Programmable Controller designed with automation in mind

MELSEC Consolidated Catalog
GLOBAL IMPACT OF MITSUBISHI ELECTRIC

Changes for the Better

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

Mitsubishi Electric is involved in many areas including the following

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

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

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

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

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

Through Mitsubishi Electric’s vision, “Changes for the Better” are possible for a brighter future.
Committed to ever higher customer satisfaction
Mitsubishi Electric is a global leader in the research, manufacturing and marketing of electrical and electronic equipment used in areas such as communications, consumer electronics, industrial technology, energy and transportation. Within this, the industrial automation business has grown significantly since the first induction motor was manufactured over 90 years ago and has closely followed the automation industry in Japan, Asia, and beyond. Mitsubishi Electric industrial automation boasts a wide-range of product areas such as production control, drives, and mechatronics that are used in various industries. In addition, Mitsubishi Electric offers e-F@ctory and iQ Platform, leveraging its total industrial automation solution portfolio.

Intelligence in everything automated—MELSEC
The MELSEC (Mitsubishi ELectric SEquence Control) brand is well known in the automation industry for robust quality and excellent performance that realizes a reduction in total cost of ownership (TCO). The MELSEC lineup consists of various products, the flagship products being the MELSEC-Q Series and recently introduced MELSEC iQ-R Series. These high-end programmable controllers, mainly used for controlling processes in manufacturing lines and advanced machines are complimented by small- to medium-sized controllers like the MELSEC-L Series, MELSEC-F Series and the new MELSEC iQ-F Series, which are commonly utilized for cell manufacturing and stand-alone applications. Over the years, a main characteristic of the MELSEC Series has been seamless connection, from the sensor level all the way through to Enterprise covering all aspects of manufacturing.

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Maximizing productivity and reducing costs across the entire enterprise

e-F@ctory is the Mitsubishi Electric solution for improving the performance of any manufacturing enterprise by enhancing productivity, and reducing the maintenance and operations costs together with seamless information flow throughout the plant. e-F@ctory uses a combination of factory automation and IT technologies, offering solutions to reduce the total cost of development, production, and maintenance by supporting advanced Monozukuri*.

e-F@ctory helps to reduce overall costs and is achieved in the following four areas:

* Monozukuri is an initiative started in Japan for promoting its unique manufacturing style for continuous improvement in production processes and operations. The word is derived by combining the words “mono”, the thing that is manufactured, and “zukuri”, the process of manufacturing.

**Reduce energy costs**

**e&eco-F@ctory (energy saving solution)**

Modern manufacturing depends much on reducing energy costs as a way to realize an efficient manufacturing enterprise. e-F@ctory supports this by allowing visualization of real-time energy usage, helping to reduce the overall energy consumption.

**Integrate FA and IT systems at low cost**

**Connecting enterprise with the shop floor**

e-F@ctory solutions provide direct connectivity from the shop floor to enterprise, such as Manufacturing Execution System (MES) without requiring a gateway computer. This enables leaner operations, improved yield, and efficient management of the supply chain.

**Reduce development, production, and maintenance costs**

**iQ Platform**

The iQ Platform minimizes costs at all phases of the automation life cycle by improving development times, enhancing productivity, reducing maintenance costs, and making information more easily accessible. Integration is at the heart of the iQ Platform, with a highly intelligent controller platform as the core, combined with a seamless communication network and an integrated engineering environment.

**Reduce setup and maintenance costs**

**iQ Sensor Solution**

Easily setup and maintain various types of sensors. Maintenance and design costs can be reduced as compatible iQSS partner sensors can be managed together.
For further details, please refer to the "Mitsubishi Integrated Solution e-F@ctory", "IQ Platform Integrated Automation Concept", and "IQ Sensor Solution" catalogs.

L(NA)16012E, L(NA)08340ENG, L(NA)16029ENG

**e-F@ctory Alliance**

The e-F@ctory Alliance is an ecosystem offering best-in-class solutions by combining products between Mitsubishi Electric and its various partners. Close collaboration with such partners broaden the choices for the customer and realize the best solution possible.
MELSEC

Comprehensive controller lineup available to meet customers’ requirements, from small-scale and stand-alone to medium- and large-scale systems

Application-specific CPUs

- Safety CPU*
- Process/Redundant CPU
- C Controller
- Motion CPU

These best-in-class CPUs, integrated into the iQ Platform, are designed for specific needs across various different industry areas.

*1: RISCPU-SET includes both a safety CPU and safety function module
Medium- to large-scale control

**MELSEC iQ-R Series**
A next-generation programmable automation controller (PAC), the MELSEC iQ-R Series incorporates a revolutionary high-speed system bus that improves productivity through advanced performance and functionality.

**MELSEC-Q Series**
The first to incorporate the multiple CPU architecture, the MELSEC-Q Series wide-range of CPUs enables control of multiple operations, improving the performance and scalability of the overall production system.

Small- to medium-scale control

**MELSEC-L Series**
The MELSEC-L Series is a baseless highly scalable controller ideal for applications having limited space. With various I/O functionality embedded into the CPU head, exceptional cost versus performance is achieved in a compact body.

Small-scale and stand-alone

**MELSEC iQ-F Series**
Designed to provide outstanding performance and superior drive control, the MELSEC iQ-F Series is a high-performance compact-class controller with a rich assortment of integrated functions.

**MELSEC-F Series**
Incorporating abundant features with a flexible system configuration, the MELSEC-F Series has a power supply, CPU and I/Os into a single compact body. Furthermore, a diverse range of options are available to further expand its capabilities.
MELSEC Designed with automation in mind

Mitsubishi Electric offers a wide range of controllers capable of satisfying the diversified application needs in various industries. The high-speed, high-accuracy controllers in the MELSEC series covers them all, providing highly flexible cost-effective solutions.

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- **iQ-R**: MELSEC iQ-R Series
- **Q**: MELSEC-Q Series
- **L**: MELSEC-L Series
- **iQ-F**: MELSEC iQ-F Series
- **F**: MELSEC-F Series
- **S**: Safety
- **P**: Process/Redundant system
- **C**: C Controller
- **M**: Servo system controller
- **R**: Robot controller
- **N**: CNC CPU

### Automotive

![Automotive Image]

Improve productivity and realize flexibility in different automotive assembly lines with high-accuracy motion control, including linear/circular interpolation and electric cam profile.

### Food and beverage, CPG

![Food and beverage Image]

Realize improvements in various packaging applications such as high-speed filling, which requires a highly accurate, continuous feed rate and precision.

### Pick-and-place

![Pick-and-place Image]

Achieve highly precise, fast and accurate placement of components in various sizes and shapes such as that required by SMT pick-and-place equipment, further improving productivity.

### Automated warehouse

![Automated warehouse Image]

Realize advanced logistics coordination and eliminate errors in repetitive processes. Servo-based high-speed material handling and highly accurate positioning improving productivity and reduce energy consumption.

