12,000 (when 121 stations are connected) Star topology: Depends on the system configuration Ring topology: 12,100 (when 121 stations are connected)
Max. number of connectable stations	121 (master station: 1, slave station: 120)
Max. number of link points per network	
Remote input (RX), remote output (RY)	16K points (16384 points, 2K bytes)
Remote register (RWw, RWr)	8K points (8192 points, 16K bytes)

System
configuration

CPU

I/O

Analog

Motion, Positioning,
High-speed counter

Network

Software

CC-Link System Module

RJ61BT11

Max. 10 Mbps, master/local station (CC-Link Ver.2)

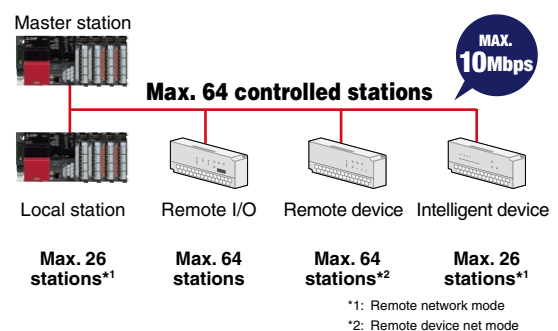


CC-Link is a high-speed and highly reliable deterministic I/O control network that realizes reduced wiring while offering multi-vendor compatible products.



Multiple connectivity of field devices

CC-Link incorporates many different field devices that can be configured into a wire-saving communications network. Using the remote device net mode, it is possible to connect up to 64 remote devices, such as analog I/O modules.



Item	RJ61BT11
Transmission speed (bps)	156k/625k/2.5M/5M/10M
Network topology	Bus (RS-485)
Communication cable	Ver.1.10-compatible CC-Link dedicated cable
Overall distance (m)	100 (10 Mbps)...1200 (156 kbps)
Max. number of connected modules	65 stations (master station: 1, slave station: 64)
Max. number of link points per system (CC-Link Ver.2)	
Remote I/O (RX, RY)	8192 points
Remote register (RWw, RWr)	2048 points

Serial Communication Module

RJ71C24

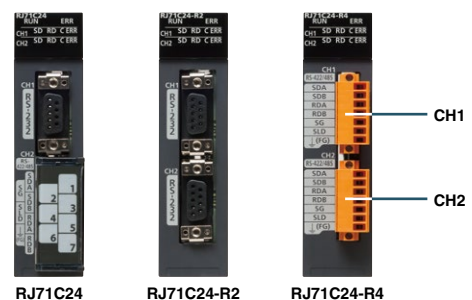
Max. 230.4 kbps, RS-232 (1 channel), RS-422/485 (1 channel)

RJ71C24-R2

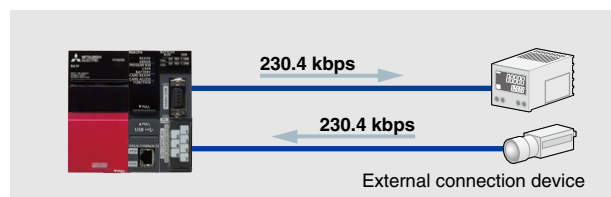
Max. 230.4 kbps, RS-232 (2 channels)

RJ71C24-R4

Max. 230.4 kbps, RS-422/485 (2 channels)



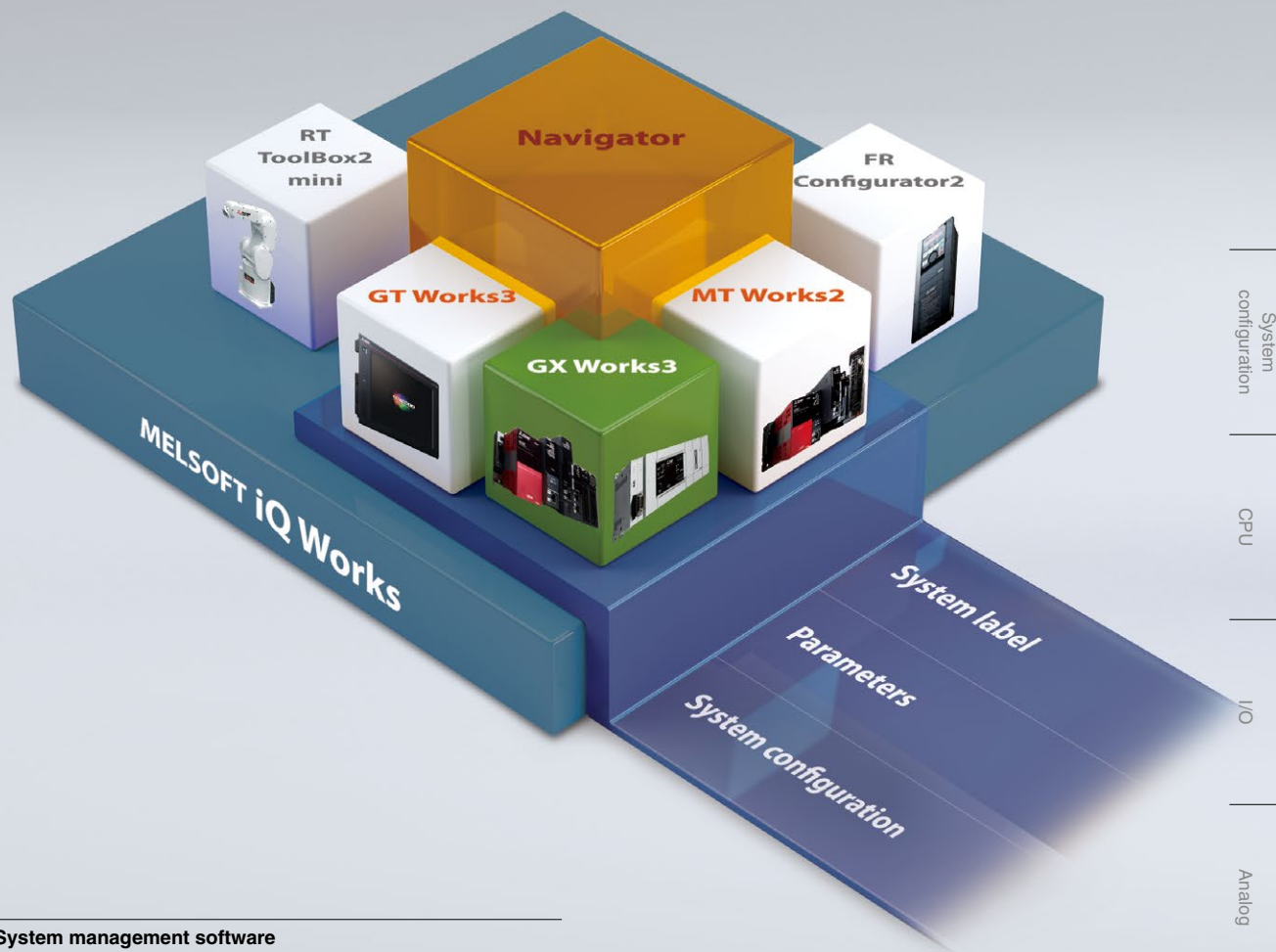
The serial communication module enables serial devices with up to 230.4 kbps transmission speeds to be connected per channel. Communications protocols such as MODBUS® are supported via the pre-defined protocol feature.



Item	RJ71C24	RJ71C24-R2	RJ71C24-R4
Transmission speed (bps)	1.2k/2.4k/4.8k/9.6k/14.4k/19.2k/28.8k/38.4k/57.6k/115.2k/230.4k		
Interface			
CH1	RS-232	RS-232	RS-422/485
CH2	RS-422/485	RS-232	RS-422/485
Overall transmission distance			
RS-232 (m)	15	15	-
RS-422/485 (m)	1,200	-	1,200

FA Integrated Engineering Software MELSOFT iQ Works

MELSOFT iQ Works is an integrated software suite consisting of GX Works3, MT Works2, GT Works3, RT ToolBox2 mini and FR Configurator2, which are programming software for each respective product. Integration is further enhanced with MELSOFT Navigator as the central system configuration incorporating an easy-to-use, graphical user interface with additional project-sharing features such as system labels and parameters. The advantages of this powerful integrated software suite are that system design is made much easier with a substantial reduction in repetitious tasks, cutting down on errors while helping to reduce the overall TCO.



System management software

MELSOFT Navigator

System level graphic-based configuration tool that simplifies the system design by providing a visual representation of the system. System management features such as system-wide parameterization, labels and block reading of project data are also included.

Programmable controller engineering software

MELSOFT GX Works3

GX Works3 is the latest generation of programming and maintenance software offered by Mitsubishi Electric specifically designed for the MELSEC iQ-R Series control system. It includes many new features such as graphic-based system configuration, integrated motion control setup, multiple language support, providing an intuitive engineering environment solution.

