FACTORY AUTOMATION

Visual Inspection Software
MELSOFT VIXIO

Maisart

Automating the World

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.

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.

SUSTAINABLE DEVELOPMENT GOALS

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.

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Concerns in the
inspection process

☑ Labor shortages increase the burden on inspectors

☑ Generational changes in inspectors make consistent visual inspection difficult

☑ Even though inspection is rule-based, overdetection is increasing

We want to implement AI for visual inspection, but we find it challenging due to our lack of AI expertise.

The solution -
Visual Inspection Software

MELSOFT VIXIO »

Perform visual inspection easily and accurately with AI

Feature 1

Featuring a high-speed, high-accuracy AI algorithm ideal for factory automation

▌AI introduction challenge (1)

The limited number of defective product images complicates accuracy improvement. Generating AI models requires extensive image learning, making the process time consuming and inefficient.

▼

▌With MELSOFT VIXIO

Easily generate AI models with high-speed, high-accuracy AI.

Anomaly detection

Detect "Different from usual"

Anomaly detection

Learn from non-defective product images to remember "Features of non-defective products"

Learn

High-speed model generation in seconds

Infer

Inference results (heat map)
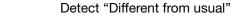
AI that detects differences from non-defective products

With conventional learning methods

To increase accuracy, it is necessary to learn from a large number of images, so the learning time is long and it is difficult to rebuild models.

Point — Even unexpected defects can be detected.

Defective point detection

Detect specific abnormality patterns

Defective point detection

Learn defects features

Learn

Model generation from even a single defective product image

Infer

Inference results (heat map)

AI that detects defects

With conventional learning methods

Although learning requires a large number of defective product images, it is difficult to obtain the necessary number of such images in the manufacturing industry.

Point — Detection of similar defects even in different locations or with different sizes is possible.

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Feature 2

Simple operation settings without programming

▌ AI introduction challenge (2)

Even if an AI model could be generated, specialized programming is required to implement it in the system.

▼

▌ With MELSOFT VIXIO

Easily set up tasks in a flowchart format.
Settings from model generation to monitor screen creation can be performed with a single tool.
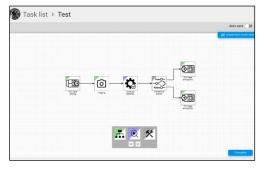
Easy system construction

All functions necessary to construct an AI visual inspection system can be easily set up without programming.

Setting the overall operation

Point

Set the overall operation flow in a flowchart format.

Camera settings

Point

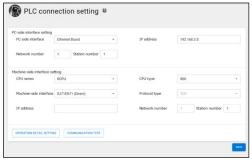GigE Vision® Camera settings can be configured in the camera's various settings.

Settings for communication with programmable controllers*

Point

Easy data exchange with various programmable controllers.
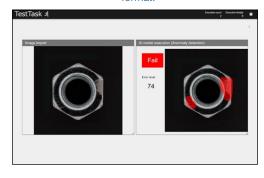
Inspection monitor screen
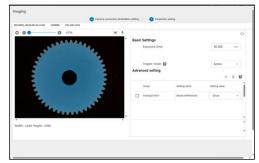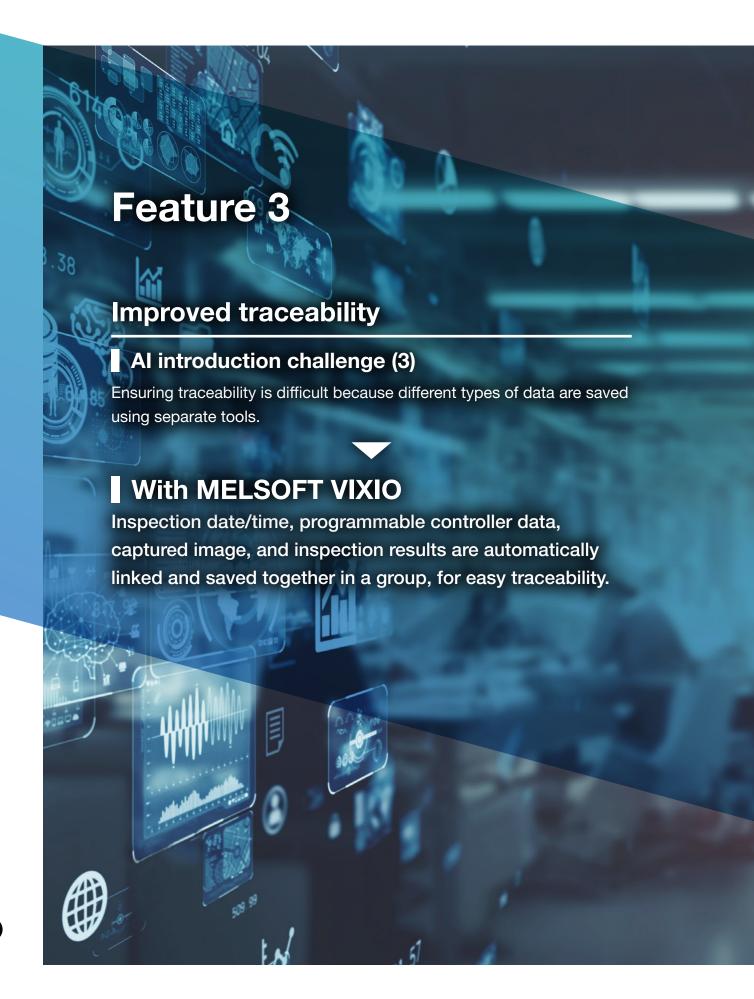
Point