### Semiconductor

![Semiconductor Image]

Reduce maintenance costs using the high-durability MELSEC Series. Having the compact, robust design desired for semiconductor manufacturing, MELSEC products solve the small footprint, high-performance requirements.

### Flat panel display (FPD)

![Flat panel display Image]

Improve the large data bandwidth and high performance requirements common in FPD manufacturing processes using MELSEC’s integrated control platform. The integrated controller and network solution offer increased flexibility and enhanced performance.
Chemical

Improve control of processes involving chemical manufacturing using highly scalable solutions that integrate process control and factory automation.

Renewable energy

Easily integrate renewable energy plant management utilizing plant-wide data acquisition and extensive real-time control, thereby reducing overall investment and maintenance costs.

Printing

Realize high-speed, high-quality printing through various solutions offered depending on the printing process involved such as roll paper feed-in, offset printing, binding, and sortation.

Machine tool

Improve productivity, operating efficiency and overall equipment effectiveness using the scalable control of MELSEC products, supporting tasks such as drilling, grinding, and milling.

Building automation

Increase security and ensure effective use of energy management capabilities by supporting various building automation protocols, resulting in a reduced carbon footprint.

Injection molding

Achieve reductions in machine operation costs and improve productivity by integrating MELSEC controllers that utilize an easy-to-use control platform combined with highly accurate motion control.

General automation

Alternative automation applications such as automatic car washes and automated hydroponic farming require a high-level of automation similar to industrial solutions.
## MELSEC Selection Guide

### Controller lineup

<table>
<thead>
<tr>
<th>Series</th>
<th>Modular type</th>
<th>Basic type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MELEQC-Q/R</td>
<td>MELEQC-Q</td>
</tr>
<tr>
<td>Lineup</td>
<td>PAC (Programmable automation controller)</td>
<td>Programmable controller CPU</td>
</tr>
<tr>
<td></td>
<td>● Modular type</td>
<td>● Machine control</td>
</tr>
<tr>
<td></td>
<td>● Programmable controller CPU: 5 models</td>
<td>● Machine control</td>
</tr>
<tr>
<td></td>
<td>● CC-Link IE embedded CPU: 5 models</td>
<td>● Machine control</td>
</tr>
<tr>
<td></td>
<td>● Safety CPU: 4 models</td>
<td>● Machine control</td>
</tr>
<tr>
<td></td>
<td>● Process CPU: 4 models</td>
<td>● Machine control</td>
</tr>
<tr>
<td></td>
<td>● C Controller: 1 model</td>
<td>● Machine control</td>
</tr>
<tr>
<td></td>
<td>● Motion CPU: 3 models</td>
<td>● Machine control</td>
</tr>
</tbody>
</table>

### Control method
- Stored program cyclic operation
- Stored program cyclic operation
- Stored program cyclic operation

### I/O control mode
- Refresh mode
- Refresh mode
- Refresh mode

### Programming language
- Ladder diagram
- Structured text (ST)
- Function block (FB)
- Function block diagram (FBD/LD)

### Engineering environment
- MELSOFT GX Works3
- MELSOFT MT Works2
- MELSOFT PX Developer
- MELSOFT MT Works2
- CW Workbench
- MELSOFT GX Works2

### Operating ambient temperature
- 0...55°C (0°C~15°C) **
- 0...55°C
- 0...55°C

### General specifications/conformed standards
- International safety standards: ISO 13849-1 PL e, IEC 61508 SIL 3 **
- Standard on corrosive atmosphere: UL 6950-3-3 IEC 6950-3-3 (30C)
- UL: Underwriters Laboratories Listing
- LR: Lloyd’s Register of Shipping approval
- DNV: Norwegian Maritime approval
- RINA: Italian Maritime approval
- NK: ClassNK approval
- ABS: American Bureau of Shipping approval
- BV: Bureau Veritas approval
- GL: Germanischer Lloyd approval

### Key features/functions
- Line manufacturing
- Distributed control
- Large-scale I/O control
- Security
- Inter-modular sync
- Built-in database
- Integrated network
- Multiple CPU
- ● Line manufacturing
- ● Distributed control
- ● Large-scale I/O control
- ● Security
- ● Inter-modular sync
- ● Built-in database
- ● Integrated network
- ● Multiple CPU

---

1: Supports redundant system when paired with W/RFPM
2: SFC is not supported in redundant mode and by safety CPU
3: Does not support QJ3UC8CPU and QJ3UC6CPU only
4: Supports QJ3UDIC6CPU and QJ3UC6CPU only
5: Supports QJ3UDIC6CPU and QJ3UC6CPU only
6: Does not support QJ3UDIC6CPU only
7: Supports the user Ethernet port of QJ4DHICP0U-V/5VLS and QJ4DHICP0U-V/5VLS
8: Supports QJ3UDIC6CPU and QJ3UC6CPU only
9: Supports QJ3UDIC6CPU and QJ3UC6CPU only
10: Supports QJ3UDIC6CPU and QJ3UC6CPU only
11: Supports FX series only

*1: Supports redundant system when paired with W/RFPM
*2: SFC is not supported in redundant mode and by safety CPU
*3: Does not support QJ3UC8CPU and QJ3UC6CPU only
*4: Supports QJ3UDIC6CPU and QJ3UC6CPU only
*5: Supports QJ3UDIC6CPU and QJ3UC6CPU only
*6: Does not support QJ3UDIC6CPU only
*7: Supports the user Ethernet port of QJ4DHICP0U-V/5VLS and QJ4DHICP0U-V/5VLS
*8: Supports QJ3UDIC6CPU and QJ3UC6CPU only
*9: Supports QJ3UDIC6CPU and QJ3UC6CPU only
*10: Supports QJ3UDIC6CPU and QJ3UC6CPU only
*11: Supports FX series only
### Compact type

<table>
<thead>
<tr>
<th>Model</th>
<th>FX5U/FX5UC</th>
<th>FX5S/3S</th>
<th>FX5U/FX5UC</th>
<th>FX5S/3S</th>
<th>FX5S/3S</th>
</tr>
</thead>
<tbody>
<tr>
<td>FX5U/FX5UC</td>
<td>FX5S/3S</td>
<td>FX5S/3S</td>
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<td>FX5S/3S</td>
<td>FX5S/3S</td>
<td>FX5U/FX5UC</td>
</tr>
</tbody>
</table>

### Stored program cyclic operation

- Ladder diagram
- Structured text (ST)
- Function block diagram (FB2/LD)
- Function block (FB)

### Refresh mode

- Function block (FB)
- Ladder diagram
- Structured text (ST)
- Function block diagram (FB2/LD)
- Function block (FB)

### MELSOFT GX Works3

- FX5U/FX5UC: 6 models
- FX5S/3S: 12 models

### MELSOFT GX Works2

- FX5U/FX5UC: 24 models
- FX5S/3S: 2 models

### Other Features

- Supports Q programming
- Supports Q programming
- Supports Q programming
- Supports Q programming
- Supports Q programming

### Notes

- Only supported when used together with extended temperature range main/extension base units
- Supports Q programming
- Supports Q programming
- Supports Q programming
- Supports Q programming
- Supports Q programming

### Additional Information

- For protection against aggressive atmosphere and gases, products with a conformal coating (JIS C 60721-3-3/IEC 60721-3-3 Class 3C2) are available on request.
Revolutionary, next-generation controllers building a new era in automation

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*1, 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.