HMI/GOT screen design software

MELSOFT GT Works3

This graphic operation terminal (GOT) screen creation software is designed with three main features—simplicity, graphics design and operation ease—that help to create graphic screens in fewer steps.

Motion controller engineering software

MELSOFT MT Works2

This motion control design and maintenance software includes intuitive graphic-based programming together with a digital oscilloscope simulator.

Robot engineering software

MELSOFT RT ToolBox2 mini

This robot setup software supports various steps from programming, to commissioning, evaluation, and maintenance. In addition, improved preventative maintenance is realized through the use of an integrated 3D robot simulator.

Inverter setup software

MELSOFT FR Configurator2

This software simplifies the setup and maintenance of AC Inverters. Parameters can be registered easily and distributed to multiple inverters when replacing, and activation of the PLC function all from one setup screen.

System configuration

CPU

I/O

Analog

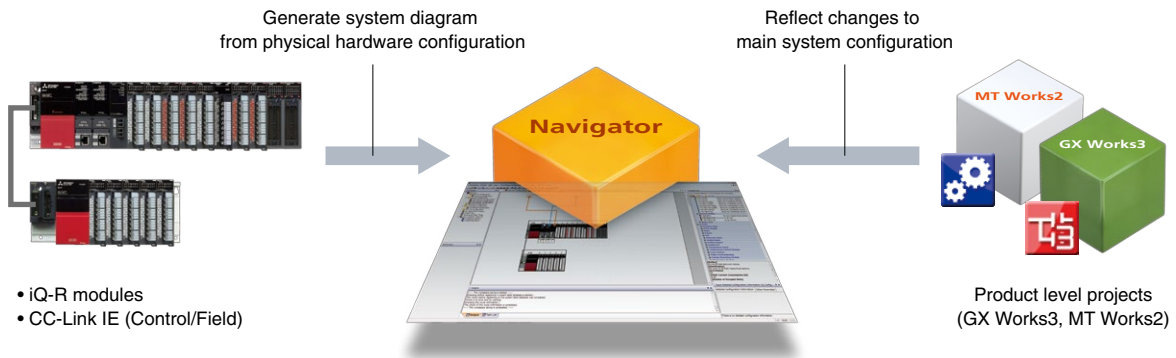
Motion, Positioning,
High-speed counter

Network

Software

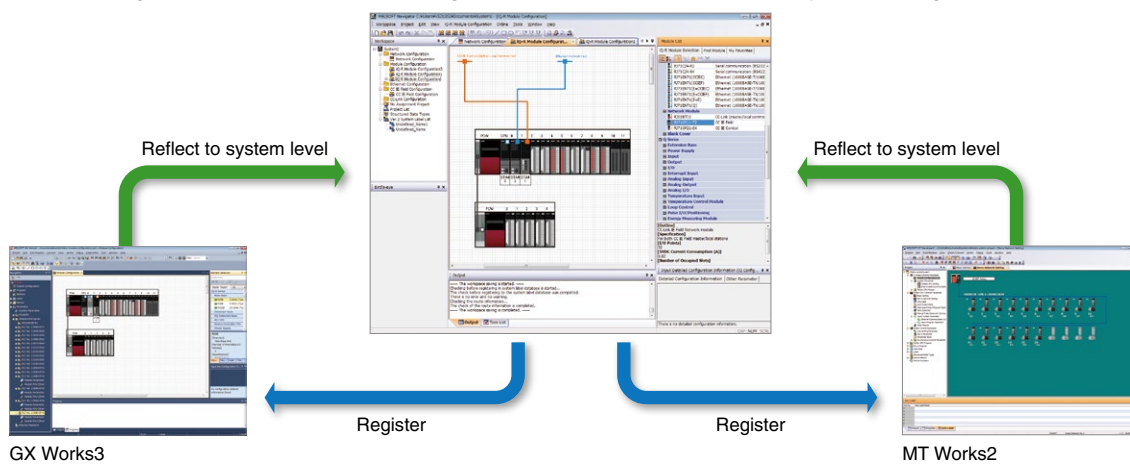
Total system centralized configuration

The correlation between the system configuration feature of MELSOFT Navigator and GX Works3, MT Works2 has been further improved. The system design console works in a bidirectional method, enabling the system configuration to be shared across all three software including network level integration without having to re-design the configuration from within the product level programming software(s).



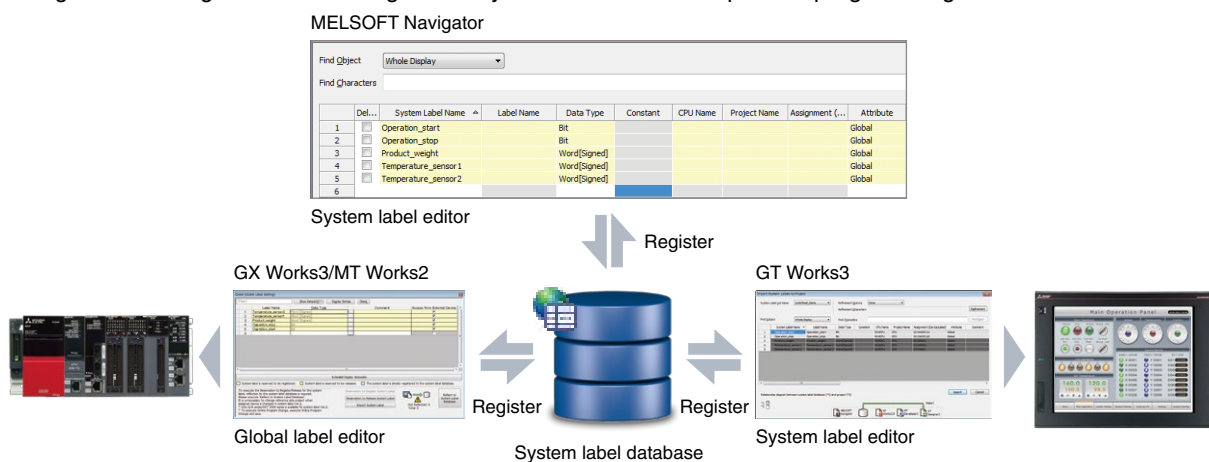
Effective parameter registration

Registration of module parameters within the system has been further enhanced with parameters being shared bidirectionally between MELSOFT Navigator and GX Works3, MT Works2. Upward registration of parameters to MELSOFT Navigator is also possible as changes are reflected from within the system configuration.



Unified system label database

The unified label database allows centralized management of global labels across both GX Works3 and GT Works3. The dynamic labeling structure enables system label sharing, which ensures that labels can be used without being conscious of the device associated with that label. The structure is also responsive to system configuration changes without having to modify the labels within the product programming tools.



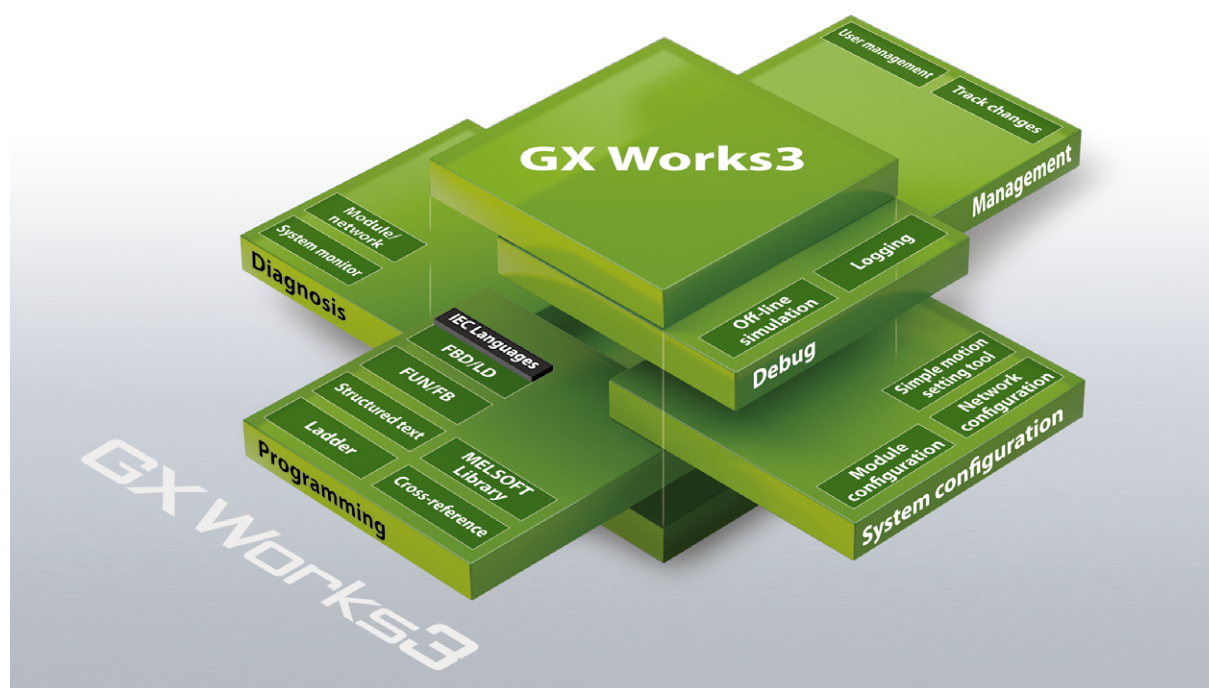
GX Works3

One Software, Many Possibilities



Mitsubishi Electric
MELSOFT GX Works3
Promotion Movie

GX Works3 consists of various different components that help to simplify project creation and maintenance tasks. A system design console that enables projects to be created at the system overview stage has been added. Additionally, the main programming languages are supported and their labels (variables) are shared, further simplifying programming. Various debug and maintenance features are also included.