A monitor screen can be created by arranging the display elements of multiple monitors in a dashboard format.

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Feature 3

Improved traceability

AI introduction challenge (3)

Ensuring traceability is difficult because different types of data are saved using separate tools.

With MELSOFT VIXIO

Inspection date/time, programmable controller data, captured image, and inspection results are automatically linked and saved together in a group, for easy traceability.

Traceability in coordination with a programmable controller

Automatic linking of manufacturing information and judgment results.

Product name	ABC0123
Inspection date	MM/DD/2024
Lot No.	1000000

Captured image   Judgment results

Pass

Fail

Manufacturing information

Automatic saving of inspection results, captured images, and various programmable controller data including manufacturing information.

Focus and view the data needed by filtering or searching saved data.

Point Immediate analysis of MELSOFT VIXIO judgment results according to the manufacturing date

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Application scenes

CASE 01

Combination of rule-based and AI-based inspections

Before

Rule-based-only inspection

When rule-based inspection is applied to items for which rules are difficult to define, numerous mis-detections occur.

CASE 02

Primary screening with AI reduces time and equalizes

Before

Sorting by human eyes and detailed inspection of defective products

Products identified as "possible defectives" by human eyes in the primary sorting must also be checked by the person in charge of quality assurance, which requires human labor.

CASE 03

Reduce inspector workload by combining human and AI

Before

Visual inspection process (by human eyes) by only one person

One person in charge of inspection visually checks all products, which leads to overlooking of defective products due to heavy workload.

improves the accuracy of the inspection process

After

Combination of rule-based and AI-based inspections

Introducing MELSOFT VIXIO AI inspection and implementing into existing rule-based inspection improves inspection accuracy.

inspection quality

After

Perform primary screening with AI

AI-based primary screening reduces the number of products requiring secondary human screening.
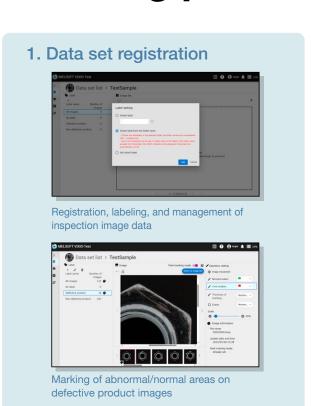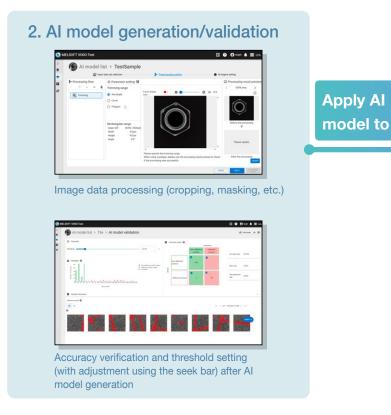

inspection

After

Double check by AI and human eyes

The introduction of double-checking reduces the risk of overlooking defective products and ensures consistency of quality between operators.

Learning phase

1. Data set registration

Registration, labeling, and management of inspection image data

Marking of abnormal/normal areas on defective product images

2. AI model generation/validation

Image data processing (cropping, masking, etc.)

Accuracy verification and threshold setting (with adjustment using the seek bar) after AI model generation

Apply AI model to

System configuration

MELSOFT VIXIO

Development license

Learning computer

Generate AI model from image data

Register images of inspection target workpieces in MELSOFT VIXIO and perform learning

Office computer (Web browser)

4

Operation Processes

Inspection phase

the site

3. Operation settings

Inspection flow configuration

Parameter configuration for camera, programmable controller, etc.