*1: Total Cost of Ownership

**Process**
- High-availability process control in a scalable automation solution
  - Extensive visualization and data acquisition
  - High-availability across multiple levels
  - Easier maintenance and programming with integrated engineering software

**Safety**
- System design flexibility with integrated safety control
  - Integrated generic and safety control
  - Consolidated network topology
  - Complies with international safety standards

**Intelligence**
- Extensive data handling from shop floor to business process systems
  - Direct data collection and analysis
  - C/C++ based programming
  - Collect factory data in real-time
  - Expand features using third party partner applications

**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

**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

**Maintenance**
- Reduce maintenance costs and downtime utilizing easier maintenance features
  - Visualize entire plant data in real-time
  - Extensive preventative maintenance functions embedded into modules

**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

**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

**Security**
- Robust security that can be relied on
  - Protect intellectual property
  - Unauthorized access protection across distributed control network

**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
**Advanced performance/functions improve productivity**

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.

**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.

**Powerful security features protecting intellectual property**

Functions such as hardware security key identification for protecting programs and an IP filter for preventing unauthorized access to the control system through the network are incorporated to protect customers intellectual property whilst ensuring secure and safe control throughout the plant.

**Intuitive and easy engineering**

With GX Works3 graphic based programming cannot be made any easier with various intuitive features such as graphic based system configuration, and an extensive module library provided as standard. In addition to multiple language support realizing a global engineering tool required for current automation needs.
A wide range of modules supporting various different applications

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.

### System configuration

- **CPU modules**
  - Install up to four CPU modules together
  - Programmable controller CPU module
  - CC-Link IE embedded CPU
  - Motion CPU module
  - Process CPU module
  - Safety CPU
  - C Controller module
  - Multi-CPU is not supported.
  - Product package includes a safety CPU and safety function module.

- **Base units**
  - Main base unit
  - Extended temperature range main base
  - Extension base unit
  - Extended temperature range extension base
  - An extension base strictly for I/O and intelligent function modules.

- **Power supply module**
  - Power supply module

- **I/O & intelligent function modules**
  - Input module
  - Output module
  - I/O combined module
  - Analog input module
  - Analog input module (Channel isolation)
  - Analog output module
  - Analog output module (Channel isolation)
  - Temperature input module
  - Temperature control module
  - Simple motion module
  - Positioning module
  - High-speed counter module
  - Ethernet interface module
  - CC-Link IE Control Network module
  - CC-Link IE Field Network master/local module
  - CC-Link IE Field remote head
  - AnyWinSLINK Master Module (RTU)
  - CC-Link system master/local module
  - Serial communication module
  - High-speed data logger module
  - C intelligent function module

### MELSEC iQ-R series

- **SRAM cassette connector**
- **SD memory card slot**
- **Ethernet port**
  - 100BASE-TX/10BASE-T
- **CC-Link IE connection port**
  - 1000BASE-T/100BASE-TX/10BASE-T
- **USB port**
  - High-speed USB2.0 (miniB)
- **Extended SRAM cassette**

**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

**EnCPU modules**

- **R04ENCPU**
  - Program capacity 40K steps, CC-Link IE embedded
- **R08ENCPU**
  - Program capacity 80K steps, CC-Link IE embedded
- **R16ENCPU**
  - Program capacity 160K steps, CC-Link IE embedded
- **R32ENCPU**
  - Program capacity 320K steps, CC-Link IE embedded
- **R120ENCPU**
  - Program capacity 1200K steps, CC-Link IE embedded

**Base units**

- **Main base unit**
- **Extended temperature range main base**
- **Extension base unit**
- **Extended temperature range extension base**
- **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).
**Integrated Safety control**

The MELSEC iQ-R Series safety control system consists of a safety CPU that is compliant with international safety standards, ISO 13849-1 PL e and IEC 61508 SIL 3 and can execute both safety and general logic in the same CPU. The CPU module paired with the safety function module enables safety control and can be installed on a standard base unit realizing integration into an existing or new control system. Safety I/Os are controlled via CC-Link IE Field network connected to dedicated safety remote I/Os.

- **CPU**
  - Safety CPU

- **Safety remote I/O**
  - Safety remote I/O module

**Highly-scalable redundant control**

The MELSEC iQ-R Series redundant control system is based on a dual-system architecture where all modules on a primary system are duplicated onto a second or standby system with a tracking cable connecting the systems together. Both systems consist of the process CPU module and redundant function module, with the CPU module able to execute standard logic and process control. Remote I/O is controlled via the CC-Link IE Field network, and dedicated base units supporting redundant power supplies come in either standard or extended temperature models.

- **CPU, redundant function module**
  - Process CPU
  - Redundant function module

- **Power supply modules, base units**
  - Redundant power supply main base unit
  - Extended temperature range redundant power supply main base unit
  - Redundant power supply extension base unit
  - Extended temperature range redundant power supply extension base unit

*Only these base units support redundant power supply modules. Can utilize standard MELSEC iQ-R Series modules.*
**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.

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**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 5766K 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.

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*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)

<table>
<thead>
<tr>
<th>ID</th>
<th>Name</th>
<th>Mix A (%)</th>
<th>Mix B (%)</th>
<th>Mix C (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0001H</td>
<td>Red</td>
<td>20</td>
<td>60</td>
<td>20</td>
</tr>
<tr>
<td>0002H</td>
<td>Blue</td>
<td>50</td>
<td>30</td>
<td>20</td>
</tr>
</tbody>
</table>

Unicode text file import
Recipe data retrieved from DB

Database (reporting tool)

<table>
<thead>
<tr>
<th>Serial no.</th>
<th>ID</th>
<th>Date/Time</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>0001234H</td>
<td>0001H</td>
<td>00/01/20YY 15:40:30</td>
<td>81</td>
</tr>
<tr>
<td>0001235H</td>
<td>0002H</td>
<td>00/01/20YY 15:41:15</td>
<td>79</td>
</tr>
</tbody>
</table>

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.

- Overseas production site
  - Easy setup just by setting trigger conditions
  - Data logged automatically when an error occurs
  - SD memory card
- Domestic development dept.
  - Visual representation of data when error occurs
  - Data sent via email
  - Quicker root cause analysis
Multi-discipline design offers a broad spectrum of automation controllers

Current production requirements are calling for an increase in productivity and carrying out production processes even faster due to an increase in production information such as production results and traceability. The MELSEC-Q Series programmable controller “Universal Model QnU” is ideal for these market needs. High-speed basic instruction processing dramatically increases control system and machine performance. Inheriting the highly robust and easy-to-use design of the Q Series, the MELSEC QnU programmable controller opens up new possibilities in automation.