Project lifecycle engineering

Various features have been consolidated into an integrated engineering environment that enables easier project creation throughout the engineering process, ensuring consistency through every step.

■ System-wide design

- Easy system configuration with parts library
- Direct module parameter registration
- Integrated simple motion module setup

■ Multiple programming languages

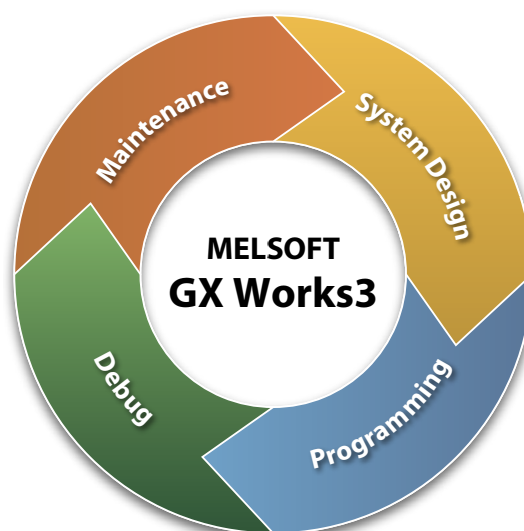
- Conforms to IEC 61131-3
- Supports main programming languages
- Consistency between different programming tabs

■ Simple to debug

- Various online monitoring
- Hardware simulator (emulator)
- Data logging

■ Straightforward maintenance

- System monitoring
- Module and network diagnostics
- Multi-language commenting



System
configuration

CPU

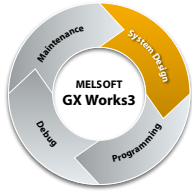
I/O

Analog

Motion, Positioning,
High-speed counter

Network

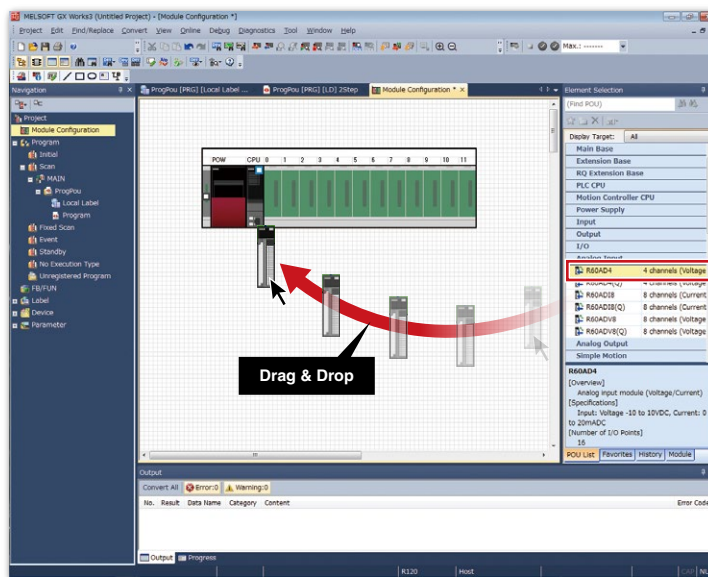
Software



System Design

System design with a convenient parts library

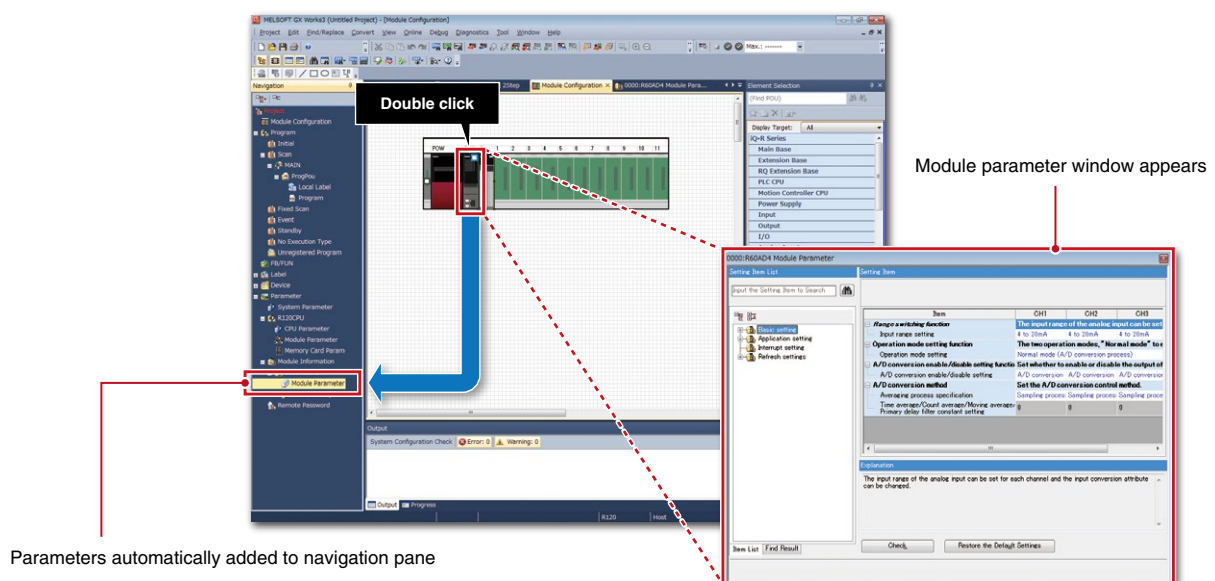
Most projects start from system design, so having a software application that caters to this initial stage is important. GX Works3 incorporates a system design feature that enables system components to be assembled directly in the programming software. It includes a parts library consisting of MELSEC iQ-R Series modules that can be used to simplify system creation.



Simply drag & drop when adding a module

Register module parameters on the fly

Another useful feature is the ability to register parameters automatically. Simply double-click on the desired module and the corresponding parameters will be registered in the project. A window with an easy-to-use parameter settings screen opens, enabling module parameters to be modified as needed.



Integrated motion setup tool

GX Works3 is equipped with a special motion setup tool that makes it easy to change simple motion module settings such as module parameters, positioning data and servo parameters. Also, debugging is simplified using the fine-tuning cam data generation feature.

