Revolutionized Social Infrastructure Solutions

MELViz iQ PlantSuite
Plant management faces various serious challenges. To reduce costs and improve productivity, management supervisors must optimize cost performance and take responsibility to ensure global competitiveness.

Mitsubishi Electric’s iQ PlantSuite provides outstanding cost performance solutions with our popular FA devices, power distribution control devices, network devices that connect these devices, and SCADA that monitors the entire system. Mitsubishi Electric is your global partner for plant management systems.
Supporting safety and security with flexible plant solutions for various infrastructure markets

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Mitsubishi Electric proposes total systems from enterprise level systems to field devices for use in social infrastructure applications. (water treatment, building, transportation, facilities, etc.)
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Total Solutions

■ Customer request
We want to easily build a plant system by integrating the FA devices, power distribution control devices, and the network devices to connect these, and use SCADA to monitor the entire system.

■ Solution
iQ PlantSuite, a total solution for social infrastructures, provides all necessary components including the FA products and SCADA. A system built with Mitsubishi Electric’s worldwide popular FA devices enables detailed monitoring and control, and helps to increase the equipment efficiency.

Redundant and High Reliability Solutions

■ Customer request
We want to build a highly reliable system, for water treatment plants, etc., that can continue plant operation even in the event of trouble.

■ Solution
iQ PlantSuite uses its Redundant CPU, CC-Link IE controller network, and SCADA redundant configuration to prevent your plant systems from failure. The highly reliably redundant configuration added to the system’s key components provides stable system operations.

Monitoring Solutions

■ Customer request
We want to perform monitoring and control operations with an user-friendly screen.

■ Solution
iQ PlantSuite’s very expressive 3D SCADA allows images, such as a device’s depth, to be displayed on the screen unlike previous 2D images. The 3D monitor screens provide views from various angles in real time enabling users to quickly and accurately grasp the equipment’s state and carry out intuitive monitoring and control operations.

Energy-saving Solutions

■ Customer request
In addition to increasing our factory’s production line efficiency, we want to conserve energy throughout the plant. We want to extend our energy-saving efforts to utilities such as air conditioning and lighting. What is a solution that can comprehensively realize this energy-saving?

■ Solution
iQ PlantSuite provides an energy-saving solution that links the Mitsubishi Electric electricity metering devices with the AX Energy software capable of advanced energy visualization and analysis. Energy is visualized, and the customer’s energy is conserved. A full lineup of energy-saving devices, such as the Mitsubishi Electric inverter that increases motor drive efficiency, is available to help you realize energy-saving with your factory equipment.
**Preventive Maintenance Solutions**

- **Customer request**
  We want to use our vast amounts of data, collected to monitor the factory equipment, etc., for preventive maintenance, etc.

- **Solution**
  iQ PlantSuite provides a facility management solution that links the advanced fault detection and device diagnosis software AX Facility to the MES Interface that collects and manages information such as production information. Automatically collect the device operation status data from this vast data, and use it for operation rate control, preventive maintenance and device fault prediction, etc.

**Data Collection and Analysis Solutions**

- **Customer request**
  We want to easily collect data from our various factories and facilities. We want to verify the collected data with graphs, etc.

- **Solution**
  Using the OPC server, iQ Plant Suite can be connected to various devices including programmable controllers, I/O devices and HMIs to easily collect data from several factories. Real-time and historical data can be visualized with charts. Combine this with the high-speed data logger module, capable of high-speed data collection synchronized with the sequence program scan, to collect highly precise historical data and increase the range of your data application.

**Design Support Solutions**

- **Customer request**
  We want to efficiently use the design information prepared at the upstream process when building our plant control program and monitor screens.

- **Solution**
  iQ PlantSuite has equipped MC Works64 with a system design support function that efficiently uses the upstream process design data and automatically generates the monitor screen, sequence program and OPC tag settings. This design support function eliminates setting mistakes in the tag settings and helps increase the quality. Debugged templates are also provided as a standard. These standard templates can be used to easily build a system.
for Water treatment
Stable operation monitoring for water treatment plants

The water purification plant is a water facility that takes raw water retrieved from rivers or groundwater, etc., purifies and sterilizes the water, and then supplies the purified water as city water. A three-stage water purification process of sedimentation, filtration and sterilization is carried out to supply city water satisfying legally set water quality standards. A highly reliable monitoring and control system is required for this public facility, to ensure that city water is constantly supplied in a stable state.

iQ PlantSuite incorporates a highly reliable Redundant system and MC Works64 to realize safe and stable water treatment plant operations.

Highly reliable system provided by Mitsubishi Electric FA devices

Conventionally, a distributed control system (DCS) was incorporated to monitoring and control water treatment plants requiring high reliability. Implementing and maintaining this exclusive system was very expensive.

iQ PlantSuite ensures high reliability with universal and high-cost performance Mitsubishi Electric FA devices including the Redundant CPU, channel isolated analog module and CC-Link IE controller network module. The redundant configuration provided by the Redundant CPU allows the plant to continue operation even in the event of trouble.

Operators can use the GOT unit provided at the site to check the operation status and events, and to carry out manual operation while confirming the state when trouble occurs.
Integrated operation monitoring of multi-branch water treatment facility

MC Works64 is used to monitor operations throughout the plant. In recent years, demands for low-cost, and highly efficient operations have become a focus even for public facilities such as water treatment plants. To enhance plant efficiency, it was necessary to implement the standard SCADA as well as business analysis tools, etc. iQ PlantSuite uses advanced monitoring with 3D graphics, and MC Works 64 equipped with functions such as trends and alarms to make it easy to grasp the plant’s operation state. This system can be easily linked with MC Historian (data collection) and AX Facility (data diagnosis) to support efficient plant operations.

Monitor the equipment operation status on the graphic screen, and the water quality on the trend screen.

Alarms such as major or minor faults are listed in chronological order.
Fast, highly reliable
CC-Link IE controller network

As the scale of a network to be monitored and managed increases, bothersome settings and tuning to maintain the performance are required. Not only does start up take longer, it also takes longer to pinpoint the cause when a problem occurs. The CC-Link IE controller network is a high-speed highly reliable network that incorporates a reliability guaranteed 1 Gpbs high-speed communication to eliminate tuning, and incorporates a network diagnosis function to realize efficient troubleshooting in the event of trouble. Even at large-scale water purification plants, large volumes of data can be shared between the controllers at high speed, so large-scale controller dispersed control is possible. The optical dual-loop transmission method maintains communication with the loop-back function even if the cable is broken or the power fails. By using the module with an external power supply function, communication can be maintained without the loop-back function even if the CPU power fails. This system ensures stable operation of your plant.

■ Loop-back function

Communication is maintained by the loop-back function

■ External power supply

The external power source allows communication to continue

Communication continues even though this station is between two stations that have lost primary power

Components

- MELSEC-Q series
- Redundant CPU
- HMI (GOT2000/GOT1000 series)
- AX Facility

Quality improvement with templates

Engineering of a conventional monitoring and control system required an operator to create a control program while viewing the plant design drawings (P&ID and I/O lists), while also creating a monitor screen with SCADA. This process required many hours to program the system and to verify its operation. MC Works64 has a variety of reliable debugged templates corresponding to basic devices such as valves and pumps used at a water treatment plant. Using MC AppBuilder, the control programs and the monitor screen graphics parts using templates are automatically generated from the design drawings. This reduces engineering hours and improves quality.

Easily display face plates by clicking the symbol.
for Building Automation
iQ PlantSuite has a system to save energy and reduce CO₂ emissions as a measure against global warming while at the same time providing comfort to building residents. Money saved with energy conservation can be applied to managing the building equipment. Integrated management and control of the building’s equipment and system operations helps to enhance the building’s value.

### Managing the entire building’s energy

By using the iQ PlantSuite products, the energy consumed by air-conditioning, lighting, gas and water supply as well as the consumption of energy in public spaces such as the lobby, hallways, restrooms and parking lot can be “visualized”.

For example, the energy consumption amounts can be easily measured using EcoWebServer III included in the iQ PlantSuite and power measurement devices. The energy amount can be “visualized” by using these measured amounts with the advanced visualization and diagnostics software AX Energy. This “visualized” energy consumption rate can be used to analyze points of waste and adopt further energy-saving measures.
Providing comfort and energy-saving with air-conditioning control and lighting control

To maintain a comfortable space regardless of seasonal changes in the outdoor temperature, indoor temperature or humidity, the air-conditioning control switches between cooling and heating, and controls the temperature and air volume settings. Energy consumed by air-conditioning is high, and often is more than 50% of the total power consumption rate. Comfort is often sacrificed when energy-savings are pursued.

iQ PlantSuite maintains comfort while realizing energy-savings without hampering the air-conditioning’s original functions. By using the iQ PlantSuite products, groups of air-conditioners installed on each floor can be centrally managed and controlled. In addition to ON/OFF control, detailed control such as the set temperature and switching of operation modes is possible. The lighting can also be controlled, such as controlling the lights at a scheduled times or when people are detected.

Life cycle cost of building

- Construction costs
- Maintenance costs
- Equipment management costs
- Energy costs
- General management costs

Reduce with iQ PlantSuite
Monitor each system's operation status and alarms

Buildings have a variety of systems that require 24-hour monitoring. These include, electric power equipment such as lights and sockets; air-conditioning systems such as air-conditioners, heating apparatuses and ventilation; water supply/discharge systems such as reservoirs, pumps, and drain systems; and machinery such as elevators, automatic doors and escalators. The operation state and alarms of each system can be monitored with iQ PlantSuite. For example, MC Works64 provides graphic displays allowing the system state to be grasped at a glance. Chronological changes in the measured values, cumulative values and device operation time are displayed on trend graphs and bar graphs, allowing changes in the alarms and system state to be monitored in real time. The advanced fault prediction and device diagnostics software AX Facility enables system management by collecting data on the device operation state, controlling the operation rate, providing preventive maintenance and predicting device failure.

Components

<table>
<thead>
<tr>
<th>MELSEC-L series</th>
<th>EcoWebServer II</th>
<th>MELSEC-Q series</th>
<th>Redundant CPU</th>
<th>HMI (GOT2000/GOT1000 series)</th>
</tr>
</thead>
</table>

MC Works64
AX Energy
AX Facility
Facility

To totally monitor factory equipment, it is essential to increase the entire factory’s efficiency by downsizing the system through unified monitoring functions and to realize significant collaboration between the monitoring systems. iQ PlantSuite can centrally control various aspects of the factory equipment and increase the entire factory’s efficiency.

[ Air-conditioning monitoring ]
Perform the air-conditioning equipment’s operation control, mode control and temperature control in detail. Save energy with the central air-conditioning controller’s schedule function and energy-saving function.

[ Lighting monitoring ]
Controlling the lights according to a schedule.

[Utility monitoring]
The operation state of the production equipment (process values for pressure and flow rate, operation time, etc) is monitored, and the energy consumption rate for each equipment is monitored. High-speed, high-precision, large volume data processing is realized with the MELSEC-Q programmable controller.