Program capacity (step)

- 10K
- 15K
- 20K
- 25K
- 30K
- 40K
- 50K
- 60K
- 100K
- 130K
- 200K
- 260K
- 500K
- 1000K

Basic operation processing speed (ms)

- 40
- 20
- 9.580
- 60
- 120
- 1.9

System configuration

- CPU modules
  - Programmable controller CPU
  - Motion CPU
  - Process CPU
  - Redundant CPU
  - C Controller
  - Robot controller
  - CNC CPU

- Base units
  - Main base (3, 5, 8, 12)
  - Multiple CPU high-speed main base (5, 8, 12)
  - Slim type main base (2, 3, 5)
  - Redundant power main base (8)
  - Extension base (2, 3, 5, 8, 12)
  - Redundant power extension base (8)
  - Redundant type extension base (5)

- Power supply modules
  - Power supply
  - Power supply with life function
  - Slim type power supply
  - Redundant power supply module
  - Redundant power supply

- I/O & Intelligent function modules
  - I/O module
  - Interrupt module
  - Analog I/O module
  - Load cell input module
  - CT input module
  - Temperature input module
  - Temperature control module
  - Loop control module
  - Simple motion module
  - Positioning module
  - High-speed counter module

- Power supply module
  - Channel isolated pulse input module
  - Energy measuring module
  - Isolation monitoring module
  - ME interface module
  - High-speed data logger module
  - Web server module
  - Intelligent communication module
  - Network module

*1: The maximum number of modules that can be installed depends on the CPU configuration.
*2: Except redundant CPU.
*3: The number within brackets is the number of slots.
High-speed, high-accuracy machine control

To achieve truly high-speed synchronized control between multiple CPUs, a dedicated bus is used, independent of sequence program operation (0.88 ms operation cycle)*1. This multiple CPU high-speed communication is synchronized with motion control to maximize computational efficiency. Additionally, the performance of the motion control CPU is twice as fast as the previous model, ensuring high-speed, high-accuracy machine control.

Large data volume at high-speed

Conventionally, continuous access to the standard RAM and SRAM card’s file register area could not be achieved which had to be reflected in the user program. When an 8 MB extended SRAM cassette*2 is installed in the High-Speed Universal model QCPU, the standard RAM can be as one continuous file register with up to 4736K words capacity, simplifying the user program. Even if device memory is insufficient, the file register area can be expanded easily by installing an extended SRAM cassette.

Easy logging without a program*3

Logging can be easily performed using the Wizard setting tool. The data collected can be saved in CSV format on an SD memory card and be displayed on a computer or GOT (HMI). Various reference materials including daily and general reports can be created easily using the saved CSV file. This data can be used for a wide variety of applications requiring traceability, production data, etc.
**Convenience that fits in the palm of your hand**

The L Series is a compact-class controller, part of the MELSEC products renowned for exceptional cost verses performance and strong reliability. It provides the performance, functions, and capabilities required for today’s demanding applications in a small package. MELSEC-L Series greatly expands the range of functionality traditionally associated with compact programmable controllers and through user-centric design, pushes the limits of ease of use.

### Program capacity (step)

<table>
<thead>
<tr>
<th>Capacity</th>
<th>L02CPU-P</th>
<th>L02CPU</th>
<th>L06CPU-P</th>
<th>L06CPU</th>
<th>L26CPU-PBT</th>
<th>L26CPU-BT</th>
<th>L26CPU-P</th>
<th>L26CPU</th>
</tr>
</thead>
<tbody>
<tr>
<td>260K</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60K</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20K</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Basic operation processing speed (ns)

- **L02CPU-P**
- **L02CPU**
- **L06CPU-P**
- **L06CPU**
- **L26CPU-PBT**
- **L26CPU-BT**
- **L26CPU-P**
- **L26CPU**

### Example of largest system configuration with L26CPU-BT

- Main block: 10 modules
- Extension block 1: 11 modules
- Extension block 2: 11 modules
- Extension block 3: 10 modules
- Branch module
- Power supply module
- Option

### CPU module

- Programmable controller CPU (sink type/source type)
- Built-in communication interface: Ethernet, Ethernet + CC-Link

### Power supply modules

- Power supply module (sink type)

### Branch/extension modules

- Branch module
- Extension module

### Modules

- I/O module
- Analog module
- Multiple input (voltage/current/temperature) module
- Temperature input module
- Temperature control module
- Simple motion module
- Positioning module
- High-speed counter module
- Flexible high-speed I/O control module
- Network module

---

1. Total number of I/O, intelligent function, and network modules. Does not include branch module.
2. Total number of I/O, intelligent function, network, and branch modules. Does not include power supply module, CPU module, display unit, extension module, RS-232 adapter, RS-422/485 adapter and END cover.
Several built-in I/O features and communication interfaces come as standard.

In its compact body, a large variety of I/O features are built in as standard. Due to an abundance of advanced functionality, L Series CPUs are flexible enough to meet a wide variety of needs. With a display unit enabling routine operation without a computer, an SD memory card, and easy-to-use programming environment, the L Series dramatically improves system designing and system operation and contributes to improving work efficiency. The display unit** shows system statuses and enables setting changes to be made without a program. Even when an error occurs, the error status can be easily checked, assisting troubleshooting on-site.

USB
Display unit**

SD memory card slot**

Built-in I/O functions
- Positioning
- High-speed counter
- Pulse catch
- Interrupt input
- General-purpose I/O
- Built-in CC-Link connectivity**

*1: Option (sold separately). Not compatible with L02SCPU (-P).
*2: Supports L02CPU (-P), L06CPU(-P), L26CPU(-P), L06CPU(-P) BT.
*3: Supports L26CPU (-P) BT.

Gain more flexibility with an integrated system bus structure

L Series modules do not require a base unit. Having an integrated system bus structure, the L Series can be attached directly to a DIN rail by using the minimal required space. Furthermore, adding modules to the system is not restricted by the number of available base unit slots, and costs may be reduced due to the elimination of extension base units.

Improved debugging for system startup and troubleshooting

Device values in the CPU can be monitored in real-time with a detailed setting including interval and timing. Additionally, changes in the device value can be monitored within the GX LogViewer trend graph and are exportable to a computer for further analysis.
New micro PLC designed on the concept of ...

Outstanding Performance

- Completely redesigned, high-speed system bus
- Extensive built-in functions
- Enhanced security functions
- No internal battery required

Superior Drive Control

- Built-in positioning (4-axis 200 kpps)
- Simple linear interpolation
- Synchronous control with Simple Motion unit (4-axis) without requiring dedicated positioning software

Intuitive Programming Environment

- Easy programming by drag and drop
- Reduced development time with module FB
- Parameterized setup for a variety of functions

System configuration

1. Number of input/output points (including input/output occupied points) Up to 256 points

2. Number of remote input/output points for CC-Link Up to 384 points

*1: Up to two extension power supply modules are connectable.
Key features/functions

- Inter-modular sync
- Built-in database
- C programming

Integrated functions

The high-speed system bus realizes faster communications speed of up to 150 times*, increasing overall machine performance. The CPU module has many integrated features (Ethernet, RS-485 (MODBUS®RTU supported), analog I/O*, SD memory card slot, etc.) providing greater flexibility and helping to reduce system costs.

