Mitsubishi FA Integrated Concept

Mitsubishi iQ Platform-compatible
FA Integrated Engineering Software
MELSOFT iQ Works
Mitsubishi Electric is dedicated to helping you reduce your TCO* from the development phase to production, maintenance, and beyond.

*Total Cost of Ownership

**iQ Platform**

The iQ Platform writes a new chapter in the book of factory automation (FA).

Mitsubishi Electric’s “e-F@ctory” FA integrated solution is an evolutionary step in manufacturing which can provide dramatic cost-saving results. Reduce your TCO and stay one step ahead of the competition by using advanced technologies to optimize the entire factory, including the development, production, and maintenance phases of operation. The key to this integrated concept is the “iQ Platform.” By combining the power of best-in-class components on the same platform, unparalleled levels of performance are possible. In addition, a vast array of communications options ensures connectivity between every element of the production process, from the smallest sensor to the most complicated IT system.

The iQ Platform maximizes the potential performance of each system component.

iQ Works integrates the functions necessary to manage every part of the system lifecycle.
MELSOFT iQ Works represents a major innovation in systems engineering. MELSOFT iQ Works integrates the various programming and design software for Mitsubishi programmable controllers, motion controllers, and GOTs. The result is one seamless engineering environment.

MELSOFT Navigator is the heart of iQ Works. It enables the effortless design of entire upper-level systems and seamlessly integrates the other MELSOFT programs included with iQ Works. Functions such as system configuration design, batch parameter setting, system labels, and batch read all help to reduce TCO.

MELSOFT GX Works2 represents the next generation in MELSOFT PLC maintenance and programming software. Its functionality has been inherited from both GX and IEC Developer, with improvements made throughout to increase productivity and drive down engineering costs.

MELSOFT MT Works2 is a comprehensive motion CPU maintenance and program design tool. Its many useful functions, such as intuitive settings, graphical programming, and digital oscilloscope, simulator, assistance help, to reduce the TCO associated with motion systems.

MELSOFT GT Works3 is a complete HMI programming, screen creation, and maintenance program. In order to reduce the labor required to create detailed and impressive applications, the software's functionality has been built around the concepts of ease of use, simplification (without sacrificing functionality), and elegance (in design and screen graphics).
MELSOFT Navigator

Integrated system management improves efficiency and thereby shortens development and maintenance time

**Improved productivity through integrated management**

**Workspace Management**
Multiple PLC, motion controller and GOT projects can be managed centrally in the workspace. This enables you to group the projects into manageable units such as factory, line or cell.

**Easy-to-design system configuration**

**System Configuration Diagram**
Create detailed system-wide network maps and select and configure every piece of hardware using multiple unit configurations with simple drag and drop operations. Verify the design using built-in system tests such as power supply capacity check.

**Visualization of project management**

**Graphical Project Management**
Functions such as program edit, parameter setting and batch reading can be executed intuitively using the graphic interface. In addition, the possibility of making setting errors is minimized because the entire system is immediately visible.

**Improved programming efficiency**

**Label Programming**
MELSOFT Navigator features a shared label database that automatically updates across all supported platforms. This system allows for top-down engineering, parallel development, and seamless communications. Drastically reduce labor and increase programming productivity by focusing on the application, not the communication details and manually labeling and re-assigning every device when a change is made.

**I have to check which project is used...**
**I have to set the labels for every single device...**
**I can't see the entire picture of the system... I hope they are connected...**
**Changes to the settings are shared**

**I hope they are connected...**
MELSOFT Navigator

Integrated system management improves efficiency and thereby shortens development and maintenance time.

Reduce the time to configure system parameters

**Batch Parameter Generation**
Greatly reduce engineering time by letting MELSOFT Navigator automatically generate the parameter settings for each project based on the graphical system configuration diagram. With one operation, complex parameter settings for networks, I/O assignments, and multi-CPU systems are done for you, preventing mistakes and saving valuable time.

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Get up and running quickly with a motion system

**Support for Motion Dedicated Device Settings**
Make use of workspace templates to get started with multi-CPU systems including motion control systems. Templates are pre-configured with parameters and labels to speed up the process of developing a new system.

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Reduce the time for development

**Integrated Development Environment**
Navigator eliminates the need to search for motion programs by using the "jump" feature. Simply right-click the motion command in the PLC program and click jump to automatically open the referenced motion program.

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Improved data transfer efficiency

**Batch Read**
Use the batch read function to download all of the programs and parameters of the PLC CPU and motion CPU, project data of the GOT with one easy operation.

