

**Automating the World** 

# FACTORY AUTOMATION

# **FA REMOTE SOLUTIONS**













Our Factory Automation business is focused on "Automating the World" to make it a better, more sustainable environment supporting manufacturing and society, celebrating diversity and contributing towards an active and fulfilling role.



The Mitsubishi Electric Group is actively solving social issues, such as decarbonization and labor shortages, by providing production sites with energy-saving equipment and solutions that utilize automation systems, thereby helping towards a sustainable society. Mitsubishi Electric is involved in many areas including the following:

#### **Energy and Electric Systems**

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

#### **Electronic Devices**

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

#### **Home Appliance**

Dependable consumer products like air conditioners and home entertainment systems.

#### Information and Communication Systems

Commercial and consumer-centric equipment, products and systems.

#### **Industrial Automation Systems**

Maximizing productivity and efficiency with cutting-edge automation technology.



The "e-F@ctory" FA-IT integrated solution proposes ways of utilizing FA and IT technologies that reduce the total cost of development, production, and maintenance activities, continuously support customer kaizen activities, and promote monozukuri that is one step ahead.



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Partner Product and Solution Introduction

# Accelerating the shift to remote monozukuri and diversifying work styles in the FA remote solutions provide this support.

Technological innovation is accelerating the diversification of work styles, and the manufacturing industry is no exception. As it becomes the norm to address monitoring, maintenance, service, and development requirements anywhere, anytime, tangible benefits include less production downtime and reduced travel costs.

Mitsubishi Electric's FA remote solutions facilitate the diversification of work styles and contribute to improving the competitiveness of all companies involved in monozukuri.



#### Building a safer and more reassuring security environment



#### Promotion of multi-layer defense:

We recommend adopting multi-layer defense in your FA system to ensure efforts for security measures in accordance with Mitsubishi Electric's FA Security Guidelines be implemented at each layer (human layer, physical layer, network layer, device layer), and achieve manufacturing at factories with a safe and reassuring security environment.

# manufacturing industry.

# INDEX



Working together on Cloud/Shared Servers



Design and development from anywhere with smooth collaboration

> with partner companies even while working from home in the same environment as the shop floor

**Remote Design and Development** 



#### Instant expert response



Value Experts respond immediately even in the event of equipment trouble

**Remote Services** 



**Remote Monitoring** 

# Easily check equipment status from a remote location

#### **Solution**

Check equipment status on a web browser using the PLC's web server function.

\* Using the Ewon/Secomea remote solution, users can easily and safely construct a remote access environment.

\* TrendMicro™ EdgeIPS™ security solutions create a more secure remote access environment.



\*1. Operations are confirmed with the Ewon Cosy and Secomea Sitemanager Series.

#### **Benefits**

- Even without a special-purpose tool, users can view equipment status via a smartphone or tablet web browser, and then respond appropriately based on facts and data.
- IDS/IPS enables the detection and blocking of unauthorized network access and the construction of a secure remote connection environment.



6



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Remote Monitoring
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# Understand the operating status of production line equipment and the overall line from remote locations

#### Solution

- (1) The GOT Mobile function monitors the entire line via the GOT2000 and GT SoftGOT2000 on the shop floor.
- (2) Timely receival of shop floor abnormalities using the email send function and the alarm receiving function of the mobile app Pocket GOT.
- (3) By utilizing the GOT mobile and VNC server functions, check the operation status and cycle time visualized by e-F@ctory support modules, etc.

\* Using Secomea remote solutions, users can easily and safely build a remote access environment.



\* Please refer to the relevant product catalog for supported functions and restrictions of each model.

**Benefits** 

Email notifications and mobile app alarms alert users of abnormalities, enabling them to swiftly take action.
 Even from an off-site location, users can check the equipment or the overall line status using a web browser or a VNC client on smartphones and tablets, and take appropriate actions.



**Remote Monitoring** 

# Monitor operating status of overall factory from a remote location

#### **Solution**

Introduce GENESIS64<sup>™</sup> to a production site for centralized monitoring of operating status, production information, and quality information on a web browser.

#### \* Using the Ewon/Secomea remote solution, users can easily and safely construct a remote access environment.

\* Introduce TXOne StellarEnforce<sup>TM</sup> to lock down your system and prevent unauthorized action. Also prevent unauthorized action via remote connection.



\*1. Operations are confirmed with the Ewon Cosy and Secomea Sitemanager Series.

\*2. Be aware of CPU and memory load.

- Able to check production status on a graphical screen from a remote location just as if the user was on the shop floor.
- The lockdown feature of TXOne StellarEnforce<sup>™</sup> enables you to create a secure remote connection environment.





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Remote Monitoring
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# Monitor factory energy use from a remote location

#### **Solution**

- (1) Email notifications from EcoWebServerIII alert users of equipment errors and exceeded demand target values.
- (2) Energy/Demand-related information can be reviewed from a remote location on a web browser.
- (3) The "EcoAdviser" Energy Saving Support Software analyzes energy use of the entire factory/line and provides the user with diagnostic results.

\* Using the Ewon/Secomea remote solution, users can easily and safely construct a remote access environment.



\*1. Operations are confirmed with the Ewon Cosy and Secomea Sitemanager Series.

- By detecting equipment errors and exceeded demand target values through email notifications, customers can respond swiftly.
- Improve efficiency by checking factors that cause energy loss using AI diagnosis from anywhere.



**Remote Monitoring** 

Case 5

# Collect and utilize production and quality data on a global scale, including overseas plants

**Solution** 

- (1) Equipment operation information and quality information are collected via the various modules of Edgecross and PLCs.
- (2) Connect to the cloud with secure communication protocols such as MQTT and OPC UA.



- Build data infrastructure for production and quality information.
- Can be deployed companywide as global standard infrastructure.





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# Be able to smoothly handle issues and start-up production lines even without engineers on the shop floor

#### **Solution**

- (1) A system recorder records all equipment operational data and camera images when an error occurs.
- (2) Log markers are used from remote locations to synchronize display of video and waveform data from ladder programs and shop floor, and share analysis contents.