Program capacity: 64K steps
Instruction processing speed: 34 ns
Fixed cycle interrupt min.: 1 ms
PC MIX value: 14.6 instructions/µs

Easy parameter setup

With the MELSEC iQ-F, setting of parameters has been made even easier by the integration of parametrization functionality into GX Works3 engineering software. Setting of parameters for built-in functions, external devices, and program execution trigger are simply done.

Settable parameters
- CPU parameters, Ethernet port, RS-485 communication port, I/O response time, expansion board, memory card, security key functions, etc.
- Expansion adapter, intelligent function module settings

Standard function/function blocks

Approximately 110 types of standard function and functions blocks are available to utilize in the control program. These functions/function blocks are conveniently located as parts library further helping to reduce overall engineering time.

*1: Compared to FX3U Series.
*2: Not available in FX5UC.
Positioning solution

Built-in positioning (200 kpps, 4-axis built-in)
- Positioning that support 20 μs high-speed startup

FX5U/FX5UC features powerful positioning functionality with 8-channel high-speed pulse inputs and 4-axis pulse outputs. Positioning operations including interrupt, variable speed, and simple interpolation, and can easily be set up using tables.

Simple motion module (4-axis module)
- Positioning control via SSCNET III/H

Positioning control is easily executed using a point table. The machine can coat the work piece by using a combination of linear interpolation, 2-axis circular interpolation, and continuous trajectory control. A smooth trajectory can be traced with the S-curve acceleration/deceleration function.
Advanced motion control

Making Simple Motion with compactly packed extra functions
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 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 performed (start/stop) for each axis, allowing synchronous and positional control axes within the same program. Up to 4 control axes can be synchronized when using the synchronous encoder, such as that used for packing 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 dimension, etc.

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.
The third generation of micro programmable controller, the FX3 Series

The FX Series is renowned for its speed, capacity, performance and extensive features. Integrated with many features including analog, communication, Ethernet, and positioning, the FX3 Series realizes high-performance in many different applications.

### Program capacity (steps)

<table>
<thead>
<tr>
<th>Number of control points</th>
<th>FX3S</th>
<th>FX3G</th>
<th>FX3GC</th>
<th>FX3U</th>
<th>FX3UC</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>64K</td>
<td>32K</td>
<td>4K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>128(256**)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>256(384**)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*1: Number of maximum I/O points including remote I/O.

### System configuration

#### Main units
- FX3S/FX3SC
- FX3U/FX3UC

#### Special adapters
- Analog I/O
- Communication
- Data collection
- 8-point variable analog potentiometer
- Extended I/O
- Special adapter connection

#### Expansion units
- I/O extension block
- Analog I/O block
- Temperature control block
- Temperature sensor input block
- Positioning control block
- Communication/network block
- Extension power supply unit

#### Options
- Display module
- Memory cassette
- Battery
- Extension cable
- Conversion adapter

*2: Connectable special adapters, extension units, expansion boards, and other options differ by the models. For details, please refer to the manual of the relevant product.
Extensive built-in functions

Including high-speed counter, positioning, high-speed I/O, communication ports, 24 V DC power supply, and other built-in functions, the main control unit can be easily connected with various different external control devices.

Combining with other Mitsubishi Electric factory automation products

In addition to its extensive built-in functions, the FX Series is highly scalable by being connectable to various different devices such as analog, positioning, communication networks, and sensor control through its expansion unit capability.

Compatibility

FX Series compatibility

The FX3 Series shares the same size with the FX1S, FX1N/FX1NC, and FX2N/FX2NC Series supporting various different extension blocks.

Reusing the existing programs

The dedicated programming tool enables any existing program to be converted, just as simply by changing the PLC type.
Integrated safety control offering a total system solution

Ensuring the safety of personnel on the factory floor is a fundamental requirement of manufacturing plants and requires stringent safety regulations. To adhere to this safety code for control systems, the MELSEC iQ-R Series is equipped with a safety CPU that is compliant with international safety standards, enabling safety devices to be connected via the CC-Link IE Field network. The entire system can be programmed using GX Works3 programming software as standard.

Safety communication on the same network

Establishing a safety communication is as easy as configuring a CC-Link IE Field network, which has the long-standing reputation as a versatile gigabit network. The physical layer and data communications is based on Ethernet technology and enables commercial cables, adapters, and hubs to be used. The safety communication also takes advantage of highly flexible features offered by CC-Link IE Field network.
The MELSEC process control system consists of a number of specialized controllers specifically designed for use in process automation such as petrochemical refinement and food/beverage production. The CPUs include a specialized set of proportional-integral-derivative (PID) algorithms, and are highly flexible utilizing standard automation control system features rather than highly-specialized distributed control system (DCS) solutions that can be costly to replace and maintain. The system is available in two types, general and high-reliability; the latter of which is in applications such as water treatment and waste incineration.

### Optional Features

**Factors unpredictable by Mitsubishi Electric:**
- Chemical, steel, environmental and water treatment plants, DCS replacement, etc.
- Food processing equipment, semiconductor systems, air-conditioning equipment, industrial furnaces, etc.

**Factors unpredictable by other duties:**
- Chemical, steel, environmental and water treatment plants, DCS replacement, etc.
- Food processing equipment, semiconductor systems, air-conditioning equipment, industrial furnaces, etc.

<table>
<thead>
<tr>
<th>Program capacity</th>
<th>Factors unpredictable by Mitsubishi Electric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discrete process control</td>
<td>Chemical, steel, environmental and water treatment plants, DCS replacement, etc.</td>
</tr>
<tr>
<td>Continuous process control</td>
<td>Food processing equipment, semiconductor systems, air-conditioning equipment, industrial furnaces, etc.</td>
</tr>
</tbody>
</table>

**Program capacity**

<table>
<thead>
<tr>
<th>Program capacity</th>
<th>Factors unpredictable by Mitsubishi Electric</th>
</tr>
</thead>
<tbody>
<tr>
<td>R12PCPU (120K steps)</td>
<td>Chemical, steel, environmental and water treatment plants, DCS replacement, etc.</td>
</tr>
<tr>
<td>R08PCPU (80K steps)</td>
<td>Food processing equipment, semiconductor systems, air-conditioning equipment, industrial furnaces, etc.</td>
</tr>
<tr>
<td>Q25PHCPU (252K steps)</td>
<td>Chemical, steel, environmental and water treatment plants, DCS replacement, etc.</td>
</tr>
<tr>
<td>Q25PRHCPU (252K steps)</td>
<td>Food processing equipment, semiconductor systems, air-conditioning equipment, industrial furnaces, etc.</td>
</tr>
<tr>
<td>R08PCPU (80K steps)</td>
<td>Chemical, steel, environmental and water treatment plants, DCS replacement, etc.</td>
</tr>
<tr>
<td>Q25PHCPU (252K steps)</td>
<td>Food processing equipment, semiconductor systems, air-conditioning equipment, industrial furnaces, etc.</td>
</tr>
</tbody>
</table>

**Optional Features**

- Process features such as process tag and faceplate will be supported in the future.
- Transition from existing control systems based on MELSEC-Q Series is simpler by using the RQ extension base unit.