Project window

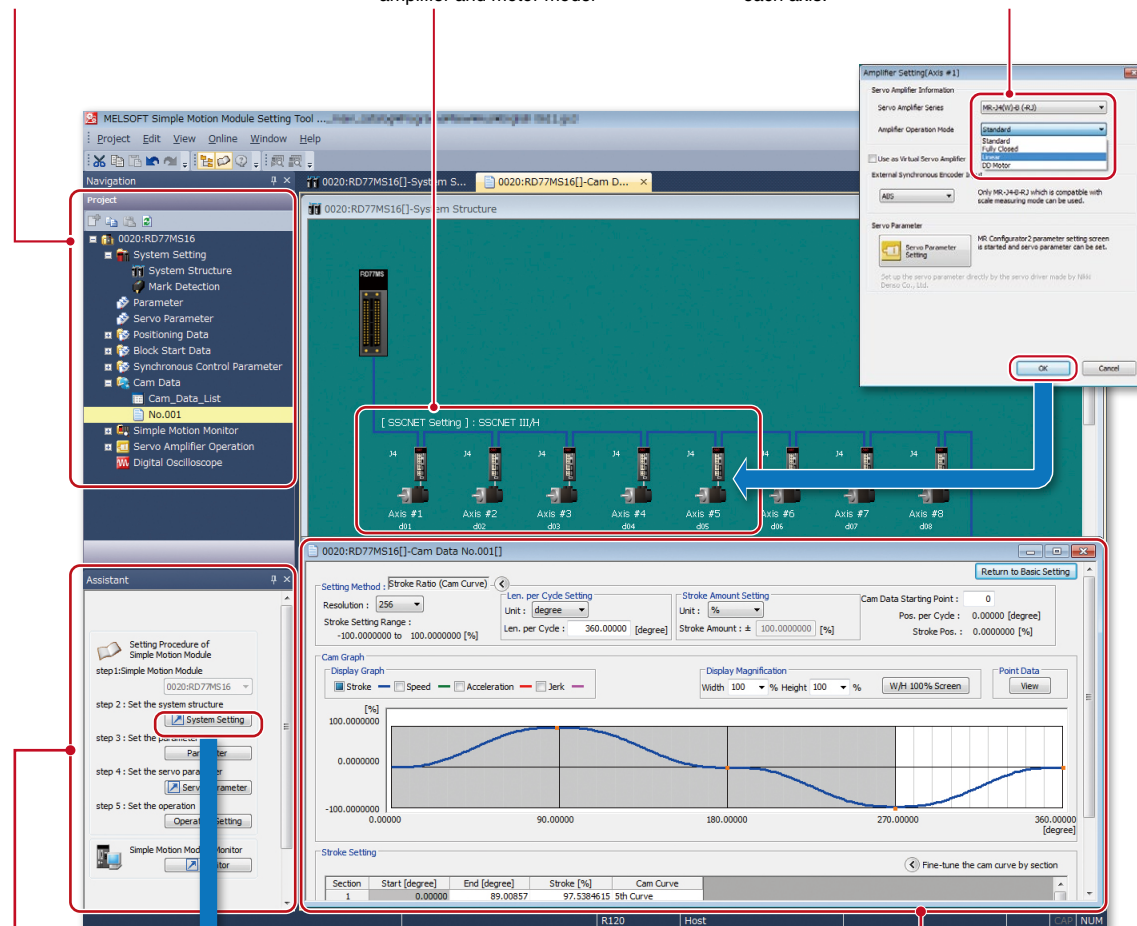
Easy to use navigation pane

Servo amplifier information

Quickly visualize type of servo amplifier and motor model

Servo amplifier setup

Select the servo amplifier and operation mode for each axis.



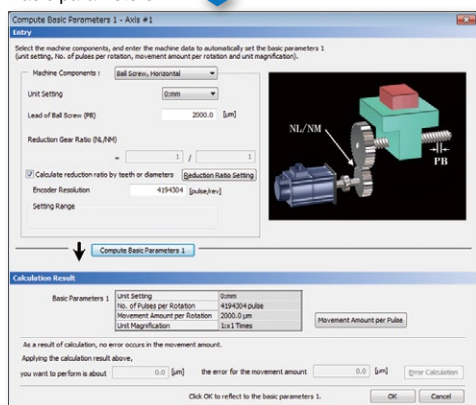
Assistant window

Selective tools further simplifying setup

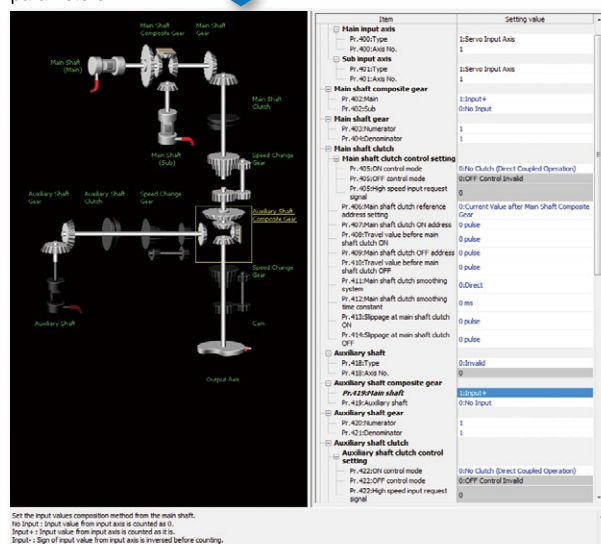
Cam data

Fine-tune cam curve data

Basic parameters



Synchronous parameters



System configuration

CPU

I/O

Analog

Motion Positioning,
High-speed counter

Network

Software



Programming

Central parts library

GX Works3 comes with an updated object library pre-installed in the software consisting of a module library with current modules at time of software release although this can be added to as newer modules become available. A variety of other objects are available such as third-party partner function blocks and an applications library (future release). The library can be fully shared across multiple projects.



MELSOFT Library

■ 3rd party partner FBs





Vision sensor RFID Laser displacement sensor

■ Module FBs (Mitsubishi Electric products)

Module Label

Module FB

- R120CPU
- R60DA4
- M+R60C Monitor error and r
- M+R60C Request setting FB
- M+R60C Wave output setti

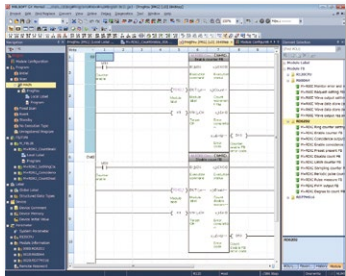
■ Applications library Coming soon!

Preventive maintenance

Energy saving

Work flow

Packaging machine

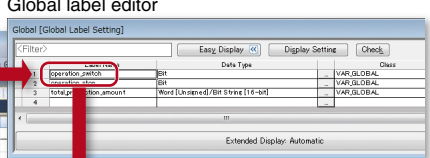


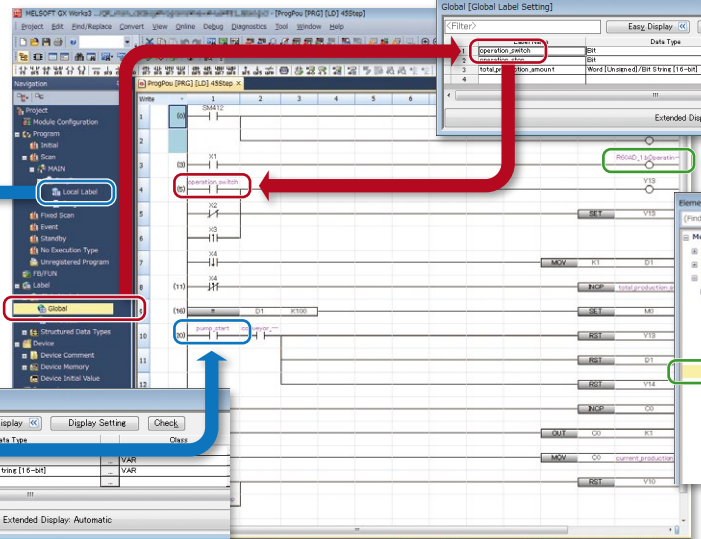
Just "select" to create a program

Reduce repetitive program tasks

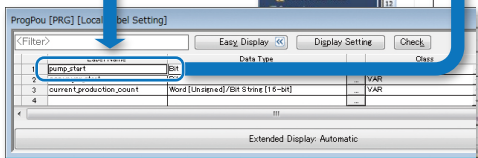
Global and local variables (labels) are supported providing an easy way to share device names across multiple projects, other MELSOFT software and third party SCADA. The variables can be registered into either the current program, function block as a local variable or within the project as a global variable to share across multiple programs within the same project. Variables specific to a particular module are also available, and can be used immediately, further reducing engineering time and cost.