[Energy monitoring]
Monitor the power distribution and power equipment states in real time. Easily monitor the energy consumed by power equipment using EcoWebServerⅢ that combines functions indispensable for energy-saving control and power measurement devices that enable detailed measurement of energy for each device and equipment.

Supporting production equipment’s operation rate

The production line data can be uploaded to the MES database server using the MELSEC-Q programmable controller MES Interface. The PLC and MES database server can be connected with easy program-less settings. Analyze the collected production data to improve your production equipment’s operation rate.

System using MES Interface Module

- Shorten lead time
- Improve quality
- Meet production targets
- Maximize uptime
- No need for gateway PC or processing programs
- Programmable controller (Local station)

MES Interface Module
- Real-time transfer of detailed production information
- Simple & cost-effective database interface
- Reduced system construction costs
- Greater reliability
Analyzing energy to improve productivity and energy-saving

Demands for energy-saving and power monitoring have increased at factories, etc., in recent years. Conventionally to achieve this, the universal SCADA as well as energy monitoring software compliant with energy-saving devices were required. iQ PlantSuite directly retrieves the measured energy rate, current and voltage, etc., from EcoWebServer III to MC Works64, and clearly displays the energy consumption rate. In addition, by connecting this to the advanced energy visualization and analysis software AX Energy to improve your productivity and save energy.
Preliminary prediction of factory equipment faults

To improve operation rates, it is essential to keep the equipment stop time as short as possible. Predicting equipment faults beforehand is important for reducing this stop time, but with conventional operation methods, it was not easy to use the programmable controller information for preventive maintenance.

iQ PlantSuite directly connects the MELSEC-Q programmable controller with the MES, and links the MES Interface, capable of collecting and managing the production information, etc., to the advanced fault prediction and equipment diagnosis software AX Facility. This allows the device operation status data to be automatically collected, and for equipment to be managed with operation rate control, preventive maintenance and device fault prediction, etc. Use this system to prevent the effect of faults onto production and reduce maintenance costs.

Generated faults are listed
Pinpoint cause from state of alarm at fault
Graphical display of number of fault occurrences

Components

- MELSEC-Q series
- EcoWebServer III
- MES Interface Module
- HMI (GOT2000/GOT1000 series)
- MC Works
- AX Energy
- AX Facility
Reduce plant costs and improve productivity

64-bit advanced SCADA featuring 3D Graphics

MC Works\textsuperscript{64}

MC Works\textsuperscript{64} is an integral software providing a variety of functions and refined user interfaces suitable for social infrastructure fields. Apply this software to comprehend the plant operation state and monitor plant-wide operation to support efficient plant operations.
Various packages for each market

MC Works64, the core of iQ PlantSuite, is an advanced 64-bit OS compatible SCADA equipped with 3D graphics screen. MC Works64 features the MC AppBuilder engineering tool to realize easy collaboration between the SCADA and programmable controller. Implement MC Works64 for monitoring and control including functions such as HMI screens, trends and alarms, and for engineering to support aspects from monitoring to control. Functions for various markets can be realized by adding the optional package to the basic package MC Works64.

For example, add AX Energy to control energy such as power, water and gas in factories.
Create convincing 3D graphics screens with a visibility improving platform that fully utilizes WPF (Windows Presentation Foundation). With 3D graphics screens, images can be viewed in real time from various angles allowing the operator to accurately grasp the equipment state.

Solid and highly reliable redundant functions

High level redundancy is provided to ensure the maximum communication reliability for critical business projects in which applications must run 24 hours without failing. The essential business data, alarms and history information can be viewed and logged on-demand when necessary, such as when a fault is automatically detected. If the server should fail in any case, an alarm to notify the server failure accurately notifies the operation status when the alarm is detected. The alarm history save and transmission function enables accurate data access and maintenance with alarm and history information if the server fails.

Object based Distributed Alarm Management

The dispersed type and enterprise-wide multi-function alarm and event management system is perfect for large scale applications with strict specification requirements.
**Real time and historical 3D chart display and analysis**

Data collection, logging, charting, reporting and analysis of the entire system are performed. The system is designed to log the data into an OLEDB database (Microsoft® SQL Server® 2008, Oracle® MySQL™, etc.) and tools are provided to display the real time data and history data as trends or graphs. Pens can be added randomly, and several trends can be viewed simultaneously.

**Combinations of Viewer Elements**

Workbench comprehensively configure all MC Works64 software. Functional and study workbench, used for processes such as editing in software, line time operations and saving and managing projects, function as advanced real time operator interfaces with outstanding visibility.

Use together with Microsoft® Silverlight® to create screens which support other browsers and different platforms.

**Quickly access base data with cutting edge map data integration function**

Visualize bases such as water treatment plants, building facilities and factories, scattered over a wide range in real time.

**Universal connectivity**

Open connectivity is provided for OPC UA and OPC Classic (DA, HDA, A/E) data sources. Connection to BACnet™, SNMP, and various databases (SQL, SAP, ODBC, OLEDB, etc.) is also supported.

**On-demand Microsoft® Excel® Reporting**

ReportWorX Express is an add-in feature for Microsoft® Excel® 2013/2010 that allows you easy access to your real-time and historical data repositories available in the MC Works64 product. With ReportWorX Express, you can configure and view reports related to your industrial processes quickly and easily. The reports can then be passed along to colleagues as a simple but powerful tool.
Windows® 7 multitouch function *1 supported

Using the Windows® 7 multitouch function, an operator can use one or two fingers to intuitively operate a graphic such as zoom in/out or rotate the graphic.

*1: Dedicated multitouch screen is required.

FDT inclusion

For networks promoted by open network (Profibus, etc.), which possess Mitsubishi Electric master modules, FDT technology is used. This means that parameter settings can be made for devices connected through other companies’ networks, from Mitsubishi Electric PLCs.

Connection with BACnet™ compatible devices

Compatibility with BACnet™ enables surveillance and control of devices connected through BACnet™. Expand the usage for Building Automation.

Easy to create display by diverting design drawing

With the inclusion of graphic image creation tool GraphWorX64, users can load 2D and 3D images they have created with AutoCAD® etc. This enables reuse of CAD files created by users, and reduces the labor needed for graphic image creation.

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AutoCAD® Binary (.dwg)</td>
<td></td>
</tr>
<tr>
<td>XAML (.xaml)</td>
<td></td>
</tr>
<tr>
<td>3D Studio (.3ds)</td>
<td></td>
</tr>
<tr>
<td>COLLADA (.dae)</td>
<td></td>
</tr>
<tr>
<td>OBJ (.obj)</td>
<td></td>
</tr>
<tr>
<td>MetaFile (.wmf, .emf)</td>
<td></td>
</tr>
<tr>
<td>SVG (.svg, .svgz)</td>
<td></td>
</tr>
</tbody>
</table>

Import AutoCAD® file directly

Display data (P&ID, etc.)

MC Works64

Reduce display creation time by importing AutoCAD® format (AutoCAD® binary format) into MC Works64.
Design support software for automatic generation of monitor screens, tag settings and PLC projects

**MC AppBuilder**

The MC AppBuilder tool supports designs for the PLC and SCADA. Templates consisting of the function blocks and screen parts realize efficient engineering.

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**Automatically generate monitor screens, tag settings and PLC projects**

Automatically create the monitor screen definition information (including symbol parts and face plate parts), OPC tag setting information (including alarms and trend settings), and GX Works2 projects (including sequence programs and label definitions). The easy design helps avoid faults caused by inconsistent tag setting information, etc.

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**Reduce design hours by using templates** *1

Designs that can be shared among device types have been put together as templates that are managed as a library. Assign a template corresponding to the device in the system tree to reduce design steps.

*1: Templates include graphic part information such as symbols and face plates, control program information such as function blocks, and various interface information (including default alarms and trend settings).

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**Easy system updating**

Devices can be added to or removed from a completed system. Reduce the design time when updating your system.

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**Design information export function**

Design data is now portable as relevant file groups can be exported in a group. Use this function when you need to take projects prepared at the office to the site, or when moving hardware in the engineering environment, etc.
Easy to monitor energy measurement equipments

Monitor screen and OPC tag setting are automatically generated by importing the measurement points information created with EcoWebServer setting tool into MC AppBuilder. Reduce display creation and OPC tag setting time by linking up with the settings tools of EcoWebServer.

*1: Refer to page 49.

Supported OPC Server

The following OPC server can collaborate with auto generation of MC AppBuilder.

- MX OPC Server
- DeviceXPlorer OPC Server

*2: Refer to page 61.

Easy to create GOT displays

GOT displays are provided equivalent to the symbols and face plate provided by MC AppBuilder’s templates. Reduce display creation time by using GOT displays.
### Template Libraries

<table>
<thead>
<tr>
<th>Name</th>
<th>Explanation</th>
<th>Component</th>
<th>GOT screen support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor</td>
<td>Indicates the input status of the connected sensor. Status, Warning or Alarm is set as the input status notification method.</td>
<td>Symbol</td>
<td>Face plate</td>
</tr>
<tr>
<td>Fan</td>
<td>Executing the fan’s ON/OFF control.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor</td>
<td>Executing the motor's ON/OFF control.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pump</td>
<td>Executing the pump's ON/OFF control.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valve</td>
<td>Executing the valve’s Open/Close control.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Damper</td>
<td>Executing the damper Open/Close control.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FanVSD</td>
<td>Executing ON/OFF control with designated fan speed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MotorVSD</td>
<td>Executing ON/OFF control with designated motor speed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PumpVSD</td>
<td>Executing ON/OFF control with designated pump speed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VSD</td>
<td>Monitors the HART device.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PID</td>
<td>Converts PID control.</td>
<td>Symbol</td>
<td>Face plate</td>
</tr>
<tr>
<td>Converter</td>
<td>Converts the input value of the analog module to the engineering value.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Controller</td>
<td>Converts the engineering value to the output value for the analog module.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HARTMonitor</td>
<td>Monitors the HART device.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EnergyMeasurement</td>
<td>Displays various energy measurement values via CC-Link.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Example. Control Valve**

1. **Face plate**
   - Symbol: A4NAV1 V001
   - Use standard templates or add customized templates.