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1. The maximum amount of usable loops may change depending on the actual program size used. Please refer to the relevant manuals for further details.

2. Process features such as process tag and faceplate will be supported in the future.
**Q Series**

**iQ-R Series**

**Application Specific**

Robust and deterministic alternative to microcomputer/computer based systems

The MELSEC C Controller product range is capable of programming using C language and offers a realistic alternative to mainstream microcomputer/computer based systems. Being part of the MELSEC Series, the C Controller utilizes its robust industrial design and long product life cycle, offering an easy way to realize a cost-efficient solution together with supporting partner products, open source and custom-made applications. This lineup is further enhanced with the new MELSEC iQ-R Series multi-core ARM®-based C Controller.

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**I/O control**

Replacing microcomputer

Information processing

Replacing computer

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

Utilizing the 3MPU architecture with integrated display port, installation of an OS specific to the application is possible, realizing an advanced information-processing control system.

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**Generic platform utilizes partner products and open source applications**

Highly customizable solution enables the integration of partner products, open source applications, and OS-independent capabilities onto a generic open platform.

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**Reduce common overhead expenses realizing a cost effective solution**

The C Controller platform is a solution that realizes computer-level functionality without the burden of high maintenance costs usually associated with computers. In addition, by being based on the MELSEC control system, the C Controller has a robust design that is ideal for industrial environments.

---

**Common drawbacks associated with embedded and industrial computers**

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

**Merits of using MELSEC-Q Series hardware**

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

For further details, please refer to "iQ Platform C Controller" catalog and "MELSEC iQ-R Series e-F@ctory Advanced Information Modules" Broadcast. L(NA)08165E, R005ENG

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For further details, please refer to "iQ Platform C Controller" catalog and "MELSEC iQ-R Series e-F@ctory Advanced Information Modules" Broadcast. L(NA)08165E, R005ENG
Lineup capable of responding to versatile sizes and applications

A full lineup of servo system controllers from Simple Motion modules to Motion CPUs supports all types of system configurations. Simple Motion modules are ideal for simple positioning control, and Motion CPUs are capable of controlling high-speed, multi-axis systems.

**Simple motion module**

- **MELSEC iQ-R Series**
- **MELSEC-Q Series**
- **MELSEC-L Series**
- **MELSEC iQ-F Series**

- Simple positioning is executed simply by setting sequence programs
- Advanced synchronous control and cam control are available
- Safety system can be configured using the Functional Safety Unit.

**Motion CPU**

- **MELSEC iQ-R Series**
- **MELSEC-Q Series**

- Increases productivity by supporting the iQ Platform
- Advanced synchronous control and cam control are available
- Safety system can be configured using the Functional Safety Unit.

**Extensive motion control**

Positioning, speed-torque (press-fit) and advanced synchronous control among other forms of motion control for various equipment, including X-Y table, packaging and press-fitting machines. Ideal features designed to provide optimal solutions for machines and applications.

**Control**

Versatile motion control support different machine operations.

**Functions**

Select the functions best suited to match equipment requirements from an extensive list of options.

- Cam auto-generation
- Mark detection function
- Optional data monitor
- Absolute position system
- Unlimited length feed
- Target position change function
- Safety observation function
- M-code output
- Digital oscilloscope function
- Master-slave operation
- Vision system

**Servo Amplifiers**

High-accuracy positioning and smooth constant-speed operation can be achieved with a combination of the MELSEC iQ-R series servo system controllers and MELSERVO-J4 series servo amplifiers.
Leveraging the integration of robots into manufacturing lines

By integrating the use of MELFA robots into the iQ Platform, it’s possible to leverage communication with the automation controller, motion control and HMI. Utilizing the multi-CPU capabilities and integrated network/engineering environment, optimizing productivity can be achieved regardless of how complex or demanding the application.

- **Fulltime**
  - Supports monitoring varying application of forces improving stability
  - Reduce temporary line shutdowns through detecting errors and auto-recovery
  - Failure prediction by various data

- **Higher productivity**
  - Improved coordinated control between robots prevents interference
  - Multiple hand option supporting a wide range of processes
  - Space-saving by man-machine collaboration

- **Continuous operation**
  - Failure prediction by various data

- **Shorter operation**
  - Multiple hands
  - Interference prevention

- **Addition of models**
  - Enhanced simulation function
  - Failure prediction by various data

- **Shorter startup**
  - Multiple hands
  - Interference prevention
  - Space-saving by man-machine collaboration

- **Cell manufacturing**
  - Detailed display of teaching positions
  - Easy-to-use teaching box
  - Facilitation by iQ Monozukuri
  - Streamlined positioning jig
  - Enhanced simulation function

- **Flexibility**
  - Detect multiple part variations through 2D/3D vision sensor
  - Streamlined positioning jig
  - Enhanced simulation function
  - Failure prediction by various data

- **Increase usability**
  - Enhanced simulation function
  - Failure prediction by various data

- **Function**
  - Improved coordinated control between robots prevents interference
  - Multiple hand option supporting a wide range of processes
  - Space-saving by man-machine collaboration

- **Facilitation**
  - Integrated into iQ Works
  - Detailed display of teaching positions
  - Easy-to-use teaching box
  - Facilitation by iQ Monozukuri

- **Force sensor**
  - 3D vision sensor
  - 2D vision sensor

- **GOT (HMI)**
  - Integrated into iQ Works
  - Detailed display of teaching positions
  - Easy-to-use teaching box
  - Facilitation by iQ Monozukuri
  - Streamlined positioning jig
  - Enhanced simulation function

- **Robot CPU**
  - Detailed display of teaching positions
  - Easy-to-use teaching box
  - Facilitation by iQ Monozukuri

- **Robot controller**
  - Space-saving by man-machine collaboration
  - Integrated into iQ Works
  - Detailed display of teaching positions
  - Easy-to-use teaching box
  - Facilitation by iQ Monozukuri

For further details, please refer to “Mitsubishi INDUSTRIAL ROBOT MELFA F Series” catalog.
Integrating high-performance CNCs and high-speed programmable controllers

Integrate high-performance CNCs with the iQ Platform and experience substantially enhanced overall control system operation time, improving performance and enhancing productivity. Using standard modules contributes to reducing maintenance costs even further as replacements are generally available.

iQ Platform makes it possible to optimize controller use for various lines.