\* Using the Ewon/Secomea remote solution, users can easily and safely construct a remote access environment.



 $^{\star}\ensuremath{\text{1.}}$  Operations are confirmed with the Ewon Cosy and Secomea Sitemanager Series.

- Downtime is reduced as equipment designers and maintenance personnel can immediately begin remote surveys and make accurate decisions based on data.
- Service call costs are reduced by resolving problems with a single command.
- Related personnel can view the operating data and videos of equipment in real time and share knowledge to solve problems smoothly.

Product and Solution Introduction				
System Recorder	P.18	MELSOFT GX Works3	P.31	
HMS Industrial Networks HMS Ewon Cosy Series	P.38	(Alliance Secomea SiteManager Series	P.39	

**Remote Maintenance** 

Case 7

# Be able to immediately access device configuration and other relevant information for equipment requiring maintenance from a remote location

**Solution** 

- (1) Pre-register factory/line/equipment configuration and related information (device, manual, and program) with the Edgecross data model management function.
- (2) The Edgecross data model management function enables the user to narrow down to the target equipment, ascertain the current status, and perform maintenance from a remote location.



\* Remote environments are built easily and securely using Ewon/Secomea remote solutions

\*1. Operations are confirmed with the Ewon Cosy and Secomea Sitemanager Series.

\*2. When connecting with VNC Client, the computer (MI5000) installed with Edgecross requires VNC server software.

- The equipment configuration is provided in a tree structure so the relationship between equipment can be intuitively understood.
- Necessary information can be understood immediately, enabling swift and accurate maintenance to be performed.