Global label editor

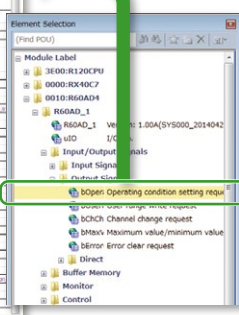




Local label editor

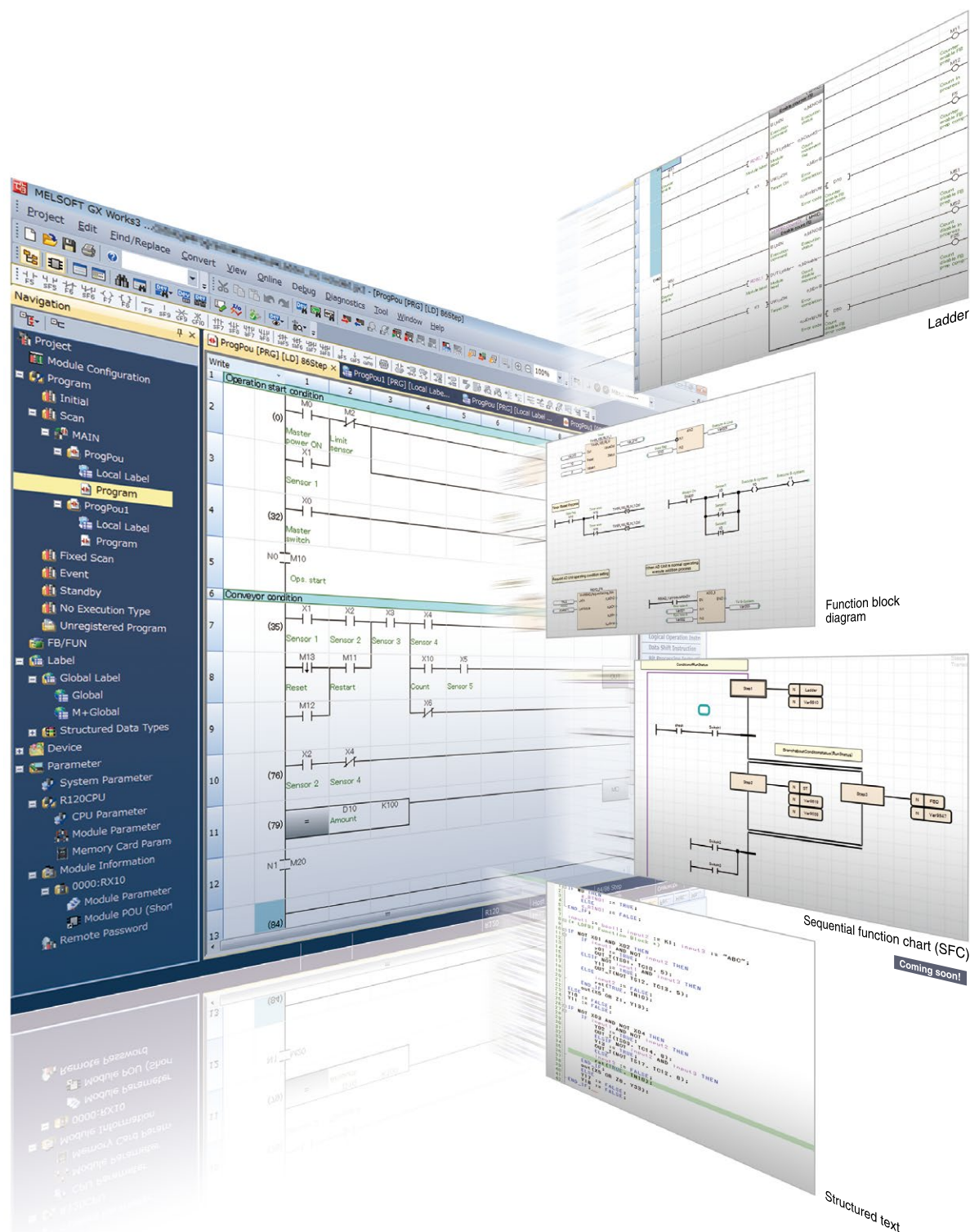


Module label



Main programming languages supported

The main IEC languages are supported by GX Works3. Various different programming languages can be used within the same project simultaneously and can be viewed easily via the menu tab. The variables and devices used in each program can be shared across multiple platforms, with user defined function blocks supported.



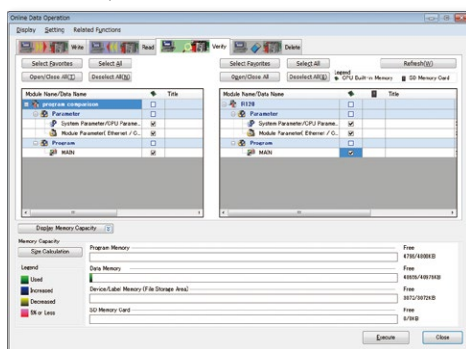


Debug

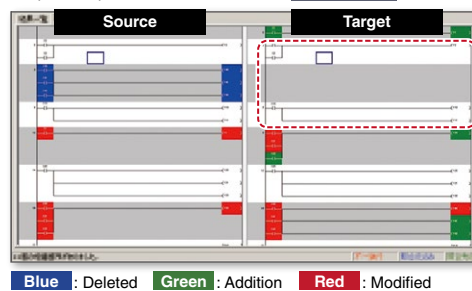
Easy version management

Being able to visually see and manage different versions of the same project can help to reduce debugging processes. Even with a number of engineers are working on the same project, changes made are easily recognized directly from the program or as an automatically generated verification results list. This feature is available for locally stored projects on the computer, and between the program stored in the programmable controller CPU.

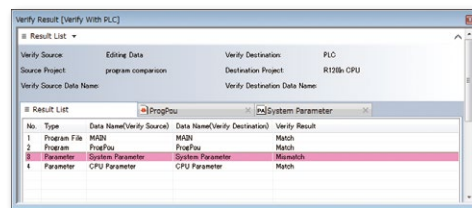
Online Data Operation



Graphical representation of differences



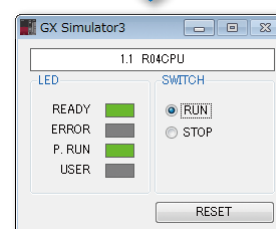
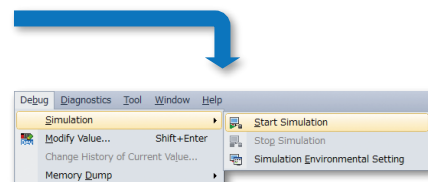
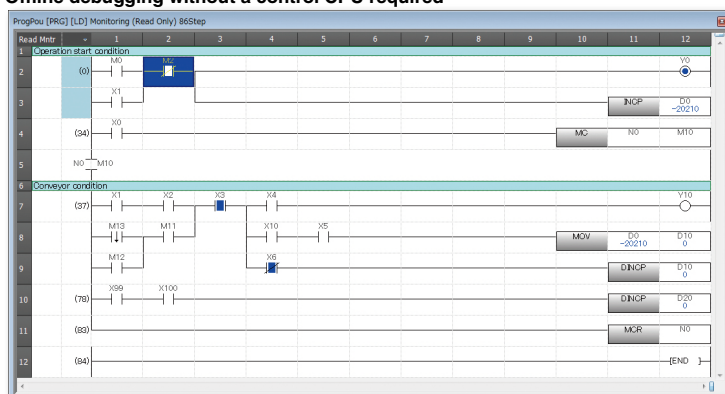
Verification results



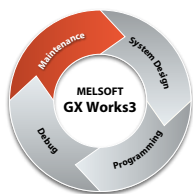
Hardware simulation

GX Works3 features an integrated simulator which helps to visualize the operation of the program during the debugging process. Motion control CPU hardware can be simulated as well.

Offline debugging without a control CPU required



Directly debugging on the computer

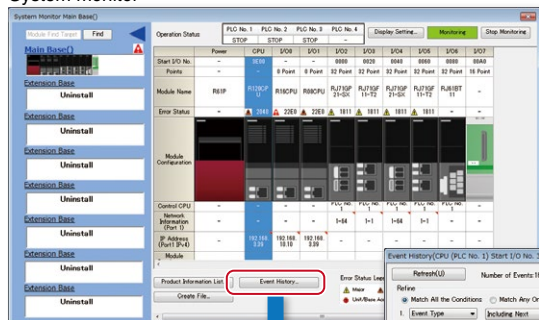


Maintenance

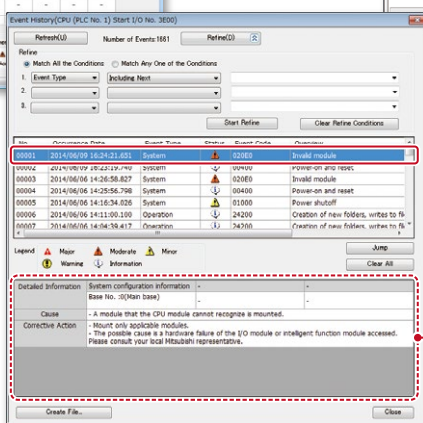
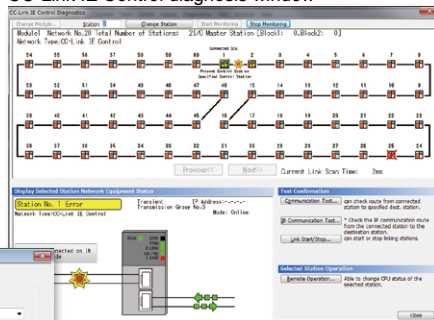
Simplified troubleshooting reduces downtime even further

GX Works3 incorporates various maintenance features helping to reduce downtime and keep productivity high. Various levels of maintenance are possible, from system-wide monitoring of errors an module status to monitoring at the network level; for example, detailed operations that show where programs or parameters have been changed in the CPU and the monitoring of system events, which also includes a useful historical function that can be exported as a CSV file.

System monitor



CC-Link IE Control diagnosis window

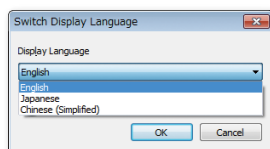
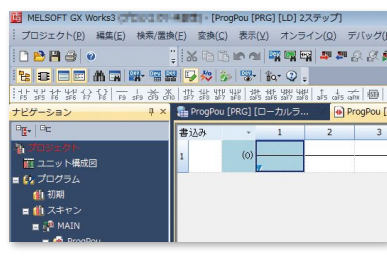


Event history

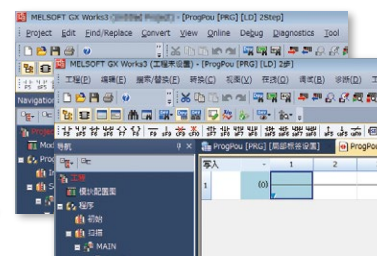
Detailed information including the cause and respective countermeasures are shown here

Multi-language menu, ideal for global support

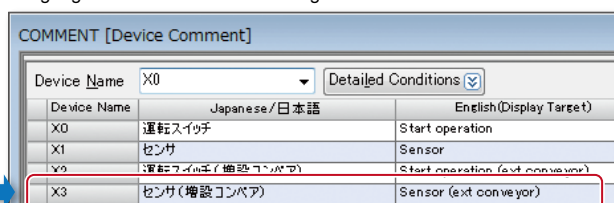
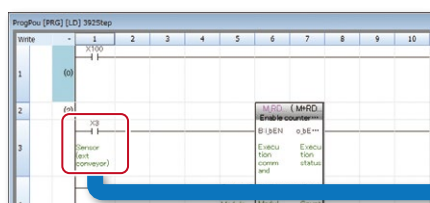
The menu system can be switched between various languages, enabling different locations to work on the same project with the same programming software version. In addition, device comments within the project can be switched between various languages without having to create multiple copies of the same project to support the comments in different languages.



