Fuji Electric

Innovating Energy Technology

Small- and Medium-Scale Monitoring and Control System
MICREX-VieW XX

Monitoring and Control System for Safe and Stable Plant Operation

☑ High-capacity and high-speed plant control

☑ Continuous operation rate improvement through full redundancy

☑ Effective use of existing assets through high inheritability

ECO-PRODUCTS
Fuji Electric

MICREX-VieW XX

Visual **I**ndustry & **E**co **W**orld

More Stable and Safe Plant Operations

Fuji Electric's "MICREX" Series, plant monitoring and control systems, support a wide range of plant operations. The **MICREX-VieW XX** has further evolved to meet the needs and challenges of more customers.

It greatly improves operability and reliability by utilizing the technologies cultivated in the MICREX Series. We offer life cycle solution services designed especially for plants in a wide range of fields including the steel, food, pharmaceutical and environment industries, thereby contributing to safe and stable operations and energy savings. Furthermore, since conventional MICREX Series products are highly inheritable, they facilitate effective use of existing assets when upgrading systems. They enable migration to more reliable systems by shortening deployment times and minimizing costs.

Fields of Application

Accommodates a wide range of industries and fields since it facilitates flexible configuration of systems according to scale and application.

Chemical	**Food & Pharmaceuticals**	**Iron & Steel**
Batch process monitoring and control	Monitoring and control compliant with industry standards	Monitoring and control of steelmaking processes and high-speed operation

Oil	**Waste Treatment**	**Gas**
Monitoring and control of shipping for oil tanks, etc.	Monitoring and control of incineration, pollution control, waste heat utilization, etc.	Monitoring and control of city gas production and pipelines

Cement	**Water Treatment**	**Airports**
Monitoring and control of raw materials, sintering, finishing, etc.	Monitoring and control of sludge, chemical injection, etc.	Monitoring and control of aircraft refueling, etc.

5 Features

Excellent visibility and operability

Instantly ascertain the status of plant operations

Integrating electrical machinery control and measurement control

Suitable for a wide variety of plants

Efficient engineering

Offers rich environment that minimizes labor-hours

High reliability

Supports full redundancy to provide peace of mind during trouble

High inheritability

Facilitates effective use of existing assets and optimizes deployment costs

Table of Contents

MICREX-VieW XX System Configuration

MICREX-VieW XX supports everything from compact single-configuration systems to fully redundant high-reliability systems. The lineup also includes an all-in-one station that combines the operator stations and database stations for compact systems via a single unit. System can be configured in a scalable manner based on customer requirements.
Moreover, this product can inherit much from the conventional MICREX Series, allowing easy monitoring and operating of the existing control station from the new operator station as well as data coordination between new and old control stations.

(Note) The I/O network used in the system includes our high-speed "E-SX Bus" I/O network and legacy "DPCS-F," "PE-link," and "T-link" networks, as well as open Ethernet, FL-net, and other protocols.

Host system (Client PC)
As a client of the OPC UA server, enables collection and display of plant data.
(1) As a client of the data banking features, it enables collection and display of historical data such as trends.
(2) As a PC that comes equipped with a Plant Operation Assistance System[1], it can create workflows, provide online instructions for on-site work, monitor progress, and check work results.
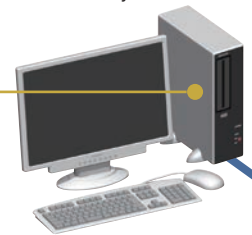
Database station XDS-3000
A station that integrates and manages trends, alarms, and operation histories. It enables long-term storage of alarms, operation history (integrated history), trends and reports. Furthermore, its data banking features make it easy to export data for external parties.
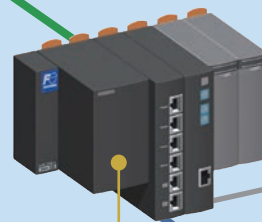
Plant Data Recorder XDR[2]
As a plant data sever for the Plant Playback System[2], it constantly collects and stores plant data (all panel TAG data) from each XCS-3000 control station.

Operator station XOS-3000
(1) It performs plant monitoring and operation. It can also connect with the XDS-3000 to display trends, alarm and operation histories, and reports.
(2) It playbacks and displays past plant data saved in the XDR. This enables quick clarification of error causes by replaying the plant status on the panel from the time of the error.