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Remote Maintenance
```

# Perform maintenance on various FA devices easily, even from remote locations

#### **Solution**

- The VNC server function of the GOT2000 Series enables users to display and operate GOT screens "as is" using a VNC client at remote locations.
- (2) Monitor and maintain Mitsubishi Electric devices such as PLCs, servo amplifiers, inverters, robots on GOT screens. \* Using Ewon/Secomea remote solutions, users can easily and safely build a remote access environment.



\*1. Operations are confirmed with the Ewon Cosy and Secomea Sitemanager Series.

\* Please refer to the relevant product catalog for supported functions and restrictions of each model.

- By linking GOT with individual FA devices, users can review information and perform maintenance using GOT even from remote locations.
- Possible to minimize the introduction of new devices and introduce remote maintenance.



**Remote Maintenance** 

Case 9

# Perform detailed maintenance on various FA devices from remote locations

#### Solution

- (1) Utilize the FA Transparent function of the GOT2000 Series to connect to individual FA devices from remote locations.
- (2) Perform maintenance on individual FA devices from a remote PC using an engineering tool.

Using Ewon/Secomea remote solutions, users can easily and safely build a remote access environment.



\* Please refer to the relevant product catalog for supported functions and restrictions of each model.

- By linking GOT with individual FA devices, users can review information and perform maintenance using GOT even from remote locations.
- Not just simplified, basically all engineering tool functions are available.





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# Utilize audio and/or images from a remote location to give specific instructions for equipment maintenance in real-time

#### Solution

- (1) Visualization of factory, line, and equipment status using GENESIS64™.
- (2) AlertWorX<sup>™</sup> sends an email notification when an equipment error occurs.
- (3) RemoteExpert mode enables maintenance to be performed in accordance with instructions using audio and images.



#### **Benefits**

Users can give specific instructions to conduct maintenance with greater certainty than audio alone.
 Reduce maintenance time using real-time instructions with images.

**Product and Solution Introduction** 





**Remote Services** 

# Propose remote services to users for machine tools

#### **Solution**

- (1) Through the iQ Care Remote4U platform, added a remote service function to machines equipped with Mitsubishi Electric's computerized numerical controllers (CNC).
- (2) Through a cloud server provided by Mitsubishi Electric, enabled remote access from the machine manufacturer's call center or our service center.



\* Please contact your nearest Mitsubishi Electric overseas office regarding which regions offer this service.

#### **Benefits**

Able to monitor operating information for machines equipped with Mitsubishi Electric CNC in real-time.
 Remote diagnosis of CNCs on users' machines improves maintainability and reduces machine downtime.

**Product and Solution Introduction** 

Numerical Control (CNC) Remote Service iQ Care Remote4U

P.33



# Streamline the development of large-scale programs such as PLCs

#### **Solution**

- (1) Using MELSOFT iQ AppPortal, materials and programs related to equipment design are centrally managed on an internal server.
- (2) Each person in charge simultaneously proceeds with development while referring to the same materials and programs in all scenes.



#### **Benefits**

Monitor rework by preventing accidental overwriting of the latest files edited by other people.
 Ascertain changed locations and latest version based on history management to secure quality.

**Product and Solution Introduction** 

**MELSOFT iQ AppPortal** 



# System Recorder

The system recorder is a corrective maintenance solution that ensures effective resumption of operations reducing downtime through its extensive system-wide data recording and simplified analysis software features.

Data before and after the set trigger can be collected with a timestamp every scan. This eliminates the need to worry about what data is being collected when setting up recording and supports swift recovery operations.



#### Breakdown maintenance solutions with System Recorder

Significantly reduces machine downtime with "complete recording" and "easy analysis" of system operating status during error



GX Log



#### **Complete recording**

When problems arise for equipment with multiple devices, it is necessary to find out the facts before and after such an occurrence (when, where, and what happened) in order to recover normal operation.

Mitsubishi Electric's system recorder can record the entire process condition and offer an operations log for control data of multiple equipment and devices, allowing the reproduction (or playback) of the process offline, helping to highlight and show the actual cause of failure.



#### Want to record video and data

Recording function (MELSEC iQ-R Series)

- All device/label logging per sequence scan
   Recorder Unit exhaustively records changes in all devices/labels
- All labels/FB logging of the PLC Unconsciously records all device addresses/system configurations
- Event history
   Records device/label operations from external devices
- General-purpose network camera video Records visual information such as work behavior and user's behavior

- Also want to record drive system conditions
- MELSERVO-J5 Series/MELSEC iQ-R Series Motion module
- All device/label logging per sequence scan Timestamped and accurate recording of motion control data that operates faster than a PLC scan

#### Also want to record users' operations

GOT2000 Series

Records HMI (GOT) operation history and alarm history Records operation history of shop floor workers and alarm information for connected devices

#### Easy analysis

The data collected through complete recording (recording file) can be reproduced offline together with program operation transition. Moreover, by confirming data together with camera video footage, this function enables marking of potentially problematic points (time of error occurrence) from the video. The reviewer can share the equipment conditions at the marked time with shop floor workers, maintenance personnel and designers, thus smoothly communicating to ensure everyone has the same understanding of the error occurrence status from vast amounts of video data and, ultimately, easily identifying the cause of the error.



# MELSEC iQ-R/iQ-F Series CPU module

The system recorder is a corrective maintenance solution that ensures effective resumption of operations reducing downtime through its extensive system-wide data recording and simplified analysis software features.

Data before and after the set trigger can be collected with a timestamp every scan. This eliminates the need to worry about what data is being collected when setting up recording and supports swift recovery operations.



MELSEC iQ F



#### **Web Server Function**

By accessing the web server from a web browser of a computer, tablet, etc., it is possible to write and read data of devices belonging to the CPU unit, batch monitor device data, perform device tests, etc. Moreover, by setting access authority for each user, it is possible to limit the pages each user can view/write to.



#### **Data Logging Function**

By installing a CPU unit logging setting tool on a computer in a remote location, the CPU unit can be accessed via EZ Socket in order to read, write, or delete logging settings.



#### **FTP Server/Client Function**

By installing general-purpose FTP client software on a computer at a remote site, a user can access the CPU's FTP server from the FTP client software. It is also possible to automatically transfer logging files to the FTP server. (FTP client function)

	:0 0	iQ	-F
	IQ-R	FX5U/FX5UC	FX5UJ
Web server function	Δ	•	•
Data logging function	•	•	•
FTP server	•	•	•
FTP client function	Δ	•	Coming soon

Ethernet

●: Supported △: Partially supported (Please see the catalog for details.)