2. **Symbol**
   - A4NAV1 V001

3. **Control function block**
   - 12.0 %
   - W: A: L: M

### List of equipment supported by MC AppBuilder

<table>
<thead>
<tr>
<th>Item</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic model QCPU</td>
<td>Q00CPU, Q01CPU</td>
</tr>
<tr>
<td>High Performance model QCPU</td>
<td>Q02CPU, Q05CPU, Q06CPU, Q12CPU, Q15CPU, Q25CPU, Q32CPU, Q33CPU, Q43CPU, Q44CPU, Q45CPU, Q46CPU, Q56CPU, Q57CPU, Q63CPU, Q64CPU, Q65CPU, Q66CPU, Q67CPU, Q68CPU, Q69CPU, Q76CPU, Q77CPU, Q86CPU, Q87CPU</td>
</tr>
<tr>
<td>Universal model QCPU</td>
<td>Q00CPU, Q05CPU, Q06CPU, Q12CPU, Q15CPU, Q25CPU, Q32CPU, Q33CPU, Q43CPU, Q44CPU, Q45CPU, Q46CPU, Q56CPU, Q57CPU, Q63CPU, Q64CPU, Q65CPU, Q66CPU, Q67CPU, Q68CPU, Q69CPU, Q76CPU, Q77CPU, Q86CPU, Q87CPU</td>
</tr>
</tbody>
</table>

**Notices:**
- *1: The GOT screen provides symbol parts and face plate parts.
- *2: The speed is not controlled.
- *3: There is no function to designate the open/close status.
- *4: Process CPU is not compatible with PID control.
AX Energy

Real time energy management system

AX Energy is an energy monitoring, energy analysis and energy management system (EMS) that delivers a rich platform and browser-independent real-time visualization. This system helps improve energy usage patterns, monitor energy reliability and even forecast energy consumption.

Flexible and open connectivity

AX Energy provides open connectivity with OPC Classic, OPC Unified Architecture, BACnet™, SNMP, Modbus and Web services. Easily connect AX Energy to existing networks with this open connectivity.

Examples of AX Energy application

- Optimize energy management
- Pinpoint assets that consume large amounts of energy
- Identify peak consumption periods to disperse asset loads and utilize idle intervals
- Visualize energy consumption rate for site areas
- Analyze CO₂ emissions per worker and area
- Monitor trends and details of device energy consumption rates
- Issue alarm to operators if meter fails or energy consumption rate exceeds upper limit
- Mail energy consumption rates and cost information to administrators
- Present alternate energy sources for higher efficiency and cost reduction
Device fault prediction and diagnosis solutions

AX Facility is a predictive equipment diagnosis solution that uses an advanced Fault Detection and Diagnostics (FDD) Engine to analyze all available information to detect and predict faults in equipment. It incorporates algorithms that weigh the probability of faults and advise management, operators and maintenance personnel of actions to prevent equipment failure from excessive use of energy. Should an equipment fail, the advanced software technology provides automatic guidance to a list of causes sorted by probability, resulting in reduced downtime and lower costs for diagnosis and repairs.

Flexible and open connectivity

AX Facility provides open connectivity with OPC Classic, OPC Unified Architecture, BACnet™, SNMP, Modbus and Web service. It is easy to connect AX Facility to existing BAS, SCADA or control networks with this open connectivity.

Examples of AX Facility application

» Predict, reduce and eliminate equipment downtime
» Automate equipment fault detection, and send real-time notifications
» Reduce maintenance and pinpoint estimated causes
» Improve reliability and control
» Improve general environment quality
» Notify on a “random platform from anywhere at anytime”
Real-time production history information collection package with 64-bit environment compatible high-performance, solid, scalable and safe operations

**MC Historian**

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**Prominent performance**

The cutting edge data compression algorithm, Swinging Door, allows data to be collected at a high speed of 50,000 points per minute.

**Swinging Door Algorithm**

- Deadband Filter
  - Stores unneeded samples (6, 7, 15, 16)
  - Misses inflection samples (4, 13)

- Swinging Door
  - Higher Compression
  - Better accuracy

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**Integrated redundancy functions**

Solid software redundancy functions are assembled to support essential business applications requiring continuous access and data collection.

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**Real time and history 3D chart**

Data can be charted in 3D using XY coordinate graph, logarithm graphs, bar graphs, strip charts and pie graphs.

By overlapping the real-time data and history data for the same trend plots, this week’s data can be easily compared with last week’s data.
Ensuring safety with automatic save and automatic transmission functions

Maintain data integrity even if your system fails or a communication error occurs. This data can be used to swiftly recover your system.

Industry standard data connectivity

The advanced data integration function realizes projected connectivity to any device via OPC-DA, OPC-UA, OPC-HDA, OPC XML, SNMP, BACnet™ or values in the database.

SQL integration

The industry standard SQL query interface is incorporated allowing solid connections with Microsoft® SQL Server® 2005, SQL Server® 2008, Oracle® MySQL® and many other SQL compatible databases.

Automatic archiving function

Easily create backup files to free disk space, ensure long time storage of data, and to restore data.
Real-time collaboration and visual dashboard

AX Portal provides a real-time collaboration portal built on the powerful Microsoft® SharePoint® 2010 Platform. Utilizing AX Portal and the SharePoint® Platform, users can easily define portals and dashboards for corporate and customer collaboration. With "web parts" delivered through AX Portal, and optional web parts available from Microsoft® and many third-party vendors, users can deliver the required information to any user or position in their organization or supply chain.

AX Portal is an innovative frame-based runtime environment that provides an organized screen layout, often called a portal or dashboard. AX Portal makes it easier and faster to configure complex dashboards and layouts for functions such as alarm monitoring and operation control.

AX Portal supports Microsoft® Silverlight®, and can be deployed easily on any system with very little setup.

Flexible and open connectivity

AX Portal provides an open connectivity with OPC Classic, OPC UA, OPC.NET, BACnet™, SNMP and Web service.

Main features of AX Portal

» Existing HMI screens, trends, manufacturing information reports and charts, etc., can be used with point & click settings.

» The right amount of information is provided to realize cost savings through informed decisions.

» The user’s organization is given authority to positively and quickly resolve problems.

» Intuitive navigation is realized with drill down analysis that matches the situation.

» Total cost of ownership (TCO) is reduced and early Return on investment (ROI) recover is realized by utilizing the existing IT foundation.

Web analysis screen programming support tool

Using AX Portal, MC Works64/ AX Energy/ AX Facility screens can be displayed together on the web browser.
The powerful SPC analysis

AX Quality is built upon the powerful MC Historian Product and delivers powerful Statistical Process Control Analysis, Alarming and Charting. AX Quality is a complete quality analysis solution providing SQC/SPC data analysis, powerful yet flexible SQC charting, reporting and SPC rules-based alarming. The solution is based on having universal connectivity to most manufacturing equipment, and assuring communications to any manufacturing control equipment or systems to continuously collect needed information.

A rich quality calculations

AX Quality is easy to configure and operate. Users can simply specify the collection points and select one or more of the full range of quality calculations, such as:

- CPK
- Cusum
- X-Bar
- S-Bar
- R-Bar
- R
- S
- Lower control limit (LCL) and Upper control limit (UCL)
- Many More Statistical Calculations

A extensive set of SPC Charts, Histograms and Data Grids can be configured for real-time monitoring of the measured and calculated statistical values. Rich operator dashboards and visualization can be viewed from any device, at any time, and can displayed on desktops using Windows 7/Windows 8 or any Web browser, tablet or mobile phone device. Support for Microsoft® SharePoint®, for integration with corporate portals, is also available.

Main features of AX Quality

- Quickly identify faulty products and improve product quality.
- Interactive control charting and visualization.
- Fully Configurable Calculations and SPC Alarms.
- Deliver charts, KPIs, data and alerts to any device.
- Universal connectivity to quality sensors and gauges.
- Configurable SPC reports and dashboards.
- Improve profitability with integrated control.
- Merge lab data with real-time production data.
MC Mobile is a must-have mobile software solution for anyone monitoring any critical building, manufacturing or industrial application. Designed for either on-premise or cloud based deployment, MC Mobile is remarkably easy to set up and use but, at the same time, incredibly powerful. Users can monitor and access their most important data, anytime, anywhere and on any device. MC Mobile works on hundreds of Web-enabled smartphones, tablets, browsers, HDTVs and more. Real-time access to critical data is now available to executives, engineers, maintenance technicians and operators on the go. If you want information at your fingertips and want to see real-time, historical, alarm, energy, quality, production or other critical information, then MC Mobile is just what you need. Add MC Mobile to any existing application and quickly access KPIs, trends, alarms, scorecards, GEO SCADA visualization and more from any real-time, historical or Web service data source. It was designed from the ground up to be simple and effective, offering smart mobile applications that can be deployed in hours with zero code and effort. Use MC Mobile with any of the latest devices such as Microsoft® Surface™ tablets, Windows Phone®, iPhone®, iPad®, Android™ devices, HDTVs or any other Web-connected device.
Next Generation Seamless Engineering Environment

iQ Works is the combination of Mitsubishi Electric engineering software (GX Works2, MT Works2, GT Works 3, RT ToolBox2) that allows for the sharing of design information to improve programming efficiency and reduce TCO.

System Management Software

**MELSOFT Navigator**

In combination with GX Works2, MT Works2, GT Works3, and RT ToolBox2, this software performs upstream system design and inter-software operation. It provides such convenient functions as system configuration design, batch setting of parameters, system labeling, and batch reading.

Programmable Controller Engineering Software

**MELSOFT GX Works2**

This all-in-one package provides all functions required for system designing and programming, debugging and maintenance, to PLC engineering. Use this tool effectively in scenes where languages are freely mixed according to applications SFC, ST and ladders for IEC61131-3 Standards productization during modularization and structured programming for IEC61131-3 Standards.

**MELSOFT MT Works2**

This software comprehensively supports motion controller design and maintenance. Reductions to the motion system's TCO are assisted by intuitive settings on a graphical screen, programming functions and convenient functions such as the digital oscillation simulator.

**GOT2000/GOT1000 Screen Design Software**

**MELSOFT GT Works3**

This software comprehensively supports creation of screens for Graphic Operation Terminal. User-oriented functions have been created with three concepts in mind, simplicity, aesthetics, and ease of use, to help the creation of high-grade screens with simple settings.

**RT ToolBox2**

This software comprehensively supports robot program programming and editing, implementation, startup and maintenance after the start of operation. Use is not limited to robot engineering, but also extends to effective teaching, research and training.
Realizing high-speed large-volume data processing for complicated production systems and manufacturing systems.

**iQ Platform Programmable Controllers MELSEC-Q series**

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 new generation programmable controller “Universal Model QnU” is a leader for these market needs.

High-speed basic instruction processing on a micro scale dramatically increases your system and machine performance.

While inheriting the highly robust and simple-to-use design of the Q series, MELSEC QnU … This new-generation programmable controller opens up new possibilities for your automation solutions.

![Diagram showing MELSEC-Q series Universal Model Lineup](image)

**MELSEC-Q series Universal Model Lineup**

Program capacity (step)

- **High-speed Universal model CPU**: built-in Ethernet port QCPU
- **Built-in RS-232 port CPU**: USB

**Customer experiences created this new-generation Programmable Controller**
- Support for shorter operation cycle times
- Support for higher quality control requirements
- Complex and large-scale equipment and systems
- Expanding control and production control data
- Shorter product cycles
- Support for higher equipment operation rates

**Improved Productivity**

**More User-Friendly**

**Easy Maintenance**

Customer experiences created this new-generation Programmable Controller

- Support for shorter operation cycle times
- Support for higher quality control requirements
- Complex and large-scale equipment and systems
- Expanding control and production control data
- Shorter product cycles
- Support for higher equipment operation rates

**Support for shorter operation cycle times**

**Support for higher quality control requirements**

**Complex and large-scale equipment and systems**

**Expanding control and production control data**

**Shorter product cycles**

**Support for higher equipment operation rates**
“Little on size, Large on performance”
The new L series has a small footprint and is loaded with features.