Control station XCS-3000
A high-speed, large-capacity and high-reliability control station for plant control. It allows both electrical machinery control and measurement control to be performed with a single unit.

Network adapter
Various types of network can be connected including our legacy networks such as DPCS-F, PE-link, and T-link and open networks such as FL-net.

High-reliability I/O, E-SX I/O
The I/O network uses a high-speed 100 Mbps E-SX bus. Furthermore, the high-reliability I/O is very reliable and maintainable, allowing I/O module pair redundancy and node pair redundancy[3].

Host system

Database station

Plant data recorder

Operator station

Control LAN FL-net Ver.3-compliant LAN

Control station

Network adapter

E-SX bus

High-reliability I/O, E-SX I/O

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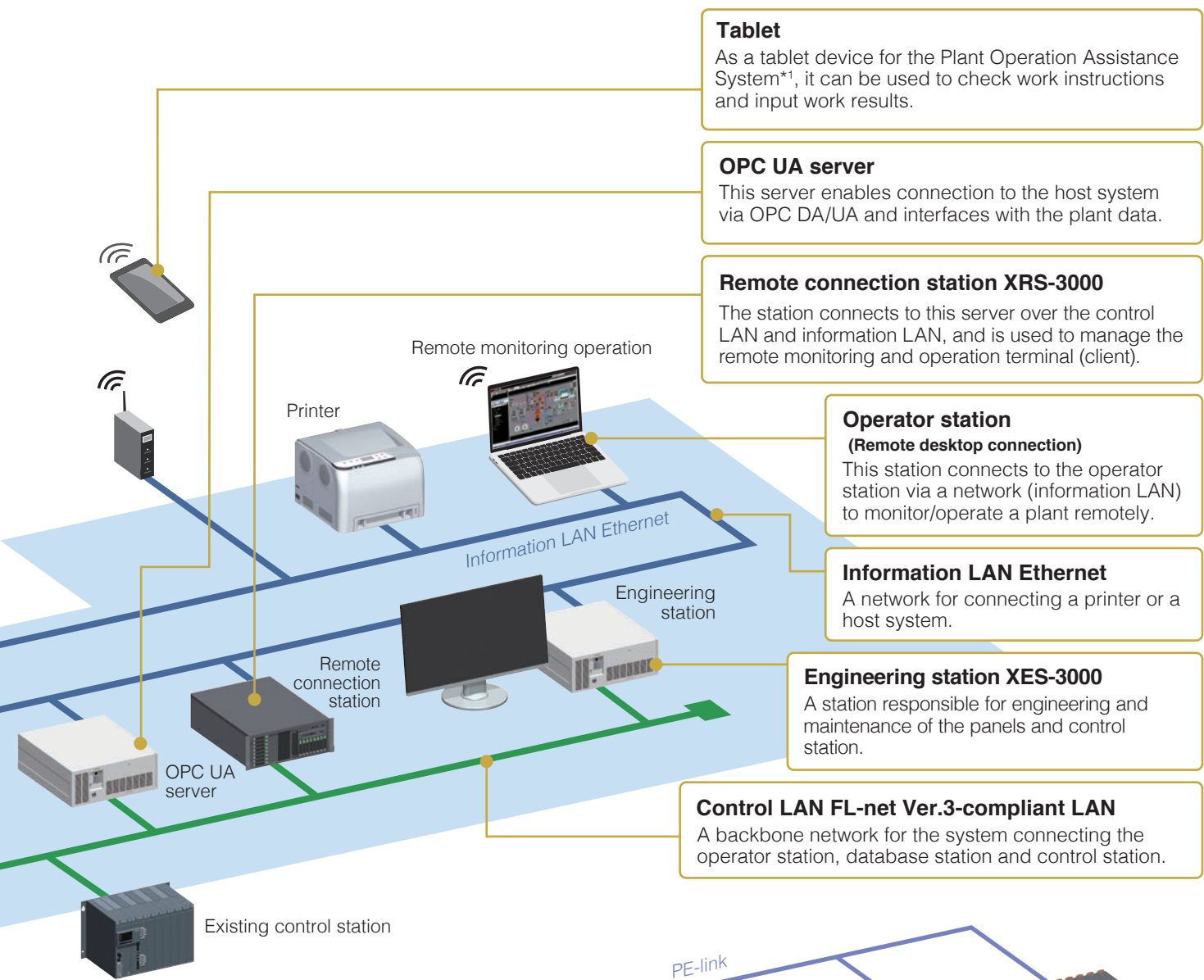
Tablet

As a tablet device for the Plant Operation Assistance System*[1], it can be used to check work instructions and input work results.