## **MES Interface Module**

Along with ever-changing manufacturing trends, improving machine productivity and maintaining manufacturing quality through meticulous traceability have become a fundamental part of manufacturing. MES interface modules address these requirements by providing direct database connectivity for IT systems and facilitating automatic SQL\*1 text generation using intuitive configuration setup software. Modules allow production data from the shop floor to be inserted into database records directly; for example, providing real-time production status that enables quicker response to production-related problems.

\*1 Structured Query Language is a programming language designed for managing data in a relational database.



#### System configuration costs reduced by 65%\*2

MES interface modules enable direct connectivity between IT database servers and PLCs on the shop floor, eliminating the need for gateway computers or specified programs. Being much more reliable than computers, the MES interface modules save on maintenance costs typical of computers. <sup>\*2</sup> Assumption based on a typical control architecture.



# C Controller Module/ C Intelligent Function Module

The C intelligent function module series are available with a dualcore Arm®-based controller that supports Linux® (supports multiple applications) or VxWorks® (advanced data analysis) operating systems which allows execution of complex programs, thereby providing a robust and deterministic alternative to computerbased systems. Utilizing a fan-less hardware design, modules are ideal for clean fab-based environments, where dust circulation can be detrimental to the production environment, and can be used for applications such as in-line production quality testing or as a gateway for various industry-specific communications protocols.





RD55UP06-V RD55UP12-V

#### Realize complex arithmetic equations in C/C++

The C intelligent function module enables the execution of C/C++ programs when paired with a standard MELSEC iQ-R Series programmable controller CPU, emulating the same features as a standalone C Controller.

Representing complex arithmetic and string equations in C/C++ programs is much easier than implementing in ladder form, thereby reducing overall development time and program size. Additionally, intellectual property is simplified as the result of separating it from the ladder program.



#### Linux<sup>®</sup>/VxWorks<sup>®</sup> realizes easier configuration of various control systems

Dedicated functions and communications libraries are provided, enabling access to the control system modules. In addition, various partner applications are available, supporting different manufacturing equipment features. By utilizing the information community of Debian GNU/Linux allows machines to adopt the latest data processing technology (software package). Key features such as remote operation, predictive maintenance, and remote maintenance of machines can be easily implemented through connection with third-party cloud services.



Pvthon®, Linux®

# **OPC UA Server Module**

The MELSEC iQ-R Series OPC UA server module integrates the OPC UA server directly into the equipment control system as a robust alternative to a computer-based configuration. OPC Unified Architecture (OPC UA) is a platform-independent communications standard developed by the OPC foundation that offers reliable and secure data

communications between the manufacturing-level and IT-level systems.





FX5-0PC

#### Robust security with protection against unauthorized data access

OPC UA security function such as certificate, encrypt and signature can be set based on system requirements. RD80OPC96 can also further enhance security by separating IT and FA networks.

#### Embedded OPC UA server improves system reliability and reduces cost

The OPC UA server module improves reliability by eliminating the requirement for a computer-based server, which can be vulnerable to security risks such as computer viruses. Less hardware maintenance is required, reducing overall system cost as industrial control systems have a longer product service life compared to computers. Efficient tag data management provided utilizing data structure format and storage of tag names within the equipment. This enables easy reference of the necessary data when building host systems.

#### Easily set OPC UA tags

Programmable controller CPU labels can be easily set as OPC UA tag names with engineering tools, which helps to shorten the development period.



## **Industrial Computer MELIPC Series**

Mitsubishi Electric's industrial-use PC MELIPC Series makes it possible to build systems with edge computing utilizing IoT at a high degree of freedom due to its robust features specifically for FA use and adoption of general-purpose applications. The lineup consists of four product types to suit various data utilization scenarios depending on the application; from a high-end model supporting a high-performance processor and CC-Link IE field network capable of high-speed communication to a simple and compact low-range model.

# <image>

#### Pre-installed with Edgecross - an open software platform suited to data utilization

Edgecross<sup>+1</sup>, a software platform in the edge computing domain, is preinstalled, therefore through combination with Edgecross-compatible software, it supports preventive maintenance and building of systems for quality improvement, etc. by utilizing shop floor data. <sup>+1</sup> An open software platform provided by the Edgecross Consortium, a general incorporated association.

https://www.edgecross.org/en/solution/feature.html

#### MI5000

#### One unit can process production information and control equipment in real-time

By operating VxWorks<sup>®</sup>, a real-time OS, in addition to Windows<sup>®</sup>, device control and information processing functions are consolidated into one unit, thus contributing to reduced system build costs and space-saving.

Moreover, control and production information of equipment connected via CC-Link IE field network are communicated at a maximum speed of 1ms, realizing high-precision device control and high-speed collection of production information.



Windows®

🟅 EDGECROSS

VxWorks<sup>®</sup>

Windows®

#### MI3000

#### Panel computers equipped with integrated high resolution touch screens

Large screen and high resolution LCD panel is equipped as standard for data display and touch operation. Light-touch operation is realized with a PCAP touch panel that is widely used for smartphones and tablet devices. The touch panel with high transmittance offers clear and high visibility display.

In addition, GT SoftGOT2000 is preinstalled\*<sup>2</sup> to easily achieve monitoring equivalent to the GOT2000 Series.

\*2 Does not require a separately-sold license key for GT SoftGOT2000 (for USB port).



#### MI2000

# Realizing optimal IoT for the production shop floor by expanding various systems

Intel<sup>®</sup> Core<sup>™</sup> i3 is adopted as the CPU, and performs not only data collection, but also simple analysis, diagnosis, and monitoring of collected data to contribute to quality improvement. It also features a 2.5" HDD/SSD slot<sup>\*3</sup> and a PCI Express<sup>®</sup>/PCI slot<sup>\*4</sup> to accumulate large amounts of data and expand functionality. <sup>•3</sup> 2.5" HDD/SSD slots are available on MI2000 only.

\*4 MI3000 is PCI Express® only.



# SCADA GENESIS64™

GENESIS64<sup>™</sup> is a visualization tool that centrally manages FA and IT data for monitoring and analyzing various types of data. Through the utilization of this tool, we provide monitoring and integration solutions optimal for our customer's needs, such as factory automation, smart building construction, and social infrastructure system establishment.



#### WebHMI<sup>™</sup>/MobileHMI<sup>™</sup>

#### **Remote monitoring**

Bring SCADA visualization to any device. Create displays on the desktop that can responsively scale to run on any mobile client. Leverage native apps to provide a consistent user experience on any smartphone, tablet, or HTML5 compliant web browser<sup>+1</sup>. GENESIS64<sup>™</sup> responsive UI technology flawlessly transitions between clients to provide a consistent user experience.





Visualize monitoring screen on a web browser