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Improved data transfer efficiency

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It's too much work to set the parameters for every single project…

I have to configure both PLC CPU and motion CPU…

Connecting to every controller and HMI in the system and downloading the programs and parameters one-by-one is a lot of work…

I have to figure out which program this command goes to and edit it…

Automatically download all selected information in the system

Automatically applied to all projects at once

MELSOFT Navigator

MELSOFT iQ Works

MELSOFT GX Works

MELSOFT MT Works

MELSOFT GT Works
Enhance project development efficiency via the user-friendly interface

Tabs and Docking Windows
The ability to swiftly change the user interface to suit current needs improves programming efficiency. Screen tabs make finding the required work object quick and convenient. Use the work area to your best advantage by minimizing docked windows to the side bar.

Inline Structured Text
Further shorten development time by programming solutions in the most suitable language, without having to create an entirely new program. For example, string and number manipulation is accomplished easier with ST. By using inline structured text, the development process can move forward quickly.

Function Blocks
Create your own function blocks for easy re-use or utilize pre-made function blocks. Combine the use of ladder and function blocks seamlessly to reduce programming errors and save time.

Instruction and Label List
Prevention of coding mistakes saves time with the ability to find an instruction or label even if the entire name is not known. Information about the selected item is automatically displayed ensuring the correct choice is made. Instructions include detailed usage information.

Symbol Entry Window
Instruction options are automatically displayed. Instruction usage information is provided as well.

Label options are automatically displayed. Instruction details are shown for reference.
Enhanced security and monitoring features aid start-up and maintenance operations

Configure and monitor system hardware with ease

Expanded Support for Intelligent Function Modules
Detailed descriptions are now given for parameter setting items, making it possible to set up and change the configuration of intelligent function modules without having to reference a manual. Use the intelligent function module batch memory monitor to create a custom list of items to observe and quickly identify problems.

Detailed system operating status display

System Monitor
Quickly diagnose network and PLC hardware problems anywhere in the system using the system operating status display.

Perform offline debugging without physical hardware

Simulation Function
Full simulation capabilities are immediately available with GX Works2. Accomplish debugging tasks more efficiently with the convenience to perform simulation anywhere, without the need for physical hardware.

Robust security for project management

Access Authority
Prevent unauthorized access to programs by requiring user and password authentication. Create a multi-level security scheme to support collaborative development while maintaining data protection.
Create advanced motion control systems with ease

Intuitive system design

System Settings
With the highly graphical nature of the system settings screen, setting up servo amplifiers is easy. The software provides details about the parameters so they can be configured without needing to refer to a manual.

Motion systems need a lot of settings...

Create clear and easy-to-understand flowcharts

SFC Motion Programming
Using an SFC motion program, it is possible to write machine operations, perform monitoring, and simulate/bug test all in flowchart form. Use the instruction wizard to quickly and easily write programs.

I want to quickly make a motion control program that's easy to understand...

Easily configure a complex synchronized system

Mechanical System Program Edit
Use a simple drag and drop interface to create complex synchronous control systems. Modify CAM patterns visually to further aid the design process.

I want to execute synchronous control on multiple axes, but I don't know how...

Detailed help is available directly in the software

Servo Programming Assistance
Configure advanced motion control programs without the need for a manual. Simply pick the desired servo commands from the instruction list and the help is right there. Follow the help and set items like axis number, positioning address, and positioning speed to complete the configuration.

I forgot what page in the manual this instruction was on...

Instruction help
Perform installations and maintenance more efficiently using enhanced debug and monitoring functionality.

Test drive equipment without a program

Various Test Mode Functions
Run basic instructions in test mode without the need for a program. Test a new system with functions like return to home position, JOG, and others with just the click of a mouse.

Ensure smooth commissioning and start-up using the tools included

Digital Oscilloscope
Plot feedback data synchronized with motion controller data on the same graph to quickly reveal any problems. Using this feature makes start-up and commissioning quick and easy. Also MT Works2 makes it easy to save the collected data in CSV format.

Perform debugging using a simulation

Motion Simulator
Program debug mode and the digital oscilloscope function allow for easy testing of motion SFC programs, servo programs, and mechanical system programs all without the need for real hardware.

Reduce down-time and spot trouble before it happens

Rich Monitor Functions
Improve installation and maintenance operation efficiency by using one of the many monitoring tools to view the motion SFC program in operation, monitor the motion controller’s status, or batch monitor errors.
Enhanced user-friendliness makes it easier than ever to get started quickly

Find what you need fast with work tree categories

Work Tree
The work tree automatically organizes every piece of your project so it’s easy to find later. The files are split among three logical categories so you know where to look intuitively. Additionally you can now create new screens or comments directly from the work tree by double clicking “New.”