Programmable Controllers MELSEC-L series
Convenience that fits in the palm of your hand.
The L series is the latest in a long line of MELSEC products renowned for exceptional performance and rock solid reliability.
Get the performance, functions, and capabilities required for today’s most demanding applications in an incredibly small package.
MELSEC-L series greatly expands the range of functionality traditionally associated with compact PLCs and through user-centric design, pushes the limits of ease of use.

Programmable Controllers MELSEC-F series
Selling more than 10 million units sold worldwide in 30 years
It has been more than thirty years since the FX programmable controller F series was introduced in 1981. More than 10 million units have been sold worldwide during this time. The FX programmable controller has been incorporated throughout the world including Japan, Europe, America, Asia and Oceania in a variety of fields including FA industries, foodstuff and distribution. Its applications are bound to increase in various fields.

Functionality
The CPU module contains a diverse range of control functions. A large variety of I/O types and features are built-in for convenience. Due to an abundance of advanced functionality, L series CPUs are flexible enough to meet a wide variety of needs.

Performance
High speed, large memory capacity CPU. The CPU has a basic operation processing speed of 9.5ns and 260k steps of program capacity are available for complex programs and equipment control.

Capabilities
Advanced capabilities focused on improving efficiency. The user-friendly display unit enables routine operations to be made without a computer. An SD memory card slot is included as standard for data logging and program storage. Write programs and manage L series controllers using GX Works2 and iQ Works, the most advanced and effective software for Mitsubishi Electric controllers yet.

Diverse built-in functions
The FX programmable controller’s compact body is equipped with outstanding functions such as positioning functions and high-speed counters. Simple programs can be controlled at high speeds using the high-speed controller, and using the built-in positioning function, highly precise positioning control of up to three axes is possible without increasing costs.

Extendability
The FX series has a wide lineup of extension devices supporting data collection, analog control and field networks, etc. Mitsubishi Electric proposes configurations suitable for user’s applications with inexpensive function extension boards and adaptors and high-function special modules.

Affinity
The FX programmable controller’s affinity with Mitsubishi Electric FA goods has been improved. The Mitsubishi Electric inverter can be monitored and set using dedicated inverter instructions, and the parameters can be referred to and changed. Up to eight units can be individually controlled, thus contributing to your system’s added value.
Q Series process controllers offer features that rival those of costly DCS systems at a fraction of the cost. A single CPU can control a large number of PID loops while simultaneously performing standard sequence control. The process CPUs are complemented by a range of channel isolated high resolution analog I/O modules with online change (hot-swap) capability, and the function block programming and engineering software environment, PX Developer.

Detailed instrument control according to process state from simple loop control to complicated loop control.

Reducant basic system including CPU module, power supply module, main base unit and network module realizes highly reliable system.

**Process CPU**

Q Series process controllers offer features that rival those of costly DCS systems at a fraction of the cost. A single CPU can control a large number of PID loops while simultaneously performing standard sequence control. The process CPUs are complemented by a range of channel isolated high resolution analog I/O modules with online change (hot-swap) capability, and the function block programming and engineering software environment, PX Developer.

**Redundant CPU**

The redundant systems are designed to provide the users with systems that have the properties of Q Series and are not affected by sudden failures. The basic system including CPU module, power supply module, main base unit and network module is redundant to prevent system failure. Programming can be performed without being conscious of redundancy.
The redundant power supply system can be configured to back up the system in the event of a power failure.

**Redundant power supply system**

Redundant power supplies supporting all CPUs
1. Even if one power supply module fails, the other one supplies the power to the system.
2. A failed power supply module can be confirmed by a "power failure detection function" or "LED indicators", allowing for quick replacement. This ensures system backup.
3. The power supply module can be replaced while online.
4. Q64RP (AC input) and Q63RP (DC input) can be used together. Creating two power supply systems (AC and DC) further enhances system reliability.

* Either Q64RP or Q63RP can be mounted on the power supply slot 1 and 2. Also, in the event of a power failure, the power supply module can be replaced while online.
Improving the reliability of PC/ Microcomputer systems.
The innovative open platform C Controller.

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

The high-end model Q24DHCCPU-V comes pre-installed with VxWorks®, and supports advanced information processing and control system I/O. The standard model Q12DCPU-V is a space saving controller that realizes high-speed I/O control. The Q24DHCCPU-LS is an OS independent controller.

Linux® based control can be easily realized by installing 3rd Party partner OS, supporting advanced information processing with a user interface environment close to conventional PCs.

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

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

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

The C Controller platform is a solution that realizes PC level functionality without the burden of high maintenance costs usually associated with PCs. In addition, it includes a robust design that is ideal for industrial environments by being based on the high quality MELSEC control system.
The concept of safety is shifting from "zero accidents" to "zero risk."

**Safety PLC MELSEC-QS Series**

MELSEC Safety realizes visualization of safety information, realizing optimal safety control, and boosting productivity. The safety components such as Safety PLC, Safety Controller, and Safety Relay Module provide a total safety solution.

**MELSEC-QS Safety programmable controller**

The safety programmable controller is an International Safety Standard certified PLC for safety control. When connected with a safety device, such as an emergency stop switch or light curtain, this programmable controller executes safety control by turning the safety output OFF with a user-created sequence program to stop movement toward a source of hazard, such as a robot.

Machine control of the robot and conveyor, etc., is executed with a general-purpose programmable controller in the conventional manner. The difference between the safety programmable controller and general-purpose programmable controller lies in that if the safety programmable controller itself fails, it performs a self-diagnosis to detect the failure and turn the safety output OFF forcibly. This prevents the safety functions from being disabled because of a fault. Create a distributed safety control system using the CC-Link Safety network or the CC-Link IE Field Network with Safety Communication Functions for large scale systems requiring many safety I/O points.

**CC-Link Safety open field network**

The CC-Link Safety network detects the communication errors defined by safety standards, and serves as a safety system to turn outputs OFF when those errors are detected. CC-Link Safety is compatible with the established CC-Link open device level network, and features an additional error detection function protocol required for safety control, thereby permitting it to be used as a safety field network. Communication is stopped when an error is detected, and the Safety CPU and Safety Remote I/O modules turn the outputs OFF.

CC-Link Safety is an international standard for the safety field network, and has been enacted as the safety communication standard IEC61784-3-8.
PLCs are directly linked to the MES for efficient collection and management of energy information.

**MES Interface Module for MELSEC-Q Series PLCs**

The MES Interface Module for MELSEC-Q Series PLCs automatically generates data to be sent to the Manufacturing Execution System (MES) in SQL. Configuration is easy, as PLCs can be connected directly to the MES without gateway PCs or processing programs that were conventionally required. The seamless network allows collection and management of all types of information inside a factory, including energy information and information regarding production processes, equipment operations, and quality. The MES Interface Module creates an information link between production equipment and MES easily, and at low-cost.

- **Eliminates the need for communication gateway PCs or programs and provides an efficient information collection system at low-cost.**
- **Supports a wide range of communication protocols to ensure efficient connections with information systems and to deliver compatibility even with large-scale IT platforms.**
- **Allows easy set-up using simple tools and easy mapping of data collected by PLCs and information systems.**

Greater compatibility with diverse platforms and databases ensures direct connections between the shop floor and information systems.

**MES Interface IT for MELSEC-Q PLCs**

MES Interface IT was developed to integrate shop floor operations into management strategies. By connecting the shop floor to information systems directly without the use of any programs, MES Interface IT allows effective management of information from production lines and facilitates business management.

- Eliminates the need for communication gateway PCs or programs and provides an efficient information collection system at low-cost.
- Supports a wide range of communication protocols to ensure efficient connections with information systems and to deliver compatibility even with large-scale IT platforms.
- Allows easy set-up using simple tools and easy mapping of data collected by PLCs and information systems.

**Main differences between MES Interface and MES Interface IT**

<table>
<thead>
<tr>
<th>Item</th>
<th>MES Interface</th>
<th>MES Interface IT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compatible databases</td>
<td>Microsoft® SQL Server®, Microsoft® Access®, Oracle®, Wonderware® Historian</td>
<td>IBM® DB2®, Microsoft® SQL Server®, Oracle®</td>
</tr>
<tr>
<td>Message communication and other communication programs</td>
<td>—</td>
<td>Message communication: WMQ, JMS, MSMQ Other communication programs: TCP, e-Mail</td>
</tr>
<tr>
<td>IT platforms</td>
<td>Windows®</td>
<td>UNIX®, LINUX®, Windows® (compatible with all types of IT platforms)</td>
</tr>
</tbody>
</table>
Electric power and currents are logged to monitor energy and keep daily records of specific energy consumption.

High-speed Data Logger Module

Mitsubishi Electric’s high-speed, simple, and low-cost High-speed Data Logger Module provides accurate data logging that transcends the conventional data logging framework. For example, it can be used to monitor electric power and currents obtained from a MELSEC-Q Series power measuring unit or to create daily reports on specific energy consumption. By accumulating various data from production processes, the High-speed Data Logger Module not only contributes to reducing energy cost, but also to optimizing systems that are necessary for improving production quality and building an efficient production site.

**Automatic creation of Excel® files from logging data**

Charts and reports are automatically generated from logging data, simply by transferring Excel® layout files to the High-speed Data Logger Module. This function can be used, for example, to monitor electric power and currents obtained from a MELSEC-Q Series power measuring unit or to create daily reports on specific energy consumption.

**Synchronization with a program scan sequence**

Energy measurements and other such data can be logged at high speed and with precision in synchronization with a program scan sequence, the smallest unit of time that can be controlled. Using this function, collected data can be analyzed for detailed operational analysis, as even the slightest change in control data is detected and logged.

**Prompt analysis of problems in the event of trouble**

The High-speed Data Logger Module allows the user to narrow down and extract only specific data, such as on specific energy consumption, that is saved around the time of a pre-defined trigger occurrence. This function is helpful in promptly identifying the cause of an error and implementing solutions for quick restoration of operations. Additionally, potential causes of errors can be established as triggers, so that the High-speed Data Logger Module only saves the data logged immediately before and after the occurrence of those triggers.
MELSEC-Q, a constant innovator in the production workplace, now has an expanded line-up with the addition of a new energy measuring module. This unit makes it easy to measure current, voltage, power, power factor, effective power consumption and other information, integrating production and quality information with energy information, and leading to improved productivity, energy-saving, and preventive maintenance. And, it slots directly into the PLC, saving space, wiring, and cost. It enables energy measurement for each piece of production equipment, preventive equipment maintenance based on realtime measurement, and the use of quality control indices linked to manufacturing information.

These are key e&eco-Factory products, achieving fusion between production and quality information, and energy information.