4. Inspection operation

Task execution status and inspection results monitoring

Incorporation of inspection results history in traceability

Pass
Fail

MELSOFT VIXIO
Run-time license

Inspection computer (site computer)

Judgment results

Image file

Production data

Capture image command

Tablet (Web browser)

Image-processing controller

Industrial camera

Programmable controller

Product specifications

■ License system
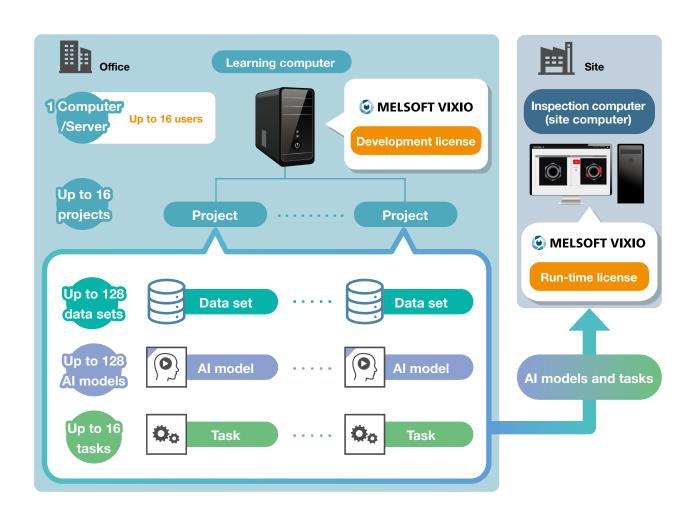
Type	Model	Form	Period of use	Remarks
Development license (short-term)*	SW1DND-AIVILE-MQ12	DVD-R	1 year	Perform AI model learning and perform inspections with tasks using the generated AI models.
	SW1DNN-AIVILE-MQ2	Certificate	2 months	
Development license (one-time purchase)*	SW1DNN-AIVILE-M	Certificate	Perpetual	
Run-time license*	SW1DND-AIVIIN-M	DVD-R	Perpetual	Deploy or import AI models generated with the development license to set tasks and perform inspections with the imported AI models.
	SW1DNN-AIVIIN-M	Certificate		

*: Node-locked license for one computer

■ Concept

Project	Data set	AI model	Task
A compilation of data sets, AI models, and tasks needed to perform learning and inspection	A set of data used for learning and validation (image data, pixel marking information, etc.)	A computational model for making predictions and decisions based on data set learning results	The inspection processing flow

Office — Learning computer

1 Computer /Server — Up to 16 users

MELSOFT VIXIO
Development license

Up to 16 projects

Project ········· Project

Up to 128 data sets — Data set ····· Data set

Up to 128 AI models — AI model ····· AI model

Up to 16 tasks — Task ····· Task

Site — Inspection computer (site computer)

MELSOFT VIXIO
Run-time license

AI models and tasks

■ Specifications

Item		Development license	Run-time license
Project	Number of projects	16 projects/computer	
	Number of users	16 users/computer	
Data set	Number of sets	128 sets/project	-
	Number of registered images	10,000 images/set	-
	Registrable image formats	jpg, jpeg, png, bmp	-
	Resolution	100 MP (10,000 × 10,000)	-
AI model	Number of sets	128 sets/project	-
	Number of simultaneously executable learning processes	8 models/computer[*1][*2]	-
Task	Number of sets	16 sets/project	
	Number of simultaneously executable tasks	4 tasks/computer	
	Number of executable AI	8 models/task[*3]	
	Number of connectable cameras	8 units/computer[*4]	
	Number of connectable programmable controllers	4 units/computer	
Accessible CPU module		MELSEC iQ-R/iQ-F/-Q/-L Series	
Connection method		MELSOFT connection	

[*1]: 4 models each for anomaly detection and defective point detection.
[*2]: Defective point detection uses 2.4 Gbytes of GPU memory per model.
[*3]: Tasks using defective point detection use 2.4 Gbytes of GPU memory per task.
[*4]: When multiple cameras are connected, phenomenon such as noise may occur in images due to resolution or network conditions. It is recommended that network cards be separated.