#### AlarmWorX<sup>™</sup>/AlertWorX<sup>™</sup>

#### Alarm visualization/ Notification

Equipped with functions such as collection, storage, and visualization necessary to utilize measurement data without programs or ladders, making it easy to build an energy monitoring system.



Search URL of server computer on a web browser

Visualize monitoring screen on a web browser





Check monitoring screen from MobileHMI™ application

#### IoTWorX<sup>™</sup>

#### IoT communication function for Cloud

IoTWorX<sup>™</sup> combines cutting-edge micro SCADA software technology with integrated SCADA, analytics, and mobile solutions running in the cloud. It includes open connectivity to assets, secure cloud communications, and built-in real-time visualization and analytics.



## **GOT2000 Series**

The GOT2000 Series HMI provides a range of models that meet the needs of your shop floor. The GOT2000 boasts advanced functionality, acts as a seamless gateway to other industrial automation devices, all while increasing productivity and efficiency.

GT SoftGOT2000 is the HMI software that runs on personal computers and panel computers. It can be used to monitor and operate the information of industrial devices that are connected to a personal computer or a panel computer via a network.

\* To use GT SoftGOT2000, installation of a license key (GT27-SGTKEY-U) is required separately.

Monitor your shop floor from a remote location



worksite using a web bro

Check the status of the

**GOT Mobile function** Use a web browser on tablets to check the equipment status from a remote location.

Multiple\*1\*2 information devices (clients) can simultaneously access GOT so that you can view and operate a different screen on each device.

#### Simultaneous monitoring on multiple\*1\*2 information devices



\*3 The wireless LAN communication unit cannot be used with GT2505, GT25 handy, or GT SoftGOT2000. A separate access point is required.

Safety Precautions

When using the remote control function, ensure the safety of the field site by being prepared to handle unexpected situations such as communication delays and interruptions.

Mobile app on Android™ enables remote monitoring in real time Compatible G0T : GT27 GT23 GT23 GT23 GT21 GS21 GT SoftG0T2000

#### **Pocket GOT**

By installing the Pocket GOT mobile app on a mobile terminal, the app collects the status of user alarms occurring in the GOT2000 or GT SoftGOT2000 being monitored and notifies you with vibration, sound, or banner when a new alarm is detected.

On the user alarm reception screen of Pocket GOT, you can check a list of the latest five alarms that are currently occurring. Pocket GOT can register up to 20 GOTs.

The status of the GOT where the user alarm has occurred can be checked on the mobile terminal by starting the GOT Mobile function from the user alarm reception screen.

#### Pocket GOT: user alarm reception screen



#### Remote monitoring of GOT from a computer or tablet

#### VNC<sup>®</sup> server function

Users can view and operate the same functions as GOT on a computer or tablet. (Utility functions screens including the sequence program monitor are also supported.) Because the shop floor GOT screens are displayed and monitored "as is," there is no need to create screens dedicated for remote monitoring and maintenance.

\* A separate license (GT25-VNCSKEY) is required to use the VNC server function.

- Supported by GT2107-W only among GT21 models.
- \*1 A separate access point is not required if a wireless LAN communication unit is installed on GOT. (Access point mode is supported by GT Works3 Ver.1.144A and later)

#### Shop floor Shop floor On tablets and mobile devices OS: Android™ iOS Wireless LAN Access point Office Etherne Ethernet On a computer OS: Windows® VNC server function lice GT25-VNCSKEY

#### Smooth debugging

#### FA transparent function

By connecting a computer to the front USB interface on the GOT, the GOT acts as a transparent gateway to enable programming, startup, and adjustment of industrial devices. Users do not have to bother with opening the electrical cabinet or changing cable connections

Moreover, users can open programming/setup software to start up and adjust industrial devices using a computer in a remote location that is connected to the shop floor GOT via Ethernet. To connect shop floor GOT and industrial devices, Ethernet, CC-Link IE connection, and Direct CPU connection (serial) are supported.

- \*2 GT23, GT21, and GS21 cannot be used when GOT is connected to devices via Ethernet.
- \*3 Not supported by GT2505, GT25 handy, GT23, GT21, and GS21.
- \*4 Installation of a wireless LAN communication unit (GT25-WLAN) is required on the GOT. \*5 For the countries where the wireless LAN communication unit can be used and other details,
- please refer to the GOT2000 catalog (L(NA)08270ENG).
- \*6 GT21 and GS21 do not support connection to Mitsubishi Electric servo amplifiers.

#### Edgecross enables visualization of the shop floor

Compatible GOT : GT27 GT25 GT23 GT21 GS21 GT SoftGOT2000



**Edgecross interaction** 

Edgecross is the open software platform in Japan in the edge computing field that coordinates factory automation and IT systems. Edgecross analyzes and diagnoses data near the shop floor and enables real time feedback to the production, data collection, and sending or receiving data to/from facilities and equipment regardless of vendors and network types.

The data collected by Edgecross can be easily visualized and analyzed using various functions such as trend graph display on GT SoftGOT2000.



\*7 It is required to install Edgecross Basic Software. Data Collector, and GT SoftGOT2000 on a personal computer

\*8 To write data from GT SoftGOT2000 to Edgecross Basic Software, installation of MELSOFT GT OPC UA Client software is required separately.

#### Compatible GOT : GT27 GT25 GT23 GT21 GS21 GT SoftGOT2000

## e-F@ctory Starter Package

The e-F@ctory Starter Package consists of sample projects for the PLC MELSEC iQ-R/iQ-F Series and HMI GOT2000 Series. By providing programs for visualization, easy analysis, etc., in sample project form, this product single-handedly integrates IoT on the production shop floor with basic settings such as device allocation and parameter settings.

The e-F@ctory Starter Package helps to provide solutions to various issues that may occur when introducing IoT systems such as investigation period and budget.

#### Visualization of overall equipment efficiency iQ-R iQ-F

A general display of equipment production/operating status, including overall equipment efficiency and production volume.



#### Error detection by monitoring cylinder operation time **iQ-R iQ-F**

Measures and monitors cylinder conditions, operations, and equipment operating cycles to identify any sign of errors.



\* The sample screen shown above is from the MELSEC iQ-R Series

iQ-R

#### Management of equipment/process changes

Users can manage change points according to the 4M and 5M+1E perspectives used in quality management, and then use this information for cause analysis when a problem arises.





#### Detection of irregularities using the MT method iQ-R iQ-F

Expresses degree of divergence between regular data and input data in numerical form and detects errors.

The iQ-R Series also includes a function to input feature quantity derived from time series data collection and vibration analysis.



\* The sample screen shown above is from the MELSEC iQ-R Series

#### Error detection by monitoring analog waveform status iQ-R

Uses thresholds to monitor the shape of the waveform. Guard band monitoring makes it possible to monitor the waveform status of analog waveform data such as electrical current and temperature. Accordingly, it is possible to detect abnormal waveform fluctuation that was difficult to detect with threshold monitoring based on simple upper/lower limits.



#### Error detection by frequency analysis of vibration waveform iQ-R

Uses vibration analysis (FFT) to express vibration created by equipment, devices, and products in numerical form and visualize the status. Detection of abnormal vibration makes it possible to perform preventive maintenance on equipment and increase productivity.