MELSEC-Q Series Energy Measuring Module

Meets Energy-Saving measurement needs
I want to monitor the power used by each piece of equipment, for detailed energy-saving monitoring.

Meets Preventive maintenance needs
I want to detect power and current used by manufacturing equipment and prevent sudden failures.

Meets Short-term measurement needs
I want a fast measurement cycle to measure short-term loads.

Meets Quality control needs
I want to detect power supply irregularities in manufacturing equipment to control product quality.

Meets Simple installation needs
I want simple and smooth installation, with no program for power measurement.

Slots directly into the PLC!
The energy measuring module is directly attached to the PLC, so there is no need to install any other instruments or connect wiring. There is no need for any major system construction either, so it also saves space.

Measure energy consumption simply
Read the signal from the current sensor on the device breaker, to measure energy consumed by the device. It's easy to grasp power consumption for each PLC unit and manage the specific energy consumption for each individual device.

Easy comparison of power consumption
Power can be measured only when a specific output signal is on. Power over a period can be measured at two points, to find the standby power consumed while idling or compare power consumed over a certain period.

Grasp the energy consumption status of a device
Record the maximum and minimum values of demand current, voltage, demand power and power factor for each device. Equalization of energy consumption is supported, to identify devices and times of high energy consumption.

Quickly catch abnormal device status
Set two measurement factors and monitor their upper and lower limit values. That makes it possible to quickly catch abnormal device status, and to find devices which are using large amounts of energy.
Energy information is also measured to promote the “visualization” of the shop floor.

**GOT2000/GOT1000 Series : HMI**

These devices collect and display electric power, water, air, gas, and fuel measurement data from a MELSEC-Q Series measuring module via CC-Link. They not only monitor energy consumption in real time, but also facilitate energy management, quality management, and monitoring of equipment operations in accordance with shop floor information.

- **Monitors energy consumption in real time.**
- **Facilitates energy management, quality management, and monitoring of equipment operations in accordance with shop floor information.**
- **Computerizes information from existing equipment and equipment other than MELSEC PLCs.**
- **Supports workers by providing a connection to a barcode reader and displaying documents.**
- **Offers extensive information management functions that can only be offered by an HMI.**

**GOT2000**

**GOT1000**

- Collection of electric power, water, air, gas, and fuel measurement data via CC-Link
- Collection of power consumption data from each device
- Collection of production information
- Measurement by a energy measuring module
- Energy information
- Parameter settings for a Q Series power measuring unit

**Application examples**

**Solutions**

**Software**

**Products**

**SCADA Products list**
Most-advanced Motion controller.

- **SSCNET III/H compatible Motion controller**
  - Q173DSCPU, Q172DSCPU

The Motion controller is a CPU module used with the PLC CPU for Motion control. The Motion controller using the Motion SFC program separately controls I/O modules, etc., from PLC CPUs; therefore high speed control is achieved.

![Diagram of Motion controller](image1)

**Example of system configuration**

1. **PLC CPU**
   - Sequence program
   - Execute Motion dedicated instructions, such as Motion SFC
   - Data exchange with multi-CPU high-speed communication area, etc.

2. **Motion Controller**
   - Motion SFC
   - To servo amplifier

**Advanced control but simple use as the positioning module.**

- **SSCNET III/H compatible Simple Motion module**
  - QD77MS16, QD77MS4, QD77MS2

The Simple Motion module is an intelligent function module performing positioning control following the PLC CPU’s command. Synchronous control that was unavailable with the previous positioning module is now available with this new Simple Motion module, which is used easily just like the positioning module.

![Diagram of Simple Motion module](image2)

**Example of system configuration**

1. **PLC CPU**
   - Sequence program
   - Output signal
   - Writing data to buffer memory
   - Reference to input signal
   - Reading data from buffer memory

2. **Simple Motion Module**
   - Input/output signal
   - Y 32 points
   - X 32 points
   - Buffer memory

3. **To servo amplifier**

4. **Engineering environment**
   - MELSOFT MT Works2
   - MELSOFT GX Works2
   - MELSEC-Q Series PLC CPU

5. **Connecting either a manual pulse generator (MR-HDP01) or incremental synchronous encoder**

**Software supporting servo amplifier from startup to maintenance**

- MELSOFT MR Configurator2
- MELSOFT GX Works2
- MELSOFT MT Works2

**Input destination of external servo signals (FLS, RLS, STOP, DOG) 8 axes**

- **MR-J4-B**
- **MR-J4-B**
- **MR-J4-B**
- **MR-J4-B**

**External input signal of servo amplifier**

- **MR-J4-B**
- **MR-J4-B**
- **MR-J4-B**
Mitsubishi Electric Servo Systems offering high-performance drive solutions.

**MELSERVO-J4 series**

Introducing the MELSERVO-J4 series. Offering more than just improved performance, these servos are designed to drive the industries of tomorrow. Backed by Mitsubishi Electric leadership in all-digital technology, MELSERVO has become one of the most globally respected names in factory automation. And now — with the safety, ease of use, and energy-efficient design of the new MELSERVO-J4 series.

**Machine**

- Industry-leading level of basic performance
- High-resolution absolute position encoder
- Advanced one-touch tuning
- Advanced vibration suppression control
- Robust filter

[Advanced one-touch tuning]
Servo gains including vibration suppression control and robust filter are adjusted just by turning on the one-touch tuning function. Machine performance is utilized to the fullest using the advanced vibration suppression control function.

**Man**

- Safety and convenience
  - Equipped with the safety observation function (IEC61800-5-2)
  - Tough drive function
  - Large capacity drive controller
  - Machine diagnosis function
  - MR Configurator2

[Large capacity drive recorder]
Servo data (motor current, etc.) before and after the alarm occurrence are stored in non-volatile memory. Waveforms can be checked in graph. This enables quick and accurate identification of the cause of the alarm.

**The Environment**

- Eco-friendly design that's winning acclaim worldwide
  - Multi-axis servo amplifier
  - Power monitor function
  - Compatible with power regeneration common converter
  - Energy-conservation achieved by improved performance

[Power monitor function]
Power consumption is calculated from the data in the servo amplifier such as speed and current, and then displayed, enabling energy-conserving system examination.

**Lineup**

### Servo Amplifiers

- **MR-J4-B**
  - SSCNET #H compatible 2-axis servo amplifier
- **MR-J4W2-B**
  - SSCNET #H compatible 2-axis servo amplifier
- **MR-J4W3-B**
  - SSCNET #H compatible 3-axis servo amplifier

With the SSCNET #H compatible servo amplifier, a synchronous system can be configured using high-speed serial optical communication. Servo system performance and functions are utilized to the fullest when the servo amplifier is combined with the servo system controller.

- **MR-J4-B-RJ010**
  - MR-J3-T10 CC-Link IE Field Network servo amplifier with Motion

The CC-Link IE Field Network interface servo amplifier with Motion is compatible with the Motion control in the Ethernet-based open network.

- **MR-J4-A**
  - General-purpose interface compatible servo amplifier

The general-purpose interface compatible servo amplifier enables position control by pulse train command and speed/torque control by analog voltage command.

### Servo Motors

#### Rotary servo motor

- Small capacity, low inertia: HG-KR Series
  - Capacity: 50 to 750 W
- Small capacity, ultra-low inertia: HG-MR Series
  - Capacity: 50 to 750 W
- Medium capacity, medium inertia: HG-SR Series
  - Capacity: 0.5 to 7 kW
- Medium/large capacity, low inertia: HG-JR Series
  - Capacity: 0.5 to 22 kW
- Medium capacity, ultra-low inertia: HG-RR Series
  - Capacity: 1 to 5 kW
- Medium capacity, flat type: HG-UR Series
  - Capacity: 0.75 to 5 kW

#### Linear servo motor

- Core type
  - LM-H3 Series
    - Rating: 75 to 900 N
- Core type
  - LM-F Series
    - Rating: 240 to 2500 N
    - Core type with magnetic attraction counter-force
      - LM-K2 Series
        - Rating: 150 to 2400 N
- Coreless type
  - LM-U2 Series
    - Rating: 50 to 900 N

#### Direct drive motor

- Core type (natural/liquid cooling)
  - LM-F Series
    - Rating: 600 to 8000 N
    - LM-U2 Series
      - Rating: 50 to 900 N

**SCADA Products list Application examples Solutions Software Products**
Evolution of the inverter for fan and pump applications, realizing energy-savings for buildings and factories as a whole.

FR-F700 series: Energy-saving inverter

As the need grows to conserve energy, inverters capable of delivering significant energy-savings have become indispensable, especially for air conditioning equipment, fans and pumps that have to run continuously.

The FR-F700 Series advances energy conservation technology, using optimum excitation control to reduce energy consumption by up to approximately 12%. It offers a full lineup, from small capacity (0.75 kW) to large (560 kW) inverters with excellent drive control, ease of maintenance, environmental durability and operability.

Greater Energy Savings

Upgrade of the renowned Optimum Excitation Control

- Achieved a higher level of energy-savings during acc./dec. to say nothing of during constant speed.

The effect of energy-savings is obvious

- The effect of energy-savings can be confirmed using the operation panel, output terminal (FM, AM terminal) and via networks with the newly developed energy-saving monitor.

Energy Saving Monitor List

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power saving monitor (kW)</td>
<td>Power saving rate average value (%)</td>
</tr>
<tr>
<td>Power saving rate (%)</td>
<td>Power saving charge average value ($)</td>
</tr>
<tr>
<td>Power saving amount (kWh)</td>
<td>Annual power saving amount (kWh)</td>
</tr>
<tr>
<td>Power saving amount charge ($)</td>
<td>Annual power saving amount charge ($)</td>
</tr>
<tr>
<td>Power saving average value (kW)</td>
<td></td>
</tr>
</tbody>
</table>

Ideal for Fans and Pumps

Adjustable 5 points V/F

- Possible to set the torque pattern that is optimum for the machine’s characteristic
- Possible to expect even more energy savings with optimum excitation control and optimum V/F pattern working together

Enhanced PID function

- Energy savings in low speed region ... PID shutoff (sleep control) function
- Shorter PID startup time ... PID automatic switchover function
- Monitor of set point/measured value/deviation possible ... PID monitor
- Convenient for HVAC usage ... forward/reverse operation switchover is simple with an external signal
- Corresponds to a wide range of detectors ... set point and measured value for PID input can either be voltage (0 to 5V/0 to 10 V) or current (4 to 20mA)

Ex. of Power Savings Monitor Display
All-in-One Inverter with Built-in Power Regeneration.

FR-A701: General-Purpose Inverter

The FR-A701 Series adds power regeneration to Mitsubishi Electric’s established FR-A700 Series of high-function general-purpose inverters to achieve excellent braking capacity. Because the power regeneration function is built into the inverter, it dispenses with the complicated and cumbersome wiring that was previously necessary and also saves space. The energy conservation effect is apparent, since the amount of energy regenerated can be checked by the regeneration monitor. This helps save energy in machinery and facilities that produce regenerative torque, such as lifts, cranes, centrifuges and winders.