■ Connectable industrial camera specifications

Hardware standards	Software standards
Conforms to GigE Vision® (Ver. 2.0)	Conforms to GenICam™ (Ver. 3.2.0)

Note 1: For information on usable industrial cameras, please refer to Technical Bulletin FA-A-0419.
Note 2: "Connectable" means the following:
　　· Camera-side parameters (exposure time or white balance) can be adjusted in this product.
　　· Image capture command can be issued directly by this product.
　　Since it is possible to browse to a folder on the computer and perform AI inspection on stored images, cameras which do not meet the above specifications can also be used.

■ Computer specifications

Development license		
Item	**Recommended**	**Minimum**
CPU	Intel® Core-i7™ 9th generation (October 2018) or higher	Intel® Core-i5™ 9th generation (October 2018) or higher
GPU*	NVIDIA® GPU Ampere Architecture or higher Memory: 8 GB or more	NVIDIA® GPU Pascal™ Architecture or higher Memory: 6 GB or more
Memory	32 GB or more	16 GB or more
OS (64-bit version)	Microsoft® Windows® 10 Version 21H2 or later (Pro, Enterprise, IoT Enterprise)	
	Microsoft® Windows® 11 Version 22H2 or later (Pro, Enterprise)	
Free storage space	512 GB or more	256 GB or more

Run-time license		
Item	**Recommended**	**Minimum**
CPU	Intel® Core-i7™ 9th generation (October 2018) or higher	Intel® Core-i5™ 9th generation (October 2018) or higher
GPU*	NVIDIA® GPU Pascal™ Architecture or higher Memory: 6 GB or more	NVIDIA® GPU Pascal™ Architecture or higher Memory: 4 GB or more
Memory	16 GB or more	8 GB or more
OS (64-bit version)	Microsoft® Windows® 10 Version 21H2 or later (Pro, Enterprise, IoT Enterprise)	
	Microsoft® Windows® 11 Version 22H2 or later (Pro, Enterprise)	
Free storage space	256 GB or more	128 GB or more

*: Not required for use with anomaly detection AI only.

■ Mitsubishi Electric FA Global Website　　Visual Inspection Software MELSOFT VIXIO

Mitsubishi Electric FA Global Website: **www.MitsubishiElectric.com/fa**

Trial version download

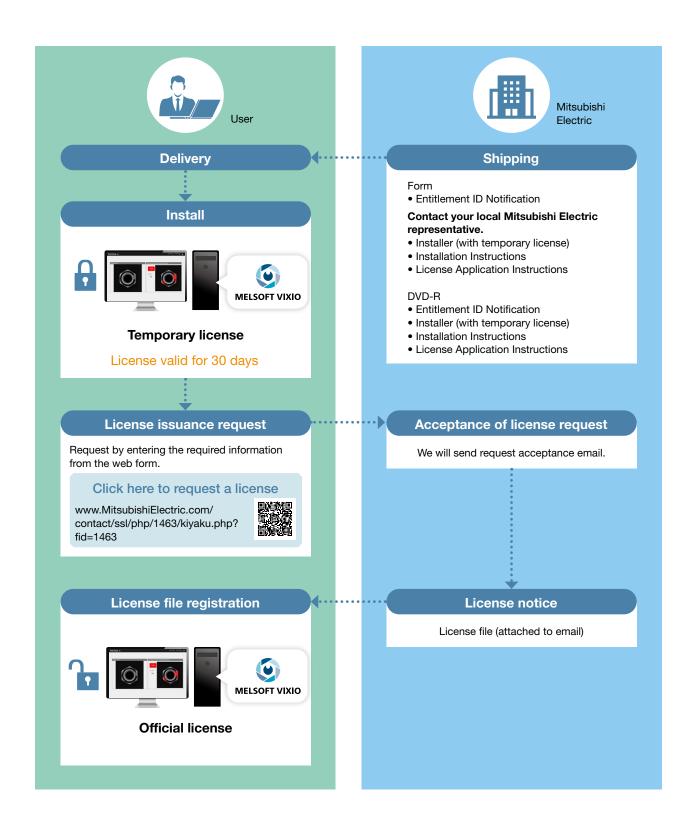A trial version of MELSOFT VIXIO can be downloaded from the Mitsubishi Electric FA Global Website.

www.MitsubishiElectric.com/fa/products/ software/image-processing/vixio/index. html

How to install

Here are the steps to install MELSOFT VIXIO.

User

Mitsubishi Electric

Delivery

Shipping

Form
• Entitlement ID Notification
Contact your local Mitsubishi Electric representative.
• Installer (with temporary license)
• Installation Instructions
• License Application Instructions

DVD-R
• Entitlement ID Notification
• Installer (with temporary license)
• Installation Instructions
• License Application Instructions

Install

Temporary license

License valid for 30 days

License issuance request

Request by entering the required information from the web form.