Menu language switch



Language version of comments being switched



System configuration

CPU

I/O

Analog

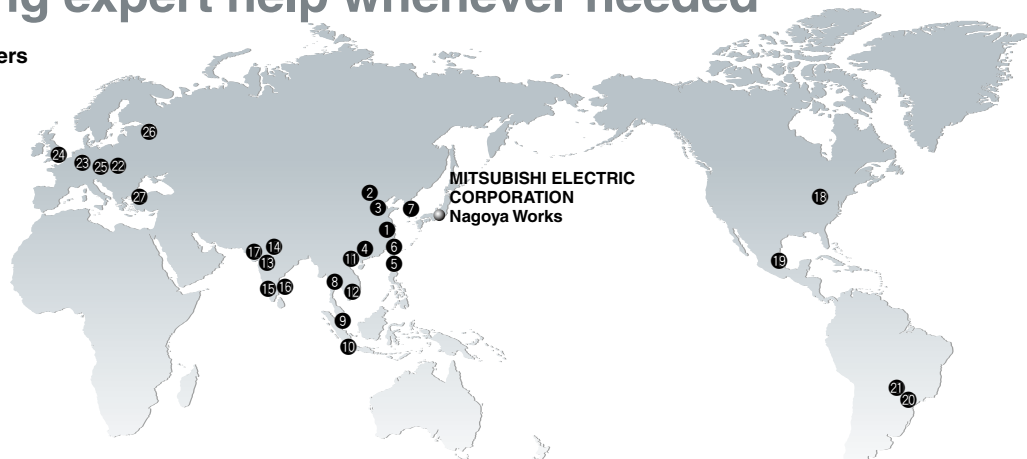
Motion, Positioning, High-speed counter

Network

Software

Extensive global support coverage providing expert help whenever needed

■ Global FA centers



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① Shanghai FA Center

MITSUBISHI ELECTRIC AUTOMATION (CHINA) LTD.
No.1386 Hongqiao Road, Mitsubishi Electric Automation Center, Shanghai, China
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② Beijing FA Center

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MITSUBISHI ELECTRIC TAIWAN CO.,LTD.
No.8-1, Industrial 16th Road, Taichung Industrial Park, Taichung City 40768, Taiwan, R.O.C.
Tel: +886-4-2359-0688 / Fax: +886-4-2359-0689

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

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⑩ Indonesia FA Center

PT. MITSUBISHI ELECTRIC INDONESIA Cikarang Office
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⑪ Hanoi FA Center

MITSUBISHI ELECTRIC VIETNAM COMPANY LIMITED Hanoi Branch
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⑫ Ho Chi Minh FA Center

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⑬ North America FA Center

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⑰ Mexico FA Center

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Brazil

⑳ Brazil FA Center

MITSUBISHI ELECTRIC DO BRASIL COMÉRCIO E SERVIÇOS LTDA.
Rua Jussara, 1750-Bloco B Anexo, Jardim Santa Cecilia, CEP 06465-070, Barueri-SP, Brasil
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㉑ Brazil Boituva FA Center

MELCO CNC DO BRASIL COMÉRCIO E SERVIÇOS S.A.
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㉒ Europe FA Center

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㉔ UK FA Center

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㉕ Czech Republic FA Center

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㉖ Russia FA Center

MITSUBISHI ELECTRIC EUROPE B.V. Russian Branch St. Petersburg office
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㉗ Turkey FA Center

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Tel: +90-216-526-3990 / Fax: +90-216-526-3995

General specifications

Item	Specification					
Operating ambient temperature	0...55°C					
Storage ambient temperature	-25...75°C					
Operating ambient humidity	5...95% RH, non-condensing					
Storage ambient humidity	5...95% RH, non-condensing					
Vibration resistance	Compliant with JIS B 3502 and IEC 61131-2	-	Frequency	Constant acceleration	Half amplitude	Sweep count
		Under intermittent vibration	5...8.4 Hz	-	3.5 mm	10 times each in X, Y, Z directions
			8.4...150 Hz	9.8 m/s²	-	
		Under continuous vibration	5...8.4 Hz	-	1.75 mm	-
		8.4...150 Hz	4.9 m/s²	-		
Shock resistance	Compliant with JIS B 3502 and IEC 61131-2 (147 m/s², 3 times each in directions X, Y, Z)					
Operating atmosphere	No corrosive gases*4, no flammable gases, no excessive conductive dust					
Operating altitude*1	0...2000 m*5					
Installation location	Inside a control panel					
Overvoltage category*2	≤ II					
Pollution degree*3	≤ 2					
Equipment class	Class 2*6					

*1: Do not use or store the programmable controller under pressure higher than the atmospheric pressure of altitude 0 m. Doing so may cause malfunction.

When using the programmable controller under pressure, please consult your local Mitsubishi Electric representative.

*2: 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 II 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.

*3: 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.

*4: The special coated product, which meets the regulation (JIS C 60721-3-3/IEC 60721-3-3 3C2) related to corrosive gas, is available for the use in a corrosive gas environment.

For more details on the special coated product, please consult your local Mitsubishi Electric representative.

*5: When used at an altitude higher than 2000 m, the upper limits of the permissible voltage and the operating ambient temperature become lower. Please consult your local Mitsubishi Electric representative.

*6: Class 1 when the RQ extension base unit is used.

Software operating environment

Item	MELSOFT GX Works3, CW Configurator	CW Workbench, CW-Sim, CW-Sim Standalone
Personal computer	Windows® supported personal computer	
CPU	Intel® Core™ 2 Duo Processor 2 GHz or more	
Available hard disk capacity	5 GB	4 GB or more
Display	Resolution 1024 x 768 pixels or higher	
Communication interface (When a CPU module is directly connected.)	USB port, Ethernet port	Ethernet port (1000BASE-T/100BASE-TX/10BASE-T)
Required memory		
64-bit edition	2 GB or more recommended	2 GB or more
32-bit edition	1 GB or more recommended	1 GB or more (2 GB or more recommended)
OS (English version)		
Microsoft® Windows® 8.1 Operating System	●	●*7
Microsoft® Windows® 8.1 Pro Operating System	●	●*7
Microsoft® Windows® 8.1 Enterprise Operating System	●	●*7
Microsoft® Windows® 8 Operating System	●	●*7
Microsoft® Windows® 8 Pro Operating System	●	●*7
Microsoft® Windows® 8 Enterprise Operating System	●	●*7
Microsoft® Windows® 7 Starter Operating System	●	-
Microsoft® Windows® 7 Home Premium Operating System	●	-
Microsoft® Windows® 7 Professional Operating System	●	●*8
Microsoft® Windows® 7 Ultimate Operating System	●	●*8
Microsoft® Windows® 7 Enterprise Operating System	●	●*8
Microsoft® Windows Vista® Home Basic Operating System	●*9	-
Microsoft® Windows Vista® Home Premium Operating System	●*9	-
Microsoft® Windows Vista® Business Operating System	●*9	-
Microsoft® Windows Vista® Ultimate Operating System	●*9	-
Microsoft® Windows Vista® Enterprise Operating System	●*9	-
Microsoft® Windows® XP Professional Operating System SP3	●*9	●*9
Microsoft® Windows® XP Home Edition Operating System SP3	●*9	-

*7: Windows Touch is not supported.

*8: Windows® XP Mode is not supported.

*9: The 64-bit edition is not supported.