Energy conservation with power regeneration function

You can reduce your total costs compared to a combination of conventional systems (inverter + power regeneration converter + AC reactor). And achieve energy saving as regenerative energy is returned to the power source, you reap the energy-savings. The actual amount of energy regenerated can be confirmed by checking a new function, the power regeneration monitor.

What is power regeneration?

Power regeneration is an action that yields great braking force by returning regenerative energy from the motor to the power source.

Requires less wiring and space

Compared to a conventional setup with a common converter that is placed separately, this can reduce wiring in the main circuit by approximately 60% and the equipment footprint by approximately 40%. And there’s no need to go to the trouble of picking a particular brake unit, because the brake circuit is built in. (In the case of 200 V, 7.5 k.)

Application example

Vertical parking structure  Ceiling crane

FR-A701

Flow of energy during regeneration

In this part, regenerative energy is returned to the power source.

Power source

AC reactor (FR-HAL equivalent)

IM

Software

Products

SCADA Products list

Application examples

Solutions
“Collection” “Saving” “Visualization (web, analysis)” “Monitoring” Smart energy-saving management in a compact body.

**Energy data collecting server EcoWebServerIII**

EcoWebServerIII generously supports optimized measurement terminals installed throughout the factory and equipment to collect, save, visualize and manage the measured energy data. The shortest data logging cycle is one minute, allowing detailed real-time data control for each equipment. In addition to logging data for the entire factory’s power consumption, the energy information as well as the production information can be retrieved from the production site and specific energy consumption management makes improvement of productivity possible.

**Features**
- Shortest logging cycle: one minute
- Storage period: 62 days (daily data; 186 d)
- Measurement data is displayed as graphs on Web browser
- Upper/lower limits monitored with alarm contact output
- Program ladder-less, additional software not required
- Simple settings (3 steps for shortest setting)

**Implementation examples**
(Unified management of entire line and individual equipment)

- MOU Breaker
- Ethernet
- Energy Measuring Module CC-Link

**System configuration**
- Factory
- Building
- Department
- Equipment

**Real-time**
(EcoWebServer III)

**Low-voltage circuit measurement**
- Current Transformer + 5A sensor
- Split current sensor (low voltage only) EMU-CT250

**High-voltage circuit measurement**
- Split current sensor (low voltage only) EMU-CT250
- For monitoring a power reception and distribution panel EMU-RD3-C

*Our lineup includes low-voltage-only and low/high voltage products, so one unit can cover a reception circuit (high voltage) and a distribution circuit (low voltage).*

**Flexible setting of measurement parameters**
One unit can measure multiple transformer systems (for abnormal voltage or phase), and the necessary measurement parameters can be set for each circuit. The use of a relay system means that sensor cables can be adjusted to the right length when attached, for economical and waste-free wiring. Modules for CC-Link communications, can be retrofitted in cassette form to configure future systems.

**Wide lineup of packages**
Products for 3, 5 or 7 circuits are packaged in our lineup (products for 3 phase 4 wire are for 2 or 4 circuits). You can devise waste-free system configurations are also possible.
Diverse functions in a small body assist detailed energy-saving management.

- **MDU Breaker**

  The Measuring Display Unit Breaker (MDU Breaker) has measuring functions and display unit. That measures circuit information and displays it digitally. The MDU Breaker supports detailed energy management and our customer's energy-saving activities.

![MDU Breaker diagram](image)

From energy-savings to preventive maintenance

If the breaker trips, the cause of the incident and the current involved are stored on flash memory. This makes it quick to identify the cause and restore the system. If the breaker also has networking functions (CC-Link communication), the times of peak values can be logged, which helps to identify times of peak power usage.

Saves wiring, construction and space

The breaker is a single unit together with the measurement VT/CT and the measuring display unit, which helps to save wiring, construction and space.

Easier to use

Our 250A frame products are even easier to use than before, with adjustable rated current, so it is simple to change the setting when loads increase, just by turning a dial.

Extensive functions and ease of use support energy-saving measurement monitoring.

- **Electronic multi-measuring instrument : ME96 Series**

  Further expanded functions for measurement monitoring, display, output, communications and operation. This meter has functions beyond those of a regular meter, and is still easy to use. Advanced functions and ease of use support all kinds of measurement monitoring systems and energy-saving measurement monitoring systems.

  
<table>
<thead>
<tr>
<th>High accuracy monitoring functions by dedicated ASIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Upper / lower limit monitoring up to 4 items</td>
</tr>
<tr>
<td>• Harmonics monitoring</td>
</tr>
<tr>
<td>• Measures import / export active energy</td>
</tr>
</tbody>
</table>

  
<table>
<thead>
<tr>
<th>Easy to read display functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 4 Items displayable</td>
</tr>
<tr>
<td>• Backlight automatic off function</td>
</tr>
</tbody>
</table>

  
<table>
<thead>
<tr>
<th>Wide range of output functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Output functions for 7 items</td>
</tr>
<tr>
<td>• Pulse width settable</td>
</tr>
<tr>
<td>• Analog output range settable</td>
</tr>
</tbody>
</table>

  
<table>
<thead>
<tr>
<th>Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Modbus RTU communication</td>
</tr>
<tr>
<td>• CC-Link communication</td>
</tr>
</tbody>
</table>

  
<table>
<thead>
<tr>
<th>Space saving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethernet</td>
</tr>
<tr>
<td>CC-Link IE</td>
</tr>
<tr>
<td>MELSEC series</td>
</tr>
</tbody>
</table>
### SCADA Products List

#### Basic set parts

<table>
<thead>
<tr>
<th>Product name</th>
<th>Model</th>
<th>Tag</th>
<th>Product outline (Please see Function list below for details.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC Works64 DW</td>
<td>SW2DND-MCMOC-E</td>
<td>75, 150, 500, 1500, 5k, 15k, 50k, 100k, 250k</td>
<td>Alarm (Runtime Version)</td>
</tr>
<tr>
<td>MC Works64 RT</td>
<td>SW2DND-MCMRT-E</td>
<td>75, 150, 500, 1500, 5k, 15k, 50k, 100k, 250k</td>
<td>Alarm (Runtime Version)</td>
</tr>
<tr>
<td>MC Graph64 DW</td>
<td>SW2DND-MCGRT-E</td>
<td>75, 150, 500, 1500, 5k, 15k, 50k, 100k, 250k</td>
<td>Alarm (Runtime Version)</td>
</tr>
<tr>
<td>MC Graph64 RT</td>
<td>SW2DND-MCGRT-E</td>
<td>75, 150, 500, 1500, 5k, 15k, 50k, 100k, 250k</td>
<td>High-speed data collection (Standard Version)</td>
</tr>
<tr>
<td>MC Alarm64 SV</td>
<td>SW2DND-MCMOC-V</td>
<td>75, 150, 500, 1500, 5k, 15k, 50k, 100k, 250k, 500k, 1M</td>
<td>High-speed data collection (Extended Version)</td>
</tr>
<tr>
<td>MC Alarm64 RT</td>
<td>SW2DND-MCMRT-V</td>
<td>75, 150, 500, 1500, 5k, 15k, 50k, 100k, 250k</td>
<td>High-speed data collection (Extended Version)</td>
</tr>
<tr>
<td>MC Historian ET</td>
<td>SW2DND-MCMET-E</td>
<td>75, 150, 500, 1500, 5k, 15k, 50k, 100k, 250k</td>
<td>High-speed data collection (Extended Version)</td>
</tr>
<tr>
<td>MC Historian ET</td>
<td>SW2DND-MCMHT-E</td>
<td>75, 150, 500, 1500, 5k, 15k, 50k, 100k, 250k</td>
<td>High-speed data collection (Extended Version)</td>
</tr>
</tbody>
</table>

#### Function list

<table>
<thead>
<tr>
<th>Product name</th>
<th>Component</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC Works64 DW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC Works64 RT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC Works64 DT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC Graph64 DW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC Graph64 RT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC Alarm64 SV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC Alarm64 RT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC Historian ET</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Mobile set parts

<table>
<thead>
<tr>
<th>Product name</th>
<th>Model</th>
<th>Product outline</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC Mobile SV</td>
<td>SW2DND-MCMOS-E</td>
<td>Monitor/operate remotely with mobile and tablet devices</td>
</tr>
<tr>
<td>MC Mobile DT</td>
<td>SW2DND-MCMRT-E</td>
<td>Monitor/operate remotely with mobile and tablet devices</td>
</tr>
<tr>
<td>MC Mobile SD</td>
<td>SW2DND-MCMOS-D</td>
<td>Monitor/operate remotely with mobile and tablet devices</td>
</tr>
<tr>
<td>MC Mobile ET</td>
<td>SW2DND-MCMET-E</td>
<td>Monitor/operate remotely with mobile and tablet devices</td>
</tr>
</tbody>
</table>

* A commercially-available OPC server can be used for the OPC server. Refer to the P.61 Partner Parts for details on the commercially-available OPC servers.

---

**Function list**

<table>
<thead>
<tr>
<th>Product name</th>
<th>Component</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC Works64 DW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC Works64 DT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC Works64 RT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC Graph64 DW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC Graph64 RT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC Alarm64 SV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC Alarm64 RT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC Historian ET</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Mobile set parts**

<table>
<thead>
<tr>
<th>Product name</th>
<th>Model</th>
<th>Product outline</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC Mobile SV</td>
<td>SW2DND-MCMOS-E</td>
<td>Monitor/operate remotely with mobile and tablet devices</td>
</tr>
<tr>
<td>MC Mobile DT</td>
<td>SW2DND-MCMRT-E</td>
<td>Monitor/operate remotely with mobile and tablet devices</td>
</tr>
<tr>
<td>MC Mobile SD</td>
<td>SW2DND-MCMOS-D</td>
<td>Monitor/operate remotely with mobile and tablet devices</td>
</tr>
<tr>
<td>MC Mobile ET</td>
<td>SW2DND-MCMET-E</td>
<td>Monitor/operate remotely with mobile and tablet devices</td>
</tr>
</tbody>
</table>

* A commercially-available OPC server can be used for the OPC server. Refer to the P.61 Partner Parts for details on the commercially-available OPC servers.
### AnalytIX® set parts

<table>
<thead>
<tr>
<th>Product name</th>
<th>Model</th>
<th>Asset</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>AX Energy SV</td>
<td>SW2DND-AXE5SV-ET</td>
<td>5</td>
<td>Energy consumption rate analysis</td>
</tr>
<tr>
<td>AX Energy</td>
<td>SW2DND-AXE-ET</td>
<td>5</td>
<td>Energy consumption rate analysis</td>
</tr>
<tr>
<td>AX Facility</td>
<td>SW2DND-AXF-ET</td>
<td>5</td>
<td>Error detection/analysis</td>
</tr>
<tr>
<td>AX Portal SV</td>
<td>SW2DND-AXPEN-E</td>
<td></td>
<td>Web analysis screen generation server HMI application for SharePoint</td>
</tr>
<tr>
<td>AX Portal ET</td>
<td>SW2DND-AXPET-E</td>
<td></td>
<td>Web analysis screen generation server HMI application for SharePoint</td>
</tr>
<tr>
<td>AX Quality SV</td>
<td>SW2DND-AXQSV-ET</td>
<td></td>
<td>Statistical process control analysis</td>
</tr>
<tr>
<td>AX Quality</td>
<td>SW2DND-AXQ-E</td>
<td></td>
<td>Statistical process control analysis</td>
</tr>
</tbody>
</table>

1: AX Energy/Facility is licensed in number of analysis (asset) units instead of number of tags.
2: Version without MX OPC Server enclosed is also available. Contact your sales representative for details.
3: Applying the function of AX Quality to all MC Historian tag becomes possible.