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## **Energy-saving Analysis and Diagnostic Applications EcoAdviser**

This software uses energy data and production information collected from EcoWebServerII or Edgecross-compatible products to create graphs and dashboard screens. In addition, Mitsubishi Electric's Maisart AI technology is installed to provide total support for energy-saving activities ranging from understanding the current situation to extracting energy loss, diagnosing factors, and verifying the effectiveness of energy-saving measures.

#### Eccederations Berg Raing Support Software Contractions Contractions

#### Understanding the Current Situation - Rich graph display facilitates speedy comprehension of current energy use

Can create seven types of graphs to suit the purpose of current status comprehension, consumption unit management, or applied analysis.



#### Loss Extraction - Utilizing AI and Mitsubishi Electric's unique know-how for automatic extraction of production equipment energy loss

Focusing on the five major perspectives of energy-savings derived from Mitsubishi Electric's know-how accumulated over many years, EcoAdviser utilizes AI to automatically extracts energy loss from electrical energy and production volume.

- Energy loss can be extracted simply by selecting the diagnosis period
- · Ranking-type display in order of equipment with high energy loss
- Displays daily energy loss for each of the five major perspectives of energy-savings and highlights places where loss is higher than usual

#### Factor Diagnosis - Utilizing AI to diagnose factors causing energy loss

Utilizes AI to assess date/time information, production information, etc. and rank items with high correlation as factors causing energy loss to provide a diagnosis together with anticipated improvement results.



#### Point 1

Ranking display of factors most likely to cause energy loss

Default factors include equipment start-up time, production start time,

- day of the week, production volume, etc.Collected arbitrary data can also be added as factors
- (production model type, temperature, humidity, etc.)

#### Point 2

Displays improvement effect in monetary terms if measure is implemented (rough estimate)

#### Point 3

Learns selected effectiveness and reflects in factor diagnosis from next time onwards

#### Point 4

For each selected factor, presents information that can be more noticeable in shop floor improvements

- Advice
- Energy loss by factor
- Energy loss by one factor limitation

#### Effect Verification - Easy visualization of improvements after implementation of energy-saving measures

Simply by selecting the period before/after the measure was implemented, users can confirm the improvement in energy loss in terms of electrical energy consumption and cost.

By revising energy-saving measures while verifying effects, energy-saving initiatives can be rolled out with good continuity.



### Energy-saving Data Collecting Server EcoWebServer

EcoWebServerIII is a product that facilitates data analysis needed to achieve energy-savings simply by setting the collection of measurement data of measurement instruments connected to a field network (CC-Link or MODBUS®). EcoWebServerⅢ can also convert the data into graph format utilizing a web browser and display current values.

#### Function required for energy-savings provided as a standard feature

Equipped with functions necessary to collect, save, visualize, etc. measurement data without programs or ladders, thereby simplifying the construction of energy monitoring systems.





#### EcowebServer

#### Converts measurement data to graph format on a web browser

- · Featuring built-in applications specifically for energy savings (graph creation function, etc.), EcoWebServerIII contributes to factory energysaving measures.
- With a HTTP server function, EcoWebServerIII sends the data it collects to the Intranet via Ethernet. Users can confirm energy consumption in real-time from any kind of device.



#### Detection of exceeded target values and equipment errors by alarm output and email notification

- · When targets are exceeded or an equipment error occurs, users are notified by alarm output and email notification, allowing them to instantly notice the change in conditions. This accelerates the PDCA cycle from the time of problem occurrence until a measure is implemented, thus increasing productivity.
- Also supports smartphones/tablets, enabling users to confirm alarm content and emails while on the shop floor.



\* For details, please consult with your network administrator (or the relevant depart

#### Full lineup of measurement instruments to suit various purposes and applications

#### **EcoMonitorPlus**



#### EcoMonitor Plus

**MELSEC iQ-R Series Energy Measuring Module** 



ME96SS Ver.B Series



- · Layered expansion to suit the purpose with a building-block approach
- · Basic unit lineup includes a control unit equipped with an energy-saving automatic control function. · Optional units support saving of measurement data
- (in CSV file format) to SD memory cards and various communications.
- · One module can measure various items including electrical energy, reactive power, current, and voltage.
- By synchronizing with production information and control programs, users can manage energy consumption in detailed consumption units by individual model type and/or process. This contributes to energy savings on the production line and higher productivity.
- Electronic Multi-Measuring Instrument ME96SS Ver. B Series supports the realization of measuring and monitoring systems that are user-friendly and have easy-to-see displays.
- Using an optional Plug-in Module can achieve Analog/Pulse/Contact output, Contact input, CC-Link and MODBUS® TCP communications and Backup (with SD card) functions.

#### EcoMonitorLight

# ARDINGT.

#### EcoMonitor Class

MDU Breaker (MDU: Measuring Display Unit)



. In the same way as EcoMonitorPlus, optional units support saving of measurement data to SD memory cards and various communication.

all be performed on a single unit.

· With a built-in LCD display, settings, measurement,

and display necessary for energy measurement can

- Consolidates a breaker, VT/CT for measurement, and measurement display unit into one and supports energy savings by saving space, and reducing installation work and wiring
- The measurement display unit is available in a variety of installation styles, including main body installation, built-in display, stand-alone built-in display unit, and panel installation (photo shows main body installation).
- Supports a wide variety of networks (CC-Link. MODBUS®, electrical energy pulse output).

## **MELSOFT GX Works3**

GX Works3 is simple, user-friendly new-generation engineering software featuring structured programming and a variety of new functions and technologies designed for use with the control systems of MELSEC iQ-R and MELSEC iQ-F Series products.



#### Intuitive engineering software covering the product development cycle

- Graphic-based configuration realizing easier programming
- Integrated motion-control system configuration
- Complies with IEC 61131-3

#### Simple point and click programming architecture

- Straightforward graphic based system configuration design
- MELSOFT library enables efficient programming through "Module Label/FB"
- Extensive version control features





#### Global realization by multi-language support

- Users can easily change the language of menus and messages in GX Works3 (multiple languages supported in a single package).
- No difference in functions between displayed languages, thereby allowing smooth introduction to production bases around the world.

#### Simultaneous editing function enables efficient program editing

- Several people can create and simultaneously edit local projects from a single master project shared on the company network or cloud.
- Enables concurrent program design without the need to wait for upstream process program editing to be completed.

# **MELSOFT iQ AppPortal**

iQ AppPortal is a software to batch manage MELSOFT product project files, design drawings, documents, etc. by individual purpose.