OPC UA server

This server enables connection to the host system via OPC DA/UA and interfaces with the plant data.
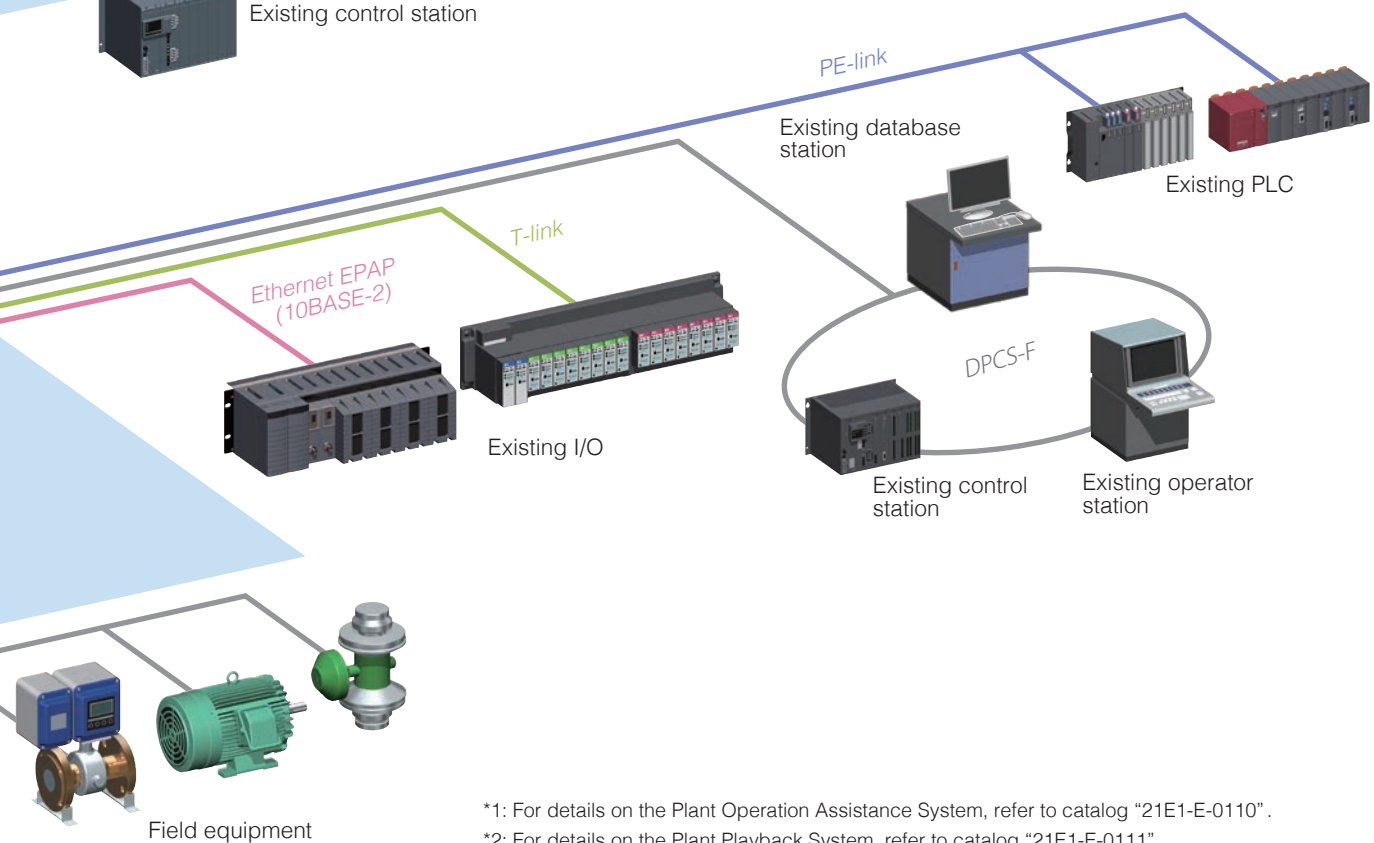
Remote connection station XRS-3000

The station connects to this server over the control LAN and information LAN, and is used to manage the remote monitoring and operation terminal (client).