<table>
<thead>
<tr>
<th>Power train machining</th>
<th>Power train assembly</th>
<th>Welding</th>
<th>Final assembly</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLC</td>
<td>PLC</td>
<td>PLC</td>
<td>PLC</td>
</tr>
<tr>
<td>CPU</td>
<td>CPU</td>
<td>CPU</td>
<td>CPU</td>
</tr>
<tr>
<td>GOT (HMI)</td>
<td>GOT (HMI)</td>
<td>GOT (HMI)</td>
<td>GOT (HMI)</td>
</tr>
<tr>
<td>CNC</td>
<td>CNC</td>
<td>CNC</td>
<td>CNC</td>
</tr>
<tr>
<td>Servo Drive</td>
<td>Servo Drive</td>
<td>Servo Drive</td>
<td>Servo Drive</td>
</tr>
<tr>
<td>Spindle Drive</td>
<td>Spindle Drive</td>
<td>Spindle Drive</td>
<td>Spindle Drive</td>
</tr>
</tbody>
</table>

High-speed communication between CNCs and programmable controllers

High-speed CPU processing supported by fast communication bus speeds enable high-speed communication between controllers.
Programmable controller 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**
Latest generation of software available for the MELSEC iQ-R and iQ-F Series control systems. Includes a graphic-based system configuration, integrated motion control setup, multiple language support, in addition to extensive diagnosis and troubleshooting functions.

**MELSOFT GX Works2**
Incorporating backward compatibility of programs created with GX Developer; GX Works2 further improves its functionality resulting in reduced engineering costs.

**HMI/GOT screen design software**

**MELSOFT GT Works3**
The GOT (Graphic Operation Terminal) screen creation software is designed with three main features; Simplicity, Graphics Design, and Easy-Usability, further helping to create graphic screens in fewer steps.

**Motion controller engineering software**

**MELSOFT MT Works2**
The motion control design and maintenance software includes intuitive graphic based programming together with a digital oscilloscope simulator.

**Robot engineering software**

**MELSOFT RT ToolBox2 mini**
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**
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.

For further details, please refer to "MELSOFT iQ Works" catalog.
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 and MELSEC iQ-F Series control system. It includes many new features and technologies to ensure a trouble-free engineering environment solution.

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

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 to the device comment language switching feature.

Navigation window
Easily access project components
Organize program file list.

Module configuration
Easily parameterize each module directly from the configuration editor.

Module list
Simply drag & drop modules directly into the module configuration.
Tab view multiple editors
Conveniently work on multiple editors without having to switch software screens.

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

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

Reduce engineering time by 60%*1

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

For further details, please refer to "Programmable controller engineering software MELSOFT GX Works3".
Programmable controller engineering software

Easily setup intelligent function modules

Title display enables program contents to be checked at a glance

Project tree view showing the engineering process

Easily switch connection targets within the same window

Sample comments are available to quickly input comments

A comment for a word device can be set at bit level, differentiating similar devices

In-line ST for directly inserting operation instructions into the ladder

Offline debugging with hardware emulation

Intuitive cross-reference list displays devices used in the program
Engineering software designed for easy usability

GX Works2 has been designed to realize intuitive programming, maintenance, and debugging through various integrated features. The software supports IEC 61131-3 programming amongst the compatible programming languages, making it easy to use across multiple applications. It has an extensive maintenance features set, allowing easy setup of the control system, connected networks, and various intelligent I/O. GX Works2 is designed with customers in mind including consolidated “all-in-one” packaged programming that integrates programming, configuration and simulation tools.

Intuitive project management

The project tree view, which is situated to the left of the docking window, enables easy understanding and management of the entire project. Various features such as viewing titles and handling multiple projects enable a very efficient and cost-effective way to manage projects, substantially reducing the overall engineering time. Project restoration is also easy using the back-up and restore feature.

Extensive program standardization

Program standardization is simplified using function blocks (FBs) within the program. The FBs make it easy to duplicate programming code that can be used multiple times in the project, or for other projects. This reduces programming time and realizes more efficient programming. A function library is also available, enabling standard FBs to be imported into projects, which saves on initial creation time.

Easy maintenance and debugging

Dedicated system monitoring and PLC diagnostics simplify control system maintenance and make error monitoring easy. Various security features are incorporated to protect intellectual property, such as controlling access to projects involving multi-person development teams using hierarchy-dependent access. Debugging using comments and project simulation is fairly easy, requiring no hardware.
Extensive visualization with advanced data connectivity

Big Data analytics requires deterministic data collection, which can be realized by incorporating two key features: SLMP**1 that enables seamless connectivity between devices in the IT layer and on the shop floor; and a high-speed, large-capacity 1 Gbps communications network that enables the handling of large data, such as production, quality and control data between different production processes.

General, motion and safety control integrated into one network

CC-Link IE incorporates generic distributed control, synchronous motion control, and safety control enabling safety communications across multiple safety devices, all on the same network. The topology is quite versatile, based on twisted-pair cables, which enables flexibility in system configuration while helping to keep installation cost low.

Comprehensive diagnosis realizing higher reliability

Disruptions to the control system are kept to a minimum via comprehensive diagnostics functions, high communications integrity owing to the noise-resistant characteristics of the optical cable, and communication re-routing capabilities made possible as the result of using a ring topology. Also, network errors can be rectified quickly by visualizing the network system image using the engineering software**2, and remotely from a GOT (HMI) directly on the machine or production line.
Seamless connectivity within all levels of automation
The backbone of e-F@ctory, leveraging connectivity between the shop floor and IT

CC-Link IE Field network remote module

Input modules

<table>
<thead>
<tr>
<th>DC input</th>
<th>Synchronized communication</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input</strong></td>
<td></td>
</tr>
<tr>
<td>Positive common</td>
<td>Negative common</td>
</tr>
<tr>
<td>Input 32, 16 points</td>
<td>24 V DC</td>
</tr>
<tr>
<td>Screw type</td>
<td>Sensor connector (e-CON)</td>
</tr>
<tr>
<td>Spring clamp terminal block</td>
<td>40-pin connector</td>
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Output modules

<table>
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<tr>
<th>Transistor output</th>
<th>Synchronized communication</th>
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<tbody>
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<td><strong>Output</strong></td>
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<tr>
<td>Sink type</td>
<td>Source type</td>
</tr>
<tr>
<td>Output 32, 16 points</td>
<td>12/24 V DC (0.5A)</td>
</tr>
<tr>
<td>Screw type</td>
<td>Sensor connector (e-CON)</td>
</tr>
<tr>
<td>Spring clamp terminal block</td>
<td>40-pin connector</td>
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I/O combined modules

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<th>Transistor output</th>
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<td><strong>Input</strong></td>
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<tr>
<td>Positive common</td>
<td>Positive/Negative common</td>
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</tr>
<tr>
<td>Input 16 points</td>
<td>24 V DC</td>
<td></td>
</tr>
<tr>
<td>Sink type</td>
<td></td>
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<tr>
<td>Output 16 points</td>
<td>12/24 V DC (0.5A)</td>
<td>12/24 V DC (0.1A)</td>
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<td>Screw type</td>
<td>Sensor connector (e-CON)</td>
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Analog input module