Files can be registered using an easy drag-and-drop operation. By easily leaving editing history after registration, users can also view editing history and retrieve past data with ease. If there is a conflict with another person's edited file, you can compare the changes to prevent mistakes such as unintentionally overwriting other people's edits. Moreover, the branch creation function and revision graph help to reduce the workload of diversion development/management by making it instantly apparent when data has been diverted, when it began being diverted, the diversion source, and diversion destination.



#### Registration Batch management by individual application

Assets can be registered easily by dragging and dropping from Explorer to iQ AppPortal



A set of assets required by a customer to achieve a goal

#### Utilization Prevents overwriting of content edited by other users

When a user tries to overwrite a file edited by someone else, a warning is issued upon upload to the server. This feature prevents users unintentionally overwriting another user's edited content.



#### Verification

It is possible to check changes in project files, design drawings, and documents of MELSOFT products by verification. It makes it easy to see what's changed when there's a data conflict or change.



#### Viewing/Vearching Review asset information without opening a project

Using filters and character string searches, users can quickly and easily find the necessary asset.



Refines and displays asset list based on filters such as project type, registration date, and categories set by customers

#### History management Detailed evaluation of change history and retrieval of past files

Users can save the history of the changed asset along with comments. It is also possible to retrieve past versions of files from the history log, thereby making it easy to manage history with reference to past file names, etc.



#### **Branch Management**

Users can easily create new applications based on existing ones. By managing as a new folder, users can also develop similar applications in parallel.

Moreover, a revision graph allows users to instantly see when and from which application the new application was created as a branch, thus making diversion development/management easy.

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ServoSolution_No.2 Rotary fo- RK_vol2 for B Corp.			I	2017/05/11			

#### Numerical Control (CNC) Remote Service iQ Care Remote4U

This service enables real-time access to operation information of machines equipped with Mitsubishi Electric CNCs. It helps to reduce downtime by improving maintainability through remote diagnosis of user's machines equipped with our CNCs.

 Please contact your nearest Mitsubishi Electric overseas office regarding which regions offer this service.





#### **CNC Remote Service (for Machine Tool Manufacturers)**

Simply by purchasing a platform license, users can take advantage of our remote service for machine tools equipped with Mitsubishi Electric CNCs. Mitsubishi Electric prepares the cloud server, thus reducing the cost involved in introducing and maintaining the remote service. Moreover, by introducing this remote service, machine manufacturers can improve the efficiency of their service work.



#### **CNC Remote Service (for Users)**

#### Dashboard function\*1

Dashboard function contributes to production process improvement and running cost reduction

Users can monitor operating information for machines equipped with Mitsubishi Electric CNCs in real-time.

\*1 Different from the dashboard function of Mitsubishi Electric EDMs and laser processing machines.

#### Remote diagnosis function

Improving maintainability with a remote diagnosis function

Mitsubishi Electric can remotely support its CNCs installed in customers' machines from its service center.



of a commercially sold computer, smartphone, or tablet without having to install dedicated software (must enter an ID and password).



Remote diagnosis of machines is also possible if there is a contract with a machine manufacturer who holds a license for the iQ Care Remote4U platform.

## **Edgecross**

Integration of IoT in manufacturing is accelerating to strengthen competitiveness and create new value. Based on this trend, the Edgecross Consortium will contribute to the development of IoT in the manufacturing industry with the aim of creating new added value that transcends the boundaries of companies and industries with a focus on the edge computing field.



#### Creating new value with a focus on the edge computing domain



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Edgecross Consortium

## **CC-Link IE TSN**

CC-Link IE TSN supports TCP/IP communications and applies it to industrial architectures through its support of TSN enabling real-time communications. With its flexible system architecture and extensive setup and troubleshooting features make CC-Link IE TSN ideal for building an IIoT infrastructure across the entire manufacturing enterprise.

What is Time-Sensitive Networking (TSN)?

TSN is the IEEE-defined standard technology that enables deterministic messaging on standard Ethernet. The technology ensures deterministic communications by utilizing the time synchronization method (IEEE 802.1AS) and time-sharing method (IEEE 802.1Qbv). With the addition of these standards to Ethernet technology, realtime control communication and non-real time information communication can be mixed, which is not possible with conventional Ethernet communications.



TSN technology enables the transfer of deterministic communication even when delivering the information communication data of IT systems on the same network. By increasing network bandwidth and giving priority to CC-Link IE TSN communications and TCP/IP communications, devices that use general Ethernet communicationscan be connected to the same network without affecting real-time control communication performance.



#### Time series analysis using high-accuracy time synchronization

Achieves high-accuracy time synchronization with a synchronization accuracy of ±1µs or less and retains timestamp information in each connected station at increments of 1 ms. Error history can be displayed in time series, therefore enabling users to accurately analyze what happened and the cause of the problem from the exact time an error occurs.



#### Easy replacement of slave devices through automatic parameter distribution [Reducing start-up time]

When power is turned on or there is contingency, the master device automatically distributes parameters saved on the CPU unit to slave devices. As such, even when a slave device is replaced, there's no need to separately write parameters to it; making for smooth replacement.





# PARTNERS

Partners



Broad knowledge and skill as a comprehensive FA manufacturer e Foctory Alliance



Know-how of all fields relating to monozukuri

Co-creation

# Customer



Giving customers back the values born from co-creation

## e-F@ctory Alliance

# e-F@ctory Ecosystem – Co-creation with over 1100 Partners\*

As a solutions provider, we collaborate with many partners across all monozukuri fields. This ecosystem provides optimal solutions in various regions and fields in response to the issues experienced by our customers.

\*As of May 2024

Collaborating with the partners across the world



Producing entire production systems Achieving advanced systems integration







Production shop floor



Robots



## Development of application software strengthening connection affinity with Mitsubishi Electric FA devices



ERP/MES/SCADA











Provide device compatibility with Mitsubishi Electric FA equipment Achieve improved system builds and maintainability



Sensors







Related network devices

#### **HMS Industrial Networks HMS Ewon Cosy Series**

With the Cosy Series (remote access gateway) and Talk2M (cloud connection service), users can access Mitsubishi Electric FA devices from anywhere in the world and safely perform troubleshooting of equipment and devices, thus reducing support cost and downtime. A secure connection is achieved through measures such as exclusive