### Function list

<table>
<thead>
<tr>
<th>Product name</th>
<th>Energy consumption rate analysis</th>
<th>Error detection and analysis</th>
<th>Modbus OPC server</th>
<th>Connection to BACnet™</th>
<th>Connection to SNMP</th>
<th>Function supported (according to server type)</th>
<th>ReportWorX [Reporting tool]</th>
<th>ReportWorX Express [Reporting tool]</th>
<th>MC Works64 package</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>AX Energy SV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Server + 1 Client (MC Works64 CL RT)</td>
<td>(1 report)</td>
<td></td>
<td></td>
<td>Additional package for MC Works64</td>
</tr>
<tr>
<td>AX Energy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(MC Works64 CL RT)</td>
<td>(1 report)</td>
<td></td>
<td></td>
<td>with MC Works64 (75 tags)</td>
</tr>
<tr>
<td>AX Facility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Server + 1 Client (MC Works64 CL RT)</td>
<td>(1 report)</td>
<td></td>
<td></td>
<td>with MC Works64 (75 tags)</td>
</tr>
<tr>
<td>AX Portal SV</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Server + 1 Client (AX Portal CL)</td>
<td></td>
<td></td>
<td></td>
<td>Set part for MC Works64</td>
</tr>
<tr>
<td>AX Portal ET</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Server + 25 Client (AX Portal CL)</td>
<td></td>
<td></td>
<td></td>
<td>Set part for MC Works64 (15k tags)</td>
</tr>
</tbody>
</table>

* ReportWorX Express is an on-demand reporting tool that works with both 32-bit and 64-bit Microsoft® Excel®.
* Please buy ReportWorX if you want to output the report by other formats (ex. HTML, PDF) or output automatically such as in daily and monthly report.

### Other products

<table>
<thead>
<tr>
<th>Product name</th>
<th>Model</th>
<th>Tag</th>
<th>Function supported (according to server type)</th>
<th>ReportWorX (Reporting tool)</th>
<th>ReportWorX Express (Reporting tool)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC Works64 CL RT</td>
<td>SW2DND-MCWSLV-RT</td>
<td>1</td>
<td>1 client license</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC Works64 CL DV</td>
<td>SW2DND-MCWSLV-EN</td>
<td>5</td>
<td>25 client license</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC Works64 CL RT</td>
<td>SW2DND-MCWSLLOV-RT</td>
<td>1</td>
<td>1 development client license</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC Works64 CL LO</td>
<td>SW2DND-MCWSLOV-EN</td>
<td>5</td>
<td>25 development client license</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC Works64 CL RT</td>
<td>SW2DND-MCWSLVO-E</td>
<td>1</td>
<td>1 client license</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC Historian R</td>
<td>SW2DND-MCHIR-RT</td>
<td>7, 150, 500, 1500, 5k, 15k, 50k, 100k, 250k, 500k, 1M</td>
<td>1 client license for redundant configuration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC Historian C</td>
<td>SW2DND-MCHCE-ET</td>
<td>1</td>
<td>MC Historian remote collector license</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AX Client</td>
<td>SW2DND-AXC-ET</td>
<td>1</td>
<td>AX Energy, AX Facility client license</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AX Portal CL</td>
<td>SW2DND-AXPCL-ET</td>
<td>5</td>
<td>AX Portal client license</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AX Energy AS</td>
<td>SW2DND-AXEAS-E</td>
<td>1</td>
<td>AX Energy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AX Facility AS</td>
<td>SW2DND-AXFAS-E</td>
<td>1</td>
<td>AX Facility</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AX Mobile CL</td>
<td>SW2DND-MCMCL-E</td>
<td>1</td>
<td>AX Mobile</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AX Mobile RO</td>
<td>SW2DND-MCMROI-E</td>
<td>1</td>
<td>AX Mobile</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC Works USB Key</td>
<td>SW2DND-MCMROI-E</td>
<td>1</td>
<td>AX Mobile</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1: AX Energy/Facility is licensed in number of analysis (asset) units instead of number of tags.
**Flow chart for MC Works64 product selection**

Selection of AnalytiX® set parts

![Flow chart diagram]

**START**

Is a development version necessary on a central server?  
Yes: A  
No: C

Only active tags are counted as I/O tags.

Need to edit graphic, alarm, and trend screens?  
Yes: A  
No: B

Are the controllers all Mitsubishi Electric Products?  
Yes: C  
No: A

Need to edit graphic screens or alarm screens?  
Yes: A  
No: B

Are the controllers all Mitsubishi Electric Products?  
Yes: C  
No: A

MC Works64 DV
(Tag: 75, 150, 500, 1500, 5k, 15k, 50k, 100k, 250k)  
High reliability (Server redundancy)  
MC Works64 DV×2

MC Works64 DV OL
(Tag: 75, 150, 500, 1500, 5k, 15k, 50k, 100k, 250k)  
High reliability (Server redundancy)  
MC Works64 DV OL×2

MC Graph64 DV
(Tag: 75, 150, 500, 1500, 5k, 15k, 50k, 100k, 250k)  
High reliability (Server redundancy)  
MC Graph64 DV×2

MC Graph64 DV OL
(Tag: 75, 150, 500, 1500, 5k, 15k, 50k, 100k, 250k)  
High reliability (Server redundancy)  
MC Graph64 DV OL×2

MC Alarm64 DV
(Tag: 75, 150, 500, 1500, 5k, 15k, 50k, 100k, 250k)  
High reliability (Server redundancy)  
MC Alarm64 DV×2

MC Alarm64 DV OL
(Tag: 75, 150, 500, 1500, 5k, 15k, 50k, 100k, 250k)  
High reliability (Server redundancy)  
MC Alarm64 DV OL×2

MC Alarm64 RT
(Tag: 75, 150, 500, 1500, 5k, 15k, 50k, 100k, 250k)  
High reliability (Server redundancy)  
MC Alarm64 RT×2

MC Alarm64 RT OL
(Tag: 75, 150, 500, 1500, 5k, 15k, 50k, 100k, 250k)  
High reliability (Server redundancy)  
MC Alarm64 RT OL×2

Need to edit graphic screens

Are the controllers all Mitsubishi Electric Products?  
Yes: C  
No: A

The runtime function of graphic screens

The runtime function of alarm screens

Are the controllers all Mitsubishi Electric Products?  
Yes: C  
No: A

MC Works64 RT
(Tag: 75, 150, 500, 1500, 5k, 15k, 50k, 100k, 250k)  
High reliability (Server redundancy)  
MC Works64 RT×2

MC Works64 RT OL
(Tag: 75, 150, 500, 1500, 5k, 15k, 50k, 100k, 250k)  
High reliability (Server redundancy)  
MC Works64 RT OL×2

MC Graph64 RT
(Tag: 75, 150, 500, 1500, 5k, 15k, 50k, 100k, 250k)  
High reliability (Server redundancy)  
MC Graph64 RT×2

MC Graph64 RT OL
(Tag: 75, 150, 500, 1500, 5k, 15k, 50k, 100k, 250k)  
High reliability (Server redundancy)  
MC Graph64 RT OL×2

MC Alarm64 RT
(Tag: 75, 150, 500, 1500, 5k, 15k, 50k, 100k, 250k)  
High reliability (Server redundancy)  
MC Alarm64 RT×2

MC Alarm64 RT OL
(Tag: 75, 150, 500, 1500, 5k, 15k, 50k, 100k, 250k)  
High reliability (Server redundancy)  
MC Alarm64 RT OL×2
B

The runtime function of graphic, alarm, and trend screens are necessary.

Are the controllers all Mitsubishi Electric products?

Yes  No

(MX OPC Server included)  (MX OPC Server not included)
MC Historian ET ×2 License
(Tag: 75, 150, 500, 1500)

C

Need to record more points than 100k points per second?

Yes  No

Are the controllers all Mitsubishi Electric products?

Yes  Yes

Are the controllers all Mitsubishi Electric products?

Yes  No  No

(MX OPC Server included)  (MX OPC Server not included)
MC Works64 LT
(Tag: 75, 150, 500, 1500)

(MX OPC Server included)  (MX OPC Server not included)
MC Works64 LT OL
(Tag: 75, 150, 500, 1500)

(MX OPC Server included)  (MX OPC Server not included)
MC Historian ET OL ×2 License
(Tag: 75, 150, 500, 1500, 5k, 15k, 50k, 100k, 500k, 1M)

(MX OPC Server included)  (MX OPC Server not included)
MC Historian SD
(Tag: 75, 150, 500, 1500, 5k, 15k, 50k, 100k, 250k, 500k, 1M)

(MX OPC Server included)  (MX OPC Server not included)
MC Historian SD OL
(Tag: 75, 150, 500, 1500, 5k, 15k, 50k, 100k, 250k, 500k, 1M)

END
Selection of AnalytiX® set parts

Reduce consumption, monitor demand trends, lower energy costs and minimize carbon emissions by the analytical function, the customizable report function and the energy information etc.

1. Additional product for the existing MC Works64 license
   - AX Energy SV

2. Set product of MC Works64 DV (75tag) and AX Energy
   - AX Energy

Predict, reduce and eliminate equipment downtime, and reduce maintenance, determine probable causes by the automatic fault detection function and the customizable report function etc.

1. Additional product for the existing MC Works64 license
   - AX Facility SV (Ver 10.6 only)

2. Set product of MC Works64 DV (75tag) and AX Facility
   - AX Facility

Customize the screen layout to make it easy to monitor and analyze the screen

1. Additional product for the existing MC Works64 license
   - AX Portal SV

2. Set product of MC Works64 DV (15k tag) and AX Portal
   - AX Portal ET

Improve product quality by powerful statistical process control analysis

1. Additional product for the existing MC Historian license
   - AX Quality SV

2. Set product of MC Historian (150tag) and AX Quality
   - AX Quality

Selection of Mobile set parts

Access to operational information from anywhere and at any time by tablets and smart phones

1. Additional product for the existing MC Works64 license
   - MC Mobile SV

2. Set product of MC Works64 DV (75tag) and MC Mobile
   - MC Mobile LT

3. Set product of MC Works64 DV (5000tag) and MC Mobile
   - MC Mobile SD

4. Set product of MC Works64 DV (100000tag) and MC Mobile
   - MC Mobile ET

Selection of Other products

Edit and view monitoring screens in Client PCs.