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<tr>
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<tr>
<td><strong>Input</strong></td>
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<td>Voltage/current input</td>
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<tr>
<td>Screw type</td>
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Analog output module

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<td><strong>Output</strong></td>
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<tr>
<td>Voltage/current output</td>
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<tr>
<td>Screw type</td>
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Temperature control module

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<tr>
<th>Isolation between input channels</th>
<th>Transistor output</th>
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<td><strong>Thermocouple input</strong></td>
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<tr>
<td>4 ch</td>
<td>RTD input</td>
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<td>Screw type</td>
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High-speed counter module

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<th>Transistor output</th>
<th>Differential input</th>
<th>Synchronized communication</th>
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<tbody>
<tr>
<td><strong>Input</strong></td>
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<td></td>
<td></td>
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<tr>
<td>200 kpps (DC input)</td>
<td>8 Mpps (Differential input)</td>
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<tr>
<td>Coincidence output</td>
<td>2 ch</td>
<td>Sink type</td>
<td></td>
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<tr>
<td>Screw type</td>
<td>40-pin connector</td>
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Extension modules

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<th>Output module</th>
<th>Transistor output</th>
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<tbody>
<tr>
<td><strong>Input</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive/Negative common</td>
<td>Input 16 points</td>
<td>24 V DC</td>
</tr>
<tr>
<td>Sink type</td>
<td>Source type</td>
<td></td>
</tr>
<tr>
<td>Output 16 points</td>
<td>12/24 V DC (0.5A)</td>
<td></td>
</tr>
<tr>
<td>Screw type</td>
<td>Spring clamp terminal block</td>
<td></td>
</tr>
</tbody>
</table>

Analog input module, Analog output module

| Voltage/current input | 4 ch |
| Screw type | |

Analog output module, Analog output module

| Voltage/current output | 4 ch |
| Screw type | |

Safety remote I/O module, Safety extension output module

| Double wiring Input 16 points | 24 V DC |
| Double wiring Output 4 points | 24 V DC (0.5A) |
| Spring clamp terminal block |
MELSEC History

1980s
- MELSEC-K Series
- MELSEC-310
- MELSEC-008
- MELSEC-007

1990s
- MELSEC-A Series
- MELSEC-K Series
- MELSEC-Q4AR
- MELSEC-Q4AR redundant system
- MELSEC-007

Safety system

Programming machine
- MELSEC-008
- MELSEC-007
- F Series
- FX Series

Engineering environment
- K6GPP
- A6GPP
- A6HGP
- A6PHP
- A7PHP
- A7HGP
- GPPA
  - Personal computer version for A Series
- GPPQ
  - Personal computer version for QnA Series
- GPPQ
  - Personal computer version for QnA Series

Network
- MELSECNET
- MELSECNET/10
- MELSECNET MINI
- MELSECNET II
- CC-Link

MELSEC History
- Designed with automation in mind
- Satisfying new challenges while utilizing past expertise
MELSEC with history and experience. Satisfying new challenges while utilizing past expertise

### 2000s

- **MELSEC-Q Series**
  - MELSEC-Q process CPU
  - MELSEC-Q redundant system
  - MELSEC-Q C Controller

### 2010s

- **MELSEC iQ-R Series**
  - MELSEC iQ-R C Controller
  - MELSEC iQ-R Process CPU
  - MELSEC iQ-R CC-Link IE embedded CPU
  - MELSEC iQ-R Safety CPU
  - MELSEC iQ-R redundant system

### Engineering environment

- **Towards high functionality/performance**

### Medium-to large-scale control

- MELSEC-Q process CPU
- MELSEC-Q redundant system
- MELSEC-Q C Controller

### Small-scale and stand-alone

- FX3 Series
- MELSEC iQ-F Series

### Safety control

- MELSEC-QS Series Safety programmable controller
- MELSEC-WS Series safety controller
- MELSEC iQ-R Series Safety CPU

### Personal computer software

- **MELSOFT GX Developer** (Windows® version GPP)
- **MELSOFT GX Works**
- **MELSOFT GX Works2**
- **MELSOFT GX Works3**

### CC-Link IE

- CC-Link LT
- CC-Link Safety
- CC-Link IE Field
- CC-Link IE Control supporting twisted pair cable

- CC-Link IE Control
- CC-Link IE Field safety communication function
- CC-Link IE Field motion function
Extensive global support coverage providing expert help whenever needed

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Factory Automation Global website

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

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

Mitsubishi Electric Factory Automation Global website:
www.MitsubishiElectric.com/fa

Online e-learning

An extensive library of e-learning courses covering the factory automation product range has been prepared. Courses from beginner to advanced levels of difficulty are available in various languages.

- Beginner level
  Designed for newcomers to Mitsubishi Electric Factory Automation products gaining a background of the fundamentals and an overview of various products related to the course.

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

The e-manual viewer is a next-generation digital manual that consolidates all manuals into an easy-to-use package. The e-manual is modeled around a centralized database allowing multiple manuals to be cross-searched, further reducing the time for reading individual product manuals.

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

MITSUBISHI ELECTRIC FA e-Manual (tablet version)

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

Supported versions

<table>
<thead>
<tr>
<th>OS</th>
<th>OS version</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>iOS</td>
<td>iOS 8.1 or later</td>
<td>Apple iPad 2, iPad (3rd generation), iPad (4th generation), iPad Air, iPad Air 2, iPad mini, iPad mini 2, iPad mini 3</td>
</tr>
<tr>
<td>Android™</td>
<td>Android™ 4.3/4.4/5.0</td>
<td>ASUS Nexus7™ (2013)†1</td>
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</tbody>
</table>

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

Precautions before use

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

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- Before using the products for special purposes such as nuclear power, electric power, aerospace, medicine or passenger-carrying vehicles, consult with Mitsubishi Electric.
- The products are manufactured under strict quality control. However, when installing the products where major accidents or losses could occur if the products fail, install appropriate backup or fail-safe functions in the system.
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Mitsubishi Electric offers a wide range of automation equipment from PLCs and HMIs to CNC and EDM machines.

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

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

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

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

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

* Not all products are available in all countries.
<table>
<thead>
<tr>
<th>Country/Region</th>
<th>Sales office</th>
<th>Tel/Fax</th>
</tr>
</thead>
<tbody>
<tr>
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<td>MITSUBISHI ELECTRIC AUTOMATION, INC.</td>
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<td></td>
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<tr>
<td></td>
<td>Mariano Escobedo #69, Col. Zona Industrial, Tlalnepanitla Edo. Mexico, C.P.54030</td>
<td></td>
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<td>Germany</td>
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<td></td>
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<td></td>
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<tr>
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<td>Italy</td>
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<td>Spain</td>
<td>MITSUBISHI ELECTRIC EUROPE, B.V. Spanish Branch</td>
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<td></td>
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Mitsubishi Electric Corporation Nagoya Works is a factory certified for ISO 14001 (standards for environmental management systems) and ISO 9001 (standards for quality assurance management systems).