Create striking screen designs using simple operations

Screen Elements Library
The library tree has been reorganized and sorted to help users find the right element more quickly. For example, it is now possible to jump directly to items based on “appearance” or “function.” A feature to select items from a recent history list is also included.

Interface icons designed to help the user

Toolbar
Hovering over icons with the mouse now provides detailed tool-tips. The user tool bar now remembers the last function used to further increase screen design efficiency. Many icons are now rendered in vibrant color for easy identification.

Improvised visibility of dialog boxes

Dialog Boxes
Set-up and operation of the system has been simplified by including easy-to-identify tabs. Tabs which have already been configured are noted with asterisk to show designers that object settings have been modified. Arrange On/Off switches and images by range and check them as you configure them.
GT Works3 is easier to use, reducing the labor necessary for screen design

One-click simulation

Simulator Function
Verify the correct operation of GOT projects on a PC, without the need for GOT or PLC hardware. Check that the system alarms operate, screen transitions are correct, and monitor devices all using the simulator. (Excluding GT10)

GT Designer automatically chooses the proper GOT operating systems

Automatic Selection of OS
Because different GOT operating systems are required based on the screen data present, the screen design software will automatically choose and upload the correct OS when transferring projects to the GOT.

Selecting parts from the toolbar

Customizable default settings

Personalized Default Settings
Save time by choosing your own defaults for shapes and objects. Registering the most frequently used settings as defaults saves you the trouble of making the same changes repeatedly to each of those objects.

Adding Objects to Your Favorites
Create a collection of favorite parts to avoid configuring from default every time. Objects in the “Favorites tool bar” can be picked and placed quickly. To add an item to your favorites list, simply click the “register” button in the “My favorites” folder in “Library”

Select data and OS automatically

Save time by choosing your own defaults for shapes and objects. Registering the most frequently used settings as defaults saves you the trouble of making the same changes repeatedly to each of those objects.
Factory Automation has made an evolutionary leap thanks to Mitsubishi Electric's combination of several leading-edge technologies. With a high-speed, high-capacity PLC CPU, and a high-speed, high-accuracy motion CPU, these iQ Platform-compatible controllers unleash unprecedented performance using advanced multiple CPU high-speed communication.

### PLC
The iQ Platform excels in bringing superior performance to multiple CPU systems. The key is the redesigned back-plane which allows for vastly increased CPU-to-CPU transfer speeds while maintaining full backward compatibility with Q Series hardware. The PLC CPUs have an increased memory sharing capacity and operation speeds in the nanosecond range which further helps to reduce takt time of production machines and manufacturing devices.

### Motion controller
The motion controller CPUs realize high accuracy, synchronous, speed/position control by executing communications with servo amplifiers in as little as a 0.44ms. Customize your motion solution by taking advantage of motion control functions such as multi-axis interpolation, speed control, electronic cam, tracking control, and more. In addition, the MELSOFT MT Works2 engineering environment has been optimized to substantially reduce program development and debugging times.

### GOT
With the introduction of system labels, the labor required for system development has been greatly reduced. There is no longer a need to memorize devices as they can be easily searched. And now, configuring connected devices and drivers has never been easier. Using the batch parameter setting function in MELSOFT Navigator, it is easy to create parameters for all connected devices, drivers, and interfaces.
High-speed and high-accuracy machine control made possible with multiple CPUs

Multiple CPU High-speed Communication

- Each programmable controller CPU in the multiple CPU configuration is capable of simultaneously processing multiple CPU high-speed communication (14k words/0.88ms), executing a sequence, process or motion program, and performing high-speed machine control. In motion applications, the motion control operations are synchronized using multiple CPU high-speed communications.

High-speed, high-accuracy real data processing

- In order to speed up production data calculations, the floating point addition instruction’s processing time has been reduced to 0.05\(\mu\)s.
- Calculation errors of complex equations can be reduced using the newly added double accuracy operation.

Efficient management by structuring programs into individual routines

- Programs are divided into 124 (max.) sub-programs according to categories such as product and process. This facilitates structuring programs into individual routines. Such structured programs can be highly specialized to enhance visibility for detailed program management. In addition, standard ROM (4MB max. capacity) enables the storage of device labels and comments for function block and sequence programs to be stored in the PLC CPU.

Large-capacity memory for large-volume data

- The capacity of standard RAM, which can be used as file register, has been increased to store larger amounts of production and quality data. Additionally, large-capacity SRAM cards are now supported. An 8MB SRAM card can be used as file register for 4096 words (max.) to handle large volumes of data.