outbound connection, two-layer authentication, connection audit tracing, and access control using physical external key switches. We have obtained ISO27001 security certification and have testing performed regularly by NVISO to check for external intrusions. NVISO is a cybersecurity consulting company with a solid track record of providing cybersecurity-related services for all Belgian banks. Access is possible not only from a computer using eCatche (client software), but also remotely from an iOS or Android™ device installed with eCatcher Mobile on a browser of MELSEC or GOT. Moreover, assuming installation on a control panel, Ewon Cosy has been designed with specifications suited to industrial use, such as 24 VDC input, industrial EMC support, wide operating temperature range, and DIN rail mounting.





#### Conceptual image of remote access



#### Reasons why the Ewon Cosy Series is the manufacturers' choice

**Banked most reliable service** in the North American market for six consecutive years сно/с 2020 icontrol desi



Overwhelming number of VPN servers for connection where in the world



Highly secure performance lighly experienced, enriched with VPN connection

anufacturer support



#### **Product data**

Remote access gateway Cosy	I			Free cloud service*2 Talk2M Free +	Talk2M
				Number of registered devices	Unlimited
Internet connection	Wired LAN	Wi-Fi	4G/LTE*1	Number of registered users	Unlimited
Product model	EC61330	EC6133C	EC6133F/G/H*2	Number of concurrent views	5
Common oppolitiontions	RJ45 x 4 (10/100Mbps), US	B x 1, DI x 2/DO x 1,		Number of concurrent connections	1
Common specifications	Rating: 12-24 VDC, Operati	ng temperature range: -28	5 to 60°C, DIN rail mounting	Monthly data volume	3GB
*1 Antennas for 4G models sold separately.				*3 Talk2M Pro is also available for a fee	ə.

\*1 Antennas for 4G models sold separately \*2 F for APAC, G for EU, H for North America.

#### Flexy Series - Industrial IoT gateway for host models also included in the lineup

In addition to the Cosy remote access, this solution also facilitates smooth IIoT transition by collecting data from a remote manufacturing site and connecting individual cloud services with OPC UA, MQTT, etc.

#### **Kanematsu Communications** Secomea SiteManager Series

With SiteManager (remote access gateway), GateManager (relay M2M communication server), and LinkManager (client software), it is possible to access Mitsubishi Electric FA devices to monitor and perform maintenance on machinery and equipment at a manufacturing site, thus reducing business trip/transportation costs, and enabling quicker response. A secure connection is achieved through measures such as exclusive outbound connection, encryption using SSL/TSL, multi-factor authentication using certificates, SMS, etc., access authority using an individual device, audit log, etc. The Secomea solution has obtained security certification from ProtectEM GmBH (a German third-party organization) and conforms to Industry 4.0. In addition to SiteManager's main unit being designed with a robust aluminum housing, SiteManager Embedded (embedded software) can be used to make industrial computers such as MELIPC, etc. function as a gateway.





#### **Conceptual image of remote access**



\*1 SIM card can be inserted by adding a separate communication module.

#### Constant connection option "LogTunnel" use case



Not only FTP, but all protocols including HTTP, OPC UA, and MQTT can be used, and traceability systems as well as SCADA system construction are supported.

Secomea SiteManager also offers constant connection at the same time as maintenance of FA devices through remote access using LinkManager.

#### Lineup

With various versions available to suit the user's environment and purpose of use, SiteManager Embedded software can be installed and used on industrial devices.

1139

1539

3339

3539

١N

Wi-Fi

1149

1549

3349

3549



SiteManager	
11xx/33xx	
Series	

SiteManac

15xx/35x

Series

	Maximum	5	1129
	number	10	1529
er	of device connection settings	25	3329
x		100	3529

Sacome	) tones

Unlike the SiteManager hardware product. SiteManager Embedded is a software gateway that can be installed in a MELIPC, etc. to function as a secure access gateway. It operates as a seamless service in the background on various OS. SiteManager Embedded is very light, and therefore uses minimal system resources.

#### **Trend Micro** Cyber security solution for FA systems

As a cybersecurity measure for FA systems, Trend Micro provides solutions tailored to customers' environments and conditions. There are products that can prevent malware infection in factories\*1, prevent damage spread, and protect vulnerable systems. Depending on the target equipment, there are two methods of protection: security for industrial PCs and industrial network security.



\*1 Malware is a generic term for malicious program and includes worms and viruses.

\*2 Please refer to the URL on the right for details on security for industrial PCs. https://www.trendmicro.com/en\_us/business/products/iot/industrial-endpoint-security.html \*3 Please refer to the URL on the right for details on industrial network security. https://www.trendmicro.com/en\_us/business/products/iot/industrial-network-security.html

\*4 Virtual Appliance is software (OVA file) that the customer prepares and installs and uses in a virtual environment

# Mitsubishi Electric FA Product Security Guidelines



Mitsubishi Electric promotes and strengthens initiatives to reduce risks in the security of its products and services. We will implement security measures in accordance with our FA Security Guidelines at each layer (human layer, physical layer, network layer, device layer) and achieve manufacturing at factories with a safe and reassuring security environment.

\* FA Security Guidelines are guidelines that summarize content to help customers understand security initiatives for our FA products and recommendations related to using our FA products.



https://www.MitsubishiElectric.com/fa/business/psirt/

#### Reference

- (1) CC-Link Association CC-Link IE TSN Security Guidelines https://www.cc-link.org/en/cclink/security/
- (2) Edgecross Consortium Security Guidelines https://www.edgecross.org/en/data-download/#security

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  installing the products where major accidents or losses could occur if the products
  fail, install appropriate backup or fail-safe functions in the system.

# **Automating the World**

# **Creating Solutions Together.**





Low-voltage Power Distribution Products



Compact and Modular Controllers



Numerical Control (NC)





Servos, Motors and Inverters



Collaborative and Industrial Robots



Products

Power Monitoring and Energy Saving



Processing machines: EDM, Lasers



Power (UPS) and Environmental Products



Edge Computing Products



SCADA, analytics and simulation software

Mitsubishi Electric's product lineup, from various controllers and drives to energy-saving devices and processing machines, all help you to automate your world. They are underpinned by software, innovative data monitoring, and modelling systems supported by advanced industrial networking and Edgecross IT/OT connectivity. Together with a worldwide partner ecosystem, Mitsubishi Electric factory automation (FA) has everything to make IoT and Digital Manufacturing a reality.

With a complete portfolio and comprehensive capabilities that combine synergies with diverse business units, Mitsubishi Electric provides a one-stop approach to how companies can tackle the shift to clean energy and energy conservation, carbon neutrality and sustainability, which are now a universal requirement of factories, buildings, and social infrastructure.

We at Mitsubishi Electric FA are your solution partners waiting to work with you as you take a step toward the realization of sustainable manufacturing and society through the application of automation. Let's automate the world together!





Mitsubishi Electric's e-F@ctory concept utilizes both FA and IT technologies, to reduce the total cost of development, production and maintenance, with the aim of achieving manufacturing that is a "step ahead of the times". It is supported by the e-F@ctory Alliance Partners covering software, devices, and system integration, creating the optimal e-F@ctory architecture to meet the end users needs and investment plans.



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