MELSOFT GX Works3-supported CPU modules

Item	Model
Programmable controller CPU	R04CPU
	R08CPU
	R16CPU
	R32CPU
	R120CPU
Process CPU	R08PCPU
	R16PCPU
	R32PCPU
	R120PCPU

CW Workbench, CW-Sim, CW-Sim Standalone, MELSOFT CW Configurator-supported CPU modules

Item	Model
C Controller	R12CCPU-V

Product List

■ CPU modules

Type	Model	Outline
Programmable controller CPU	R04CPU	Program capacity, 40K steps; basic operation processing speed (LD instruction), 0.98 ns
	R08CPU	Program capacity, 80K steps; basic operation processing speed (LD instruction), 0.98 ns
	R16CPU	Program capacity, 160K steps; basic operation processing speed (LD instruction), 0.98 ns
	R32CPU	Program capacity, 320K steps; basic operation processing speed (LD instruction), 0.98 ns
	R120CPU	Program capacity, 1200K steps; basic operation processing speed (LD instruction), 0.98 ns
Motion CPU	R16MTCPU	Up to 16-axis control; operation cycle, ≤0.222 ms; SSCNET III/H connectivity
	R32MTCPU	Up to 32-axis control; operation cycle, ≤0.222 ms; SSCNET III/H connectivity
Process CPU	R08PCPU NEW	Program capacity, 80K steps; basic operation processing speed (LD instruction), 0.98 ns
	R16PCPU NEW	Program capacity, 160K steps; basic operation processing speed (LD instruction), 0.98 ns
	R32PCPU NEW	Program capacity, 320K steps; basic operation processing speed (LD instruction), 0.98 ns
	R120PCPU NEW	Program capacity, 1200K steps; basic operation processing speed (LD instruction), 0.98 ns
C Controller	R12CCPU-V NEW	Endian format, little endian; OS, VxWorks® Version 6.9
SD memory card*1	NZ1MEM-2GBSD NEW	SD memory card, 2G bytes
	NZ1MEM-4GBSD NEW	SDHC memory card, 4G bytes
	NZ1MEM-8GBSD NEW	SDHC memory card, 8G bytes
	NZ1MEM-16GBSD NEW	SDHC memory card, 16G bytes
Extended SRAM cassette	NZ2MC-1MBS	1M bytes
	NZ2MC-2MBS	2M bytes
	NZ2MC-4MBS	4M bytes
	NZ2MC-8MBS	8M bytes
	NZ2MC-8MBSE*2 NEW	8M bytes
Battery	Q6BAT	Replacement battery
	Q7BAT	Replacement large-capacity battery
	Q7BAT-SET	Large-capacity battery with holder for mounting CPU

*1: Mitsubishi Electric shall not guarantee the operation of any third party products.

*2: ECC type for Process CPU modules only.

■ Base unit

Type	Model	Outline
Main base	R35B	5 slots, for MELSEC iQ-R Series modules
	R38B	8 slots, for MELSEC iQ-R Series modules
	R312B	12 slots, for MELSEC iQ-R Series modules
Extension base	R65B	5 slots, for MELSEC iQ-R Series modules
	R68B	8 slots, for MELSEC iQ-R Series modules
	R612B	12 slots, for MELSEC iQ-R Series modules
RQ extension base	RQ65B	5 slots, for MELSEC-Q Series modules
	RQ68B	8 slots, for MELSEC-Q Series modules
	RQ612B	12 slots, for MELSEC-Q Series modules
Extension cable	RC06B	0.6 m cable for extension and RQ extension base units
	RC12B	1.2 m cable for extension and RQ extension base units
	RC30B	3 m cable for extension and RQ extension base units
	RC50B	5 m cable for extension and RQ extension base units
DIN rail mounting adapter	R6DIN1	For main and extension base units
	Q6DIN1	For RQ68B/RQ612B
	Q6DIN2	For RQ65B
	Q6DIN1A	For RQ extension base units (with vibration-proofing bracket sets)
Blank cover	RG60	For I/O slots of main and extension base units
	QG60	For I/O slots of RQ extension base units

■ Power supply module

Type	Model	Outline
Power supply	R61P	AC power supply; input, 100 to 240 V AC; output, 5 V DC/6.5 A
	R62P NEW	AC power supply; input, 100 to 240 V AC; output, 5 V DC/3.5 A, 24 V DC/0.6 A
	R64P NEW	AC power supply; input, 100 to 240 V AC; output, 5 V DC/9 A
	R63P	DC power module; input, 24 V DC; output, 5 V DC/6.5 A

■ I/O modules

Type	Model	Outline
Input	RX10	AC input, 16 points; 100...120 V AC (50/60 Hz)
	RX40C7	DC input, 16 points; 24 V DC, 7.0 mA
	RX41C4	DC input, 32 points; 24 V DC, 4.0 mA
	RX42C4	DC input, 64 points; 24 V DC, 4.0 mA
Output	RY10R2	Relay output, 16 points; 24 V DC/2 A, 240 V AC/2 A
	RY40NT5P	Transistor (sink) output, 16 points; 12 to 24 V DC, 0.5 A
	RY41NT2P	Transistor (sink) output, 32 points; 12 to 24 V DC, 0.2 A
	RY42NT2P	Transistor (sink) output, 64 points; 12 to 24 V DC, 0.2 A
	RY40PT5P	Transistor (source) output, 16 points; 12 to 24 V DC, 0.5 A
	RY41PT1P	Transistor (source) output, 32 points; 12 to 24 V DC, 0.1 A
I/O combined	RY42PT1P	Transistor (source) output, 64 points; 12 to 24 V DC, 0.1 A
	RH42C4NT2P	DC input, 32 points; 24 V DC, 4.0 mA Transistor (sink) output, 32 points; 12 to 24 V DC, 0.2 A

■ Analog modules

Type	Model	Outline
Analog input	R60AD4	4 channels for voltage/current inputs -10...10 V DC, -32000...32000; 0...20 mA DC, 0...32000; 80 μs/CH
	R60ADV8	8 channels for voltage inputs -10...10 V DC, -32000...32000; 80 μs/CH
	R60ADI8	8 channels for current inputs 0...20 mA DC/0...32000; 80 μs/CH
	R60AD8-G NEW	8 channels for voltage/current input, channel isolated -10...10 V DC/-32000...32000, 0...20 mA DC/0...32000, 10 ms/CH
	R60AD16-G NEW	16 channels for voltage/current input, channel isolated -10...10 V DC/-32000...32000, 0...20 mA DC/0...32000, 10 ms/CH
Temperature input	R60TD8-G NEW	Thermocouple (B, R, S, K, E, J, T, N), 8 channels for input, channel isolated, 30 ms/CH
	R60RD8-G NEW	RTD (Pt100, JPt100, Ni100, Pt50), 8 channels for input, channel isolated, 10 ms/CH
Analog output	R60DA4	4 channels for voltage/current outputs -32000...32000, -10...10 V DC; 0...32000, 0...20 mA DC; 80 μs/CH
	R60DAV8	8 channels for voltage outputs -32000...32000, -10...10 V DC; 80 μs/CH
	R60DAI8	8 channels for current outputs 0...32000, 0...20 mA DC; 80 μs/CH
	R60DA8-G NEW	8 channels for voltage/current output, channel isolated -32000...32000/-12...12 V DC, 0...32000/0...20 mA DC, 1 ms/CH
	R60DA16-G NEW	16 channels for voltage/current output, channel isolated -32000...32000/-12...12 V DC, 0...32000/0...20 mA DC, 1 ms/CH

■ Motion/Positioning/High-speed counter modules

Type	Model	Outline
Simple motion	RD77MS2	2 axes, linear/circular interpolation, advanced synchronous control, SSCNET III/H support
	RD77MS4	4 axes, linear/circular interpolation, advanced synchronous control, SSCNET III/H support
	RD77MS8	8 axes, linear/circular interpolation, advanced synchronous control, SSCNET III/H support
	RD77MS16	16 axes, linear/circular interpolation, advanced synchronous control, SSCNET III/H support
Positioning	RD75P2	Transistor output, 2 axes; max. output, 200k pulse/s; linear/circular interpolation
	RD75P4	Transistor output, 4 axes; max. output, 200k pulse/s; linear/circular/helical interpolation
	RD75D2	Differential driver output, 2 axes; max. output, 5M pulse/s; linear/circular interpolation
	RD75D4	Differential driver output, 4 axes; max. output, 5M pulse/s; linear/circular/helical interpolation
High-speed counter	RD62P2	5/12/24 V DC input, 2 channels; counting speed, max. 200k pulse/s; external output, transistor (sink type)
	RD62P2E	5/12/24 V DC input, 2 channels; counting speed, max. 200k pulse/s; external output, transistor (source type)
	RD62D2	Differential input, 2 channels; max. counting speed, 8M pulse/s; external output, transistor (sink type)

■ Network modules

Type	Model	Outline
Ethernet (built-in CC-Link IE)	RJ71EN71	1 Gbps/100 Mbps/10 Mbps, 2 ports Multi-network connectivity (Ethernet/CC-Link IE)
CC-Link IE Control	RJ71GP21-SX	1 Gbps, fiber-optic cable, control/normal station
CC-Link IE Field	RJ71GF11-T2	1 Gbps, master/local station
CC-Link	RJ61BT11	Max. 10 Mbps, master/local station, CC-Link Ver.2 supported
Serial communication	RJ71C24	Max. 230.4 kbps; RS-232, 1 channel; RS-422/485, 1 channel
	RJ71C24-R2	Max. 230.4 kbps; RS-232, 2 channels
	RJ71C24-R4	Max. 230.4 kbps; RS-422/485, 2 channels