In-position response time

In a multiple CPU system (a PLC CPU and a motion CPU), with the in-position signal from the servo amplifier of the first axis (used by motion CPU) as the trigger, the PLC CPU sends a start command to the servo amplifier of the second axis. The time it takes for the servo amplifier of the second axis to output the speed command is called the in-position response time, and this time is a good indicator of CPU-to-CPU data transfer speed.

- Approx. 3.5 times faster!
- Approx. 5.8 times faster!
- Approx. 13.7 times faster!
Motion processing acceleration

- Twice the motion operational performance (0.44ms/6axis) as previously possible has resulted in increased production rates.
- Extremely accurate synchronous control and speed/position control realized thanks to the increased speed of the axial control cycle.
- A motion control-specific processor (high-performance 64bitRISC) and a proprietary acceleration algorithm ASIC improve hardware efficiency.
- Using the MELSEC Q Series universal model CPU, sequence processing is also accelerated (Using the Q06UDHCPU, the PLC basic instruction time is 9.5ns.)
- Equipped with various motion control functions such as multi-axis interpolation, speed control, electronic cam and tracking control.
- Reduce variations in response time by using motion SFC programming.

### Basic motion performance
(With 0.44ms operation cycle time)

| Processor      | Performance | Axes | 6 axes
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Q173DCPU</td>
<td>Approximately 2 times faster</td>
<td>6 axes</td>
<td></td>
</tr>
<tr>
<td>Q173HCPU</td>
<td>3 axes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Motion SFC processing time
Process time for D803L + D802L + D804L

| Processor      | Processing time | Approx. 1/4
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Q173DCPU</td>
<td>2.34μs</td>
<td></td>
</tr>
<tr>
<td>Q173HCPU</td>
<td>11.75μs</td>
<td></td>
</tr>
</tbody>
</table>

New algorithms result in high-speed and high-accuracy solutions

- Up to 4 CPU modules can be freely selected in the multiple CPU system (one PLC CPU required).
- An optimum decentralized control system can be constructed using multiple CPUs. Control is optimized by dispersing processing across the multiple CPUs with the PLC CPU handling general machine control and the motion CPU handling servo control tasks. System expandability is accomplished with ease due to the availability of over 100 different types of MELSEC Q Series modules.

### Motion controller PLCGOT

#### Optimal system construction
- Up to 96 axis per system can be controlled using multiple motion CPUs (three Q173DCPU modules).
- SSCNETIII based MR-J3 servo amplifiers deliver a high-speed, high-accuracy solution.
- Equipped with various motion control functions such as multi-axis interpolation, speed control, electronic cam and tracking control.
- Reduce variations in response time by using motion SFC programming.

#### Motion program interrupt for multiple CPU synchronization
- Using the new PLC interrupt function synchronized with the motion operation cycle (0.88ms), it is possible to achieve real-time processing of ladder programs.

#### Motion-dedicated PLC instruction
- Motion-dedicated PLC instructions have become easier to use.

#### Increased controllability
- Shared memory capacity
  - Q06UDHCPU+Q173DCPU: 4k words
  - Q06HCPU+Q173HCPU: 14k words

#### Large reduction in programming read/write time
- Substantial shortening of communication time when reading and writing to the motion CPU (Q173DCPU/Q172DCPU use).

### Multiple CPU high-speed data transfer

#### Motion CPU communication time
SerVO program read time

<table>
<thead>
<tr>
<th>Processor</th>
<th>Reduced to approx. 1/3</th>
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- Equipped with various motion control functions such as multi-axis interpolation, speed control, electronic cam and tracking control.
- Reduce variations in response time by using motion SFC programming.
Ladder monitor function

This function monitors Mitsubishi Q/QS/QnA/FX Series PLC sequence programs using a circuit diagram (ladder format).

Troubleshoot with the one-touch ladder jump function (Q/QnA ladder monitor)

- By setting a program name and coil number of the PLC to a touch switch, the desired ladder circuit block can be displayed directly.
- Display the ladder block of the circuit input window

Select “FP Function” → “Ladder Monitor” from the Monitor Menu

Improving maintenance work efficiency with a wide monitoring range of useful functions

- In addition to the PLC connected to the GOT, other stations including multi CPUs can be monitored. Multiple programs and local devices in every CPU can be monitored.
- Save sequence program comments to the CF card in the GOT (QnA ladder monitor).
- Device values and timer (T)/counter (C) set values can be changed.
- When an alarm occurs, perform a back-tracking ladder search to find the contact that triggered the alarm. <Detect search>

Device values and timer (T)/counter (C) set values can be changed.