Click here to request a license

www.MitsubishiElectric.com/contact/ssl/php/1463/kiyaku.php?fid=1463

Acceptance of license request

We will send request acceptance email.

License file registration

Official license

License notice

License file (attached to email)

Discover the latest information in Factory Automation

Factory Automation Global website

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

■ From here you can find:

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

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

Mitsubishi Electric FA
e-Learning

An extensive library of e-learning courses covering the factory automation product range.
Courses from beginner to advanced levels of difficulty are available anytime anywhere.

■ Beginner level

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

■ Basic to Advanced levels

Various different features are explained along with setup, programming, and network configuration.

Innovative next-generation
e-Manual

A next-generation digital manual that consolidates factory automation products manuals into an easy-to-use package with various useful features.

■ e-Manual Viewer

Multiple manuals can be cross-searched at once. Multiple users can share the latest manuals and knowhow with document sharing function.

■ e-Manual Create

Software for converting word files and chm files to e-Manual documents. User's customized machine manuals can be converted to e-Manual documents, allowing consolidated management of user's maintenance information and Mitsubishi Electric product information.

Find information on products, factory automation, e-F@ctory solutions and other topics
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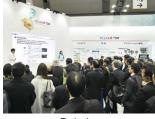**@Mitsubishi_FA**

CC-Link Partner Association (CLPA) - Actively promoting worldwide adoption of CC-Link Family

Proactively supporting CC-Link Family, from promotion to specification development

The CC-Link Partner Association (CLPA) was established to promote the worldwide adoption of the CC-Link open-field network. In 2018, CLPA has developed CC-Link IE TSN, the world's first open industrial network utilizes Time-Sensitive Networking (TSN) technology, which is an extension of standard Ethernet, to accelerate the construction of smart factories utilizing Industrial IoT (IIoT). By conducting promotional activities such as organizing trade shows and seminars, conducting conformance tests, and providing catalogs, brochures and website information, CLPA activities are successfully increasing the number of CC-Link partner manufacturers and CC-Link Family-compatible products. CLPA will provide a variety of development methods and develop a truly open industrial network on a global scale.

Seminar

Trade show

Conformance testing lab

■ **Visit the CLPA website for the latest CC-Link Family information.**

CLPA website
www.cc-link.org/en

| CLPA Headquarters | 6F Ozone Front Bldg. 3-15-58 Ozone Kita-ku, Nagoya 462-0825, JAPAN TEL: +81-52-919-1588 FAX: +81-52-916-8655 e-mail: info@cc-link.org |

Global influence of CC-Link Family continues to spread

Centered in Japan, the CLPA has established bases of operations in 10 regions around the world. We lead the way in further opening up CC-Link Family network technology to the world. From helping vendors develop compatible products to consultation concerning system construction for our users, we provide a wide range of support services.

Japan	● CLPA Headquarters **CT**		
Asia-Pacific	● CLPA-China **CT** ● CLPA-Korea **CT**	● CLPA-India ● CLPA-Taiwan	● CLPC-ASEAN ● CLPC-Thailand
EMEA	● CLPA-Europe **CT** ● CLPA-Turkey		
Americas	● CLPA-Americas ● CLPA-Mexico		

CT : Conformance testing lab

Regional Offices ▶

Precautions before use

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

⚠ For safe use

- To use the products given in this publication properly, always read the relevant manuals before beginning operation.
- The products have been manufactured as general-purpose parts for general industries, and are not designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the products for special purposes such as nuclear power, electric power, aerospace, medicine or passenger-carrying vehicles, consult with Mitsubishi Electric.
- The products have been manufactured under strict quality control. However, when installing the products where major accidents or losses could occur if the products fail, install appropriate backup or fail-safe functions in the system.

Creating Solutions Together.

Low-voltage Power Distribution Products

Transformers, Med-voltage Distribution Products

Power Monitoring and Energy Saving Products

Power (UPS) and Environmental Products

Compact and Modular Controllers

Servos, Motors and Inverters

Visualization: HMIs

Edge Computing Products

Numerical Control (NC)

Collaborative and Industrial Robots

Processing machines: EDM, Lasers

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!

Note: not all products are available in all countries

Sales office

MITSUBISHI ELECTRIC Factory Automation Global Website
▶ Locations Worldwide
www.MitsubishiElectric.com/fa/about-us/overseas/

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e-F@ctory

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.

e-F@ctory Alliance

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