■ Software

Type	Model	Outline
MELSOFT iQ Works	SW2DND-IQWK-E (DVD-ROM edition)	FA engineering software*1 - System Management Software: MELSOFT Navigator - Controller Programming Software: MELSOFT GX Works3*2, GX Works2, GX Developer - Motion Programming Software: MELSOFT MT Works2 - HMI Programming Software: MELSOFT GT Works3 - Robot Programming Software: MELSOFT RT ToolBox2 mini - Inverter Setup Software: MELSOFT FR Configurator2 - MITSUBISHI ELECTRIC FA Library
MELSOFT GX Works3	SW1DND-GXW3-E (DVD-ROM edition)	- Controller Programming Software: MELSOFT GX Works3*2, GX Works2, GX Developer - MITSUBISHI ELECTRIC FA Library
CW Workbench	SW1DND-CWWR-E NEW	Engineering tool for C Controller module
	SW1DND-CWWR-EZ NEW	Additional license for R12CCPU-V
	SW1DND-CWWR-EVZ NEW	Update license for R12CCPU-V
CW-Sim	SW1DND-CWSIMR-EZ NEW	VxWorks® simulation environment for CW Workbench, additional license
CW-Sim Standalone	SW1DNC-CWSIMR-E NEW	VxWorks® simulation environment for CW Workbench, standalone type
MELSOFT CW Configurator	SW1DND-RCCPU-E NEW	Setting and monitoring tool for C Controller

*1: For detailed information about supported modules, refer to the manuals of the relevant software package.

*2: The MELSOFT GX Works3 menu is switchable between Japanese, English, and simplified Chinese. (Traditional Chinese and Korean will be supported soon.)

FA Products

HMI

Graphic Operation Terminal GOT2000 Series GT27 Model



To the top of HMIs with further user-friendly, satisfactory standard features.

- ◎ Comfortable screen operation even if high-load processing (e.g. logging, device data transfer) is running. (Monitoring performance is twice faster than GT16)
- ◎ Actual usable space without using a SD card is expanded to 128MB for more flexible screen design.
- ◎ Multi-touch features, two-point press, and scroll operations for more user-friendliness.
- ◎ Outline font and PNG images for clear, beautiful screen display.

Product Specifications

Screen size	15", 12.1", 10.4", 8.4"
Resolution	XGA, SVGA, VGA
Intensity adjustment	32-step adjustment
Touch panel type	Analog resistive film
Built-in interface	RS-232, RS-422/485, Ethernet, USB, SD card
Applicable software	GT Works3
Input power supply voltage	100 to 240VAC (+10%, -15%), 24VDC (+25%, -20%)

Inverter

FR-A800 Series



High-functionality, high-performance inverter

- ◎ Realize even higher responsiveness during real sensor-less vector control or vector control, and achieve faster operating frequencies.
- ◎ The latest automatic tuning function supports various induction motors and also sensor-less PM motors.
- ◎ The standard model is compatible with EU Safety Standards STO (PLd, SIL2). Add options to support higher level safety standards.
- ◎ Control and monitor inverters via CC-Link/CC-Link IE Field Network (option interface).

Product Specifications

Inverter capacity	200V class: 0.4kW to 90kW, 400V class: 0.4kW to 500kW
Control method	High-carrier frequency PWM control (Select from V/F, advanced magnetic flux vector, real sensorless vector or PM sensorless vector control), vector control (when using options)
Output frequency range	0.2 to 590Hz (upper limit is 400Hz when using advanced magnetic flux vector control, real sensorless vector control, vector control or PM sensorless vector control)
Regenerative braking torque (Maximum allowable duty)	200V class: 0.4K to 1.5K (150% at 3%ED) 2.2K/3.7K (100% at 3%ED) 5.5K/7.5K (100% at 2%ED) 11K to 55K (20% continuous) 75K or more (10% continuous), 400V class: 0.4K to 7.5K (100% at 2%ED) 11K to 55K (20% continuous) 75K or more (10% continuous)
Starting torque	200% 0.3Hz (3.7K or less), 150% 0.3Hz (5.5K or more) (when using real sensorless vector, vector control)

AC Servo

Mitsubishi General-Purpose AC Servo MELSERVO-J4 Series



Industry-leading level of high performance servo

- ◎ Industry-leading level of basic performance: Speed frequency response (2.5kHz), 4,000,000 (4,194,304p/rev) encoder
- ◎ Advanced one-touch tuning function achieves the one-touch adjustment of advanced vibration suppression control II, etc.
- ◎ Equipped with large capacity drive recorder and machine diagnosis function for easy maintenance.
- ◎ 2-axis and 3-axis servo amplifiers are available for energy-conservative, space-saving, and low-cost machines.

Product Specifications

Power supply specifications	1-phase/3-phase 200V AC, 1-phase 100V AC, 3-phase 400V AC
Command interface	SSCNET III/H, SSCNET III (compatible in J3 compatibility mode), CC-Link IE Field Network interface with Motion, pulse train, analog
Control mode	Position/Speed/Torque/Positioning function/Fully closed loop
Speed frequency response	2.5kHz
Tuning function	Advanced one-touch tuning, advanced vibration suppression control II, robust filter, etc.
Functional safety	Conforms to functions of IEC/EN 61800-5-2, STO: Category 3 PL d, SIL 2 Conforms to Category 4 PL e, SIL 3 by a combination with MR-D30 functional safety unit
Compatible servo motor	Rotary servo motor (rated output: 0.05 to 55kW), linear servo motor (continuous thrust 50 to 3000N), direct drive motor (rated torque: 2 to 240N·m)

Sensor-less Servo

FR-E700EX Series, MM-GKR Series



Compact and high-function drive unit, low-inertial small capacity sensor-less PM motor

- ◎Use PM sensor-less vector control to control dedicated PM motors with high accuracy without an encoder.
- ◎High-accuracy speed control (speed fluctuation rate $\pm 0.05\%$) and positioning control are supported.
- ◎The dedicated PM motor (MM-GKR) is quiet as it has no cooling fan. The compact and lightweight unit also supports reduction gears.
- ◎The standard model supports RS-485 communication. CC-Link communication is supported with an additional option.

Product Specifications

Drive unit / motor capacity	200V class: 0.1kW to 0.75kW
Control method	PM sensor-less vector control (low speed range: high frequency superimposition control)
Rated speed	3000r/min
Speed fluctuation rate	$\pm 0.05\%$ (at 0 to 100% load fluctuation)
Position control	The point table method and zero point return enable position control with absolute position commands $\pm 1.8^\circ$ (machine angle: equivalent to 200 [pulses/rev] resolution, input voltage 200V, wiring length within 5m)
Positioning accuracy	
Starting torque	200% (default value)
Communication specifications	Built-in: RS-485 communication (Mitsubishi inverter protocol, Modbus-RTU protocol), option: CC-Link communication

Magnetic Starter

MS-T Series



Exceed your expectations.

- ◎10A frame model is over 16% smaller with a width of just 36mm!!
- ◎New integrated terminal covers.
- ◎Reduce your coil inventory by up to 50%.
- ◎Be certified to the highest international levels while work is ongoing to gain other country.

Product specifications

Frame	10 A to 32 A
Applicable standards	Certification to various standards including IEC, JIS, CE, UL, TÜV, CCC.
Terminal cover	Standard terminal cover improves safety, simplifies ordering, and reduces inventory, etc.
Improved wiring	Wiring and operability are improved with streamlining wiring terminal BC specifications.
Operation coil rating	Wide range of operation coil ratings reduces number of coil types from 14 (N Series) to 7 types and simplifies selection.
Option units	Diverse lineup includes Auxiliary Contact Block, Operation Coil Surge Absorber Unit, Mechanical Interlock Unit.

Low Voltage Circuit Breakers

Mitsubishi WS-V Series Molded Case Circuit Breakers, Earth Leakage Circuit Breakers



Technologies based on long year experience realize more improved performance.

- ◎The new electronic circuit breakers can display various measurement items.
- ◎Improvement of breaking performance with new breaking technology "Expanded ISTAC".
- ◎Compliance with global standard for panel and machine export.
- ◎Commoditization of internal accessories for shorter delivery time and stock reduction.

Product Specifications.

Frame	32-250A Frame
Applicable standard	Applicable to IEC, GB, UL, CSA, JIS and etc.
Expansion of UL listed product line-up	New line-up of 480VAC type with high breaking performance for SCCR requirement
Commoditization of internal accessories	Reduction of internal accessory types from 3 to 1
Commoditization for AC and DC circuit use	Common use of 32/63A frame in both AC and DC circuit
Compact size for easy to use	Thermal adjustable and electronic circuit breakers are same size as 250AF fixed type
Measuring Display Unit (MDU) breakers	MDU breakers measure, display and transmit energy date to realize energy management.



High speed, high precision and high reliability industrial robot

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

Product Specifications

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

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