START

Need to edit monitoring screens on Client PC?

Yes

Is the server configuration redundant?

Yes

No

MC Works64 CL DV
   (1, 5, 25 Client)

MC Works64 CL R
   (1, 5, 25 Client)

MC Works64 CL RT
   (1, 5, 25 Client)

END

If the base package is the development version, you purchase MC Works CL DV, and edit GraphWorX64/ TrendWorX64/ AlarmWorX64/ MC Historian on Client PC.

If the server configuration is redundant configuration, you purchase MC Works CL R, and display GraphWorX64/ TrendWorX64/ AlarmWorX64/ MC Historian on Client PCs.

If the server configuration is redundant configuration, you purchase MC Works CL R, and display GraphWorX64/ TrendWorX64/ AlarmWorX64/ MC Historian on Client PCs.
Collect data from a remote location to MC Historian

**START**

Need to collect data from a remote location?

Yes

Is the system configuration distributed or redundant?

Distributed configuration

MC Historian C

MC Historian CR

END

No

Redundant configuration

MC Historian ET

Add the monitoring and analysis screens on AX Portal as Web parts

**START**

Only analysis screens are added on Client PC as web parts? Or both monitoring and analysis are needed?

Monitoring screens and analysis screens

AX Portal CL (1, 5, 25 Client)

AX Client (1, 5, 25 Client)

END

Add equipment to analyze on AX Energy/ AX Facility

1. AX Energy metered asset add-on

   AX Energy AS (1, 100 Asset)

2. AX Facility monitored asset add-on

   AX Facility AS (1, 100 Asset)

Add client to control and view monitoring screens in tablets, smartphones and Client PCs

1. Control and view monitoring screens

   MC Mobile CL (1, 5, 25, 100, 500 Client)

2. View monitoring screens

   MC Mobile RO (1 Client)

Activation method (S/W license or H/W key (USB))

**START**

Is there frequent maintenance? (The license needs to be transferred from one PC to another.)

Yes

MC Works USB Key

S/W license (No need to purchase MC Works USB Key)

END

No

No
Example of buying MC Works64 license

### Case 1: Stand-alone configuration

- Various server applications (Trend Server, Alarm Server etc.)
- Development on the server
- HMI screen display on the server

Necessary license:

```
× MC Works64
```

### Case 2: Stand-alone configuration (1Server + 1Client configuration)

- Various server applications (Trend Server, Alarm Server etc.)
- Development on the server
- HMI screen display on the server
- HMI screen display on the web browser

Necessary license:

```
× MC Works64
× MC Works CL RT
```

### Case 3: 1Server + 2Client configuration

- Various server applications (Trend Server, Alarm Server etc.)
- Development on the server
- HMI screen display on the server
- Simultaneous connection up to 2 clients

Necessary license:

```
× MC Works64
× MC Works CL RT ×2
```

...
Case 4: 2Server + 2Client configuration

- Simultaneous connection up to 2 clients

- Various server applications (Trend Server, Alarm Server etc.)
- Development on the server
- HMI screen display on the server

Necessary license:
MC Works<sup>64</sup> DV ×2 license
MC Works<sup>64</sup> CL RT ×4 license
(or MC Works<sup>64</sup> CL R ×2 license)

Case 5: Case to develop with another PC

- Development environment

- Simultaneous connection up to 2 clients
  (1PC HMI screen display, 1PC HMI screen display and setting)

The project setting is forwarded by the Pack/Unpack function.

Necessary license:
MC Works<sup>64</sup> RT
MC Works<sup>64</sup> CL DV
MC Works<sup>64</sup> CL RT
## Specifications

### System requirements

<table>
<thead>
<tr>
<th>Item</th>
<th>MC Works64</th>
<th>MC Graph64</th>
<th>MC Alarm64</th>
<th>MC Historian</th>
<th>MC Mobile</th>
<th>AX Energy</th>
<th>AX Facility</th>
<th>AX Quality</th>
<th>AX Portal</th>
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</thead>
<tbody>
<tr>
<td><strong>Series</strong></td>
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<td><strong>Virtual memory (during operation)</strong></td>
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</tbody>
</table>

### Compatible OS

<table>
<thead>
<tr>
<th>OS</th>
<th>MC Works64</th>
<th>MC Graph64</th>
<th>MC Alarm64</th>
<th>MC Historian</th>
<th>MC Mobile</th>
<th>AX Energy</th>
<th>AX Facility</th>
<th>AX Quality</th>
<th>AX Portal</th>
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</thead>
<tbody>
<tr>
<td>Windows® 8*1</td>
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<td>Windows® 7</td>
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<td>Windows Server® 2012</td>
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<td>Windows Server® 2008 R2</td>
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</tbody>
</table>

### Compatible database (For storing application setting data)

<table>
<thead>
<tr>
<th>Database</th>
<th>MC Works64</th>
<th>MC Graph64</th>
<th>MC Alarm64</th>
<th>MC Historian</th>
<th>MC Mobile</th>
<th>AX Energy</th>
<th>AX Facility</th>
<th>AX Quality</th>
<th>AX Portal</th>
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<tbody>
<tr>
<td>SQL Server® 2012</td>
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<td>SQL Server® 2008 R2*2</td>
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</tbody>
</table>

### Compatible web browser (for screen display)

<table>
<thead>
<tr>
<th>Web browser</th>
<th>MC Works64</th>
<th>MC Graph64</th>
<th>MC Alarm64</th>
<th>MC Historian</th>
<th>MC Mobile</th>
<th>AX Energy</th>
<th>AX Facility</th>
<th>AX Quality</th>
<th>AX Portal</th>
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<tbody>
<tr>
<td>Internet Explorer® 10</td>
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<td>Internet Explorer® 8</td>
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<td>Internet Explorer® 7</td>
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<td>Safari</td>
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<td>Chrome</td>
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<tr>
<td>Other browser (Silverlight® compatible)</td>
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</table>

### Notes

1. Refer to the following table for details on each software’s version compatibility.
2. Required to view a screen on the browser.
3. Required to use ledger function.
4. Only AX Portal is compatible.

---

*1: Only Professional and Enterprise versions compatible.
*2: Only Professional, Enterprise and Ultimate versions compatible.
*3: Only Business, Ultimate and Enterprise versions compatible. Compatible database (For storing application setting data)

---

*1: AX Energy is compatible only with the SQL Server® 2008 R2 Standard, Enterprise and Developer versions (Express version is not supported).
*2: The free version of Express can be used.

---

*1: Only the Silverlight® version HMI screens can be displayed.
■ Flow to implementing MC Works64

Registration of license (Software key)

1. Order
2. Purchase
3. Install product into PC
4. Acquire license file from Mitsubishi Electric website http://www.mcworkslicensing.com/
5. Register license
6. Startup

Mitsubishi Electric Corp.

License Certificate
1. Product Name
2. Customer Key
3. Product Registration No.

File list of DVD

Double click "Default"
Click

Refer to "4 Software Licensing".

Registration of license (Hardware key)

1. Order
2. Purchase
3. Install product into PC
4. Register product information on Mitsubishi Electric website http://www.mcworkslicensing.com/
5. Register license
6. Startup

Mitsubishi Electric Corp.

License Certificate
1. Product Name
2. Customer Key
3. Product Registration No.

* Refer to the manual enclosed with the product for details.
DeviceXPlorer OPC Server – TAKEBISHI CORPORATION

DeviceXPlorer is communication software which supports MELSEC-Q series, C Controller, Motion Controller and Graphic Operational Terminal (GOT). By using DeviceXPlorer, it's possible to access to production data in MELSEC through Ethernet, CC-Link and various MELSEC network.

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Region

Area covered

Asia, Europe, North America, South and Central America, Africa

Sales Office

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Machinery and Electric Machine Division, Engineering Dept.
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URL : http://www.faweb.net/us/
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Area covered

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  Umraniye, Istanbul, Turkey
  Tel: +90-216-536-3990 / Fax: +90-216-536-3995
  Area covered: Turkey

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  India Factory Automation Centre
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  Tel: +91-20-2770-3502 / Fax: +91-20-2770-3100
  Area covered: India

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  Mitsubishi Electric Automation (Thailand) Co., Ltd.
  1/F, 13/1D, Building, 63/1 Tower, No. 84/19, Rama 3 Road, Klongprong, Phra Khanong, Nonthaburi, Bangkok 10310, Thailand
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  Area covered: Thailand

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  ASEAN Factory Automation Centre
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  Tel: +65-6470-2480 / Fax: +65-6476-7439
  Area covered: Southeast Asia

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  Area covered: China

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  Unit 2003, Tianjin City Tower, No.35, You Yi Road, Hexi District, Tianjin, China
  Tel: +86-22-2813-1015 / Fax: +86-22-2813-1017
  Area covered: China

- **Guangzhou FA Center**
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  Guangzhou Office
  Fl.1608, North Tower, The Hub Center, No. 1088, Xin Gang East Road, Haizhu District, Guangzhou, China
  Tel: +86-20-8923-6730 / Fax: +86-20-8923-6715
  Area covered: China

- **Shanghai FA Center**
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  Shanghai Office
  No.1386 Hongqiao Road, Changning District, Shanghai, China
  Tel: +86-21-2322-2300 / Fax: +86-21-2322-2301
  Area covered: China

- **Nagoya, Japan**
  Mitsubishi Electric Dalian
  Local factory in China
  Mitsubishi Electric Dalian Industrial Products Co., Ltd.
  1112, 2-13-1, Komatsugawa, Nakagawasaka, Tokyo, Japan
  Tel: +81-3-5721-3077 / Fax: +81-3-5721-3088
  Area covered: China

- **Mexico FA Center**
  Mitsubishi Electric Automation (China) Ltd.
  Shanghai Office
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Safety Standards

- UL: Underwriters Laboratories
Related product catalogs

- IQ Platform Programmable Controllers MELSEC-Q series [QnU] L(NA)08101E
- Programmable Controllers MELSEC-L series L(NA)08159E
- PROGRAMMABLE LOGIC CONTROLLERS MELSEC FX HIME-B215
- Mitsubishi Programmable Controllers MELSEC Process control/ Redundant system L(NA)08030E
- IQ Platform C Controller L(NA)08165E
- Safety Programmable Controller/ Safety Controller/ Safety Relay Module MELSEC Safety L(NA)08192E
- Programmable Logic Controller MELSEC-Q Series Energy Measuring Module/ Insulation Monitoring Module Y-0725
- IQ Platform Graphic Operation Terminal GOT2000 Series L(NA)08270
- Mitsubishi Graphic Operation Terminal GOT1000 L(NA)08054
- iQ Platform Graphic Operation Terminal Screen Design Software MELSOFT GT Works3 L(NA)08170
- Mitsubishi Servo System Controllers L(NA)03062
- SERVO AMPLIFIERS & MOTORS L(NA)03058
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