- Easy ladder editing with GOT at your worksite
  - You can display the current value, search and execute device test on the ladder program.
  - Circuit symbol's screen cursor is a make contact. Device values can also be changed.
  - You can also find and replace a device. Not only it is easy to find each place to edit, but it is also easy to correct multiple places in a batch.

Easy ladder editing with GOT at your worksite

- Simply by touching the part in the ladder program you want to edit, such as a contact point or a line, you can insert, change or delete circuit symbols and devices. You can also insert or delete vertical and horizontal lines, and insert or delete rows and columns.

Make a data back up in case of PLC or CPU failure or a dead battery, and quickly replace the faulty device and restore the system using the backup.

Backup/Restore function

- Various data such as the PLC CPU program, motion controller program and parameters can be backed up to the CF card in the GOT.
- Monitor, search and test the ladder program
- You can display the current value, search and execute device test on the ladder program. Testing the edited program can be executed immediately.

- Multiple programs and local devices in every CPU can be monitored
- Backup/Restore function
- When replacing the PLC CPU, the restore function may not be available depending on the system configuration and connection type.

Ladder edit function

Mitsubishi Q Series (Q mode) and CNC C70 PLC programs can be edited in ladder format.

- Easy ladder editing with GOT at your worksite

Set PLC station No., CPU No., destination device, parameters and device test names. Program file names are automatically set in the file name [

- You can also find and replace a device. Not only it is easy to find each place to edit, but it is also easy to correct multiple places in a batch.

- After you edit the program, you can “stop” it remotely from the GOT to write it, and then “run” it remotely.

- Monitor, search and test the ladder program
- You can display the current value and execute device test on the ladder program. Testing the edited program can be executed immediately.

Wide range of access

- In addition to the PLC connected to the GOT, you can access other stations (PLCs) in the network including multiple CPUs. You can edit multiple programs on every CPU.

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- Device values and timer (T)/counter (C) set values can be changed.
- When an alarm occurs, perform a back-tracking ladder search to find the contact that triggered the alarm. <Detect search>
In MELSOFT Navigator, the slot number setting of the base is fixed at the actual number of slots.

Please contact your nearest sales office or distributor for details of multiple license versions.

### MELSOFT Navigator compatible version

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<td>Software model list</td>
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<td>Description</td>
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### MELSOFT iQ Works system requirements

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### For Your Safety

- To use the products given in this catalog properly, always read the related manuals before starting to use them.
- The products within this catalog have been manufactured as general-purpose products for general industries and have not been designed or manufactured to be incorporated into any devices or systems used in purposes related to human life.
- Before using any product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult with Mitsubishi.
- The products within this catalog have been manufactured under strict quality control. However, when installing the product, please consider that major accidents or losses could occur if the product fails, and make appropriate backup or fail-safe functions if the system is critical, where major accidents or losses could occur if the product fails.

**Precautions for Choosing the Products**

Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi, machine damage or lost profit caused by faults in the Mitsubishi products: damage, secondary damage, accident compensation caused by special factors unpredictible by Mitsubishi, damages to products other than Mitsubishi products, and to other duties.

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**Available space**

- OS (Only 32-bit OS)
  - Windows 2000 Professional, Service Pack 4
  - Windows XP Professional, Service Pack 2
  - Windows 2003 Server, Service Pack 1
  - Windows Vista Home Basic, Service Pack 1
  - Windows Vista Home Premium, Service Pack 1
  - Windows Vista Ultimate, Service Pack 1
  - Windows Vista Business, Service Pack 1
  - Windows Vista Enterprise, Service Pack 1

- CPU
  - Desktop: Intel Core i3 2.8 GHz or faster
  - Laptop: Pentium M 1.7 GHz or faster

- Memory
  - 1GB or more

- Display
  - 352x(1024 x 768) or higher

- Available space
  - For installation: 2 GB of hard disk space
  - For operation: 512MB virtual memory available

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**Motion controller model list**

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<thead>
<tr>
<th>Model name</th>
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<tr>
<td>QCPU</td>
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<td>QH4CPU</td>
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<tr>
<td>QH5CPU</td>
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**Module**

- Basic (*), power supply, input, output, IO, interrupt input, analog input, analog output, temperature input, temperature control, loop control, pulse I/O, positioning, 10 Interface, information, network, servo external signal input, synchronous encoder input, modular panel input, block cover

**Network**

- Ethernet CC-Link IE Control MELSOFT/CC (between PCs)
This catalog is an introduction to only part of what Mitsubishi Electric has to offer. Mitsubishi Electric offers individualized solutions for the challenges in your factory.

Specifications are subject to change without notice.

MITSUBISHI ELECTRIC CORPORATION
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