Operator station
(Remote desktop connection)

This station connects to the operator station via a network (information LAN) to monitor/operate a plant remotely.

Information LAN Ethernet

A network for connecting a printer or a host system.

Engineering station XES-3000

A station responsible for engineering and maintenance of the panels and control station.

Control LAN FL-net Ver.3-compliant LAN

A backbone network for the system connecting the operator station, database station and control station.

Remote monitoring operation

Printer

Information LAN Ethernet

Engineering station

Remote connection station

OPC UA server

Existing control station

PE-link

Existing database station

Existing PLC

T-link

Ethernet EPAP (10BASE-2)

Existing I/O

DPCS-F

Existing control station

Existing operator station

Field equipment

*1: For details on the Plant Operation Assistance System, refer to catalog "21E1-E-0110".
*2: For details on the Plant Playback System, refer to catalog "21E1-E-0111".
*3: Node pair redundancy is a redundant configuration where a pair of I/O modules is separated into two racks.

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Monitoring/operation functions

The operator station has achieved excellent visibility and operability through the adoption of Fuji Electric's original multi-window platform*1.

*1: Middleware providing panel functions such as multi-window and multi-display. On the multi-window platform, panel applications can be operated individually, and panel functions can be added, updated and deleted easily.

Excellent visibility

(1,920 x 1,080) and up to four display units can be connected per operator station. The panel uses basic colors based on the color universal design to prevent false recognition and easy-to-identify icons, which ensures excellent visibility.

Cooperation with Windows applications

Microsoft Office, Adobe Reader and other Windows applications can be started from the operation panel. You can analyze data while monitoring/operating a plant.

Quick troubleshooting

The integrated history panel that merges alarm and operation histories provides various sort and search functions to allow quick analysis of problem factors.

Open interface

The database station includes the OPC UA interface as standard, which allows easy cooperation with other systems.

Integrated history panel
(Integrated and individual displays selectable)

High security

You can set user privileges or grouping to prevent erroneous operation or system tampering. antivirus software*2 onto the operator station or database station prevents the system from the threat of viruses.

Global support

The operator station is a global system supporting multiple languages.

*2: Antivirus software is designated by Fuji Electric. A whitelisting method has been adopted to control the starting of applications based on a list registering only applications allowed for activation.

Excellent operability

Up to eight operation panels can be displayed as windows or tabs. In addition, you can freely change, enlarge or reduce the layout. The layout of the instrument diagrams on the group panel can also be changed as desired, so that operators can use a layout suitable for operation. Moreover, the trend panel allows enlarging and reducing the point of interest with easy mouse operation, offering excellent operability. In addition, historical data for the past hour can be displayed on the loop panel's trend graph, expanded from the instrument diagram, thus improving operability for the operator.

● **Multi-window display**

● **Split display**

● **Enlarged/reduced panel display**
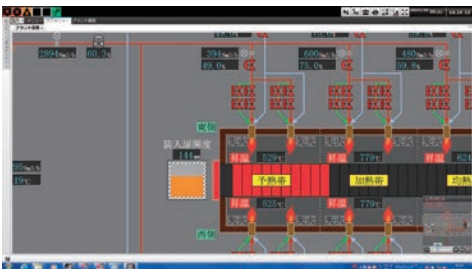
● **Group panel: Free layout switching of instrument diagrams**

● **Trend panel: Enlarged/reduced display**

Drag with the mouse.   Enlarged display

Plant Playback System (optional)

Reduces the analysis burden and elucidates the cause at an early stage by reproducing the operation state at the time of abnormality based on the monitoring data. Achieves stable operation and operational efficiency, and contributes to product quality improvement.   * For details, refer to Catalog No."21E1-E-0111"

Constantly records plant status

| During normal operation | Abnormal sign | Abnormal sign | Primary abnormal | Secondary abnormal | Secondary abnormal | Plant stoppage |

n mins. ago ··· 2 mins. ago   1 min. ago   **Abnormality**   30 secs. ago   1 sec. ago   **Present**

▲Alarm panel

DB

Speedy burden-free **Cause analysis**

Actual plays back the panel for every second in the past from the time of the abnormality

Contributes to stable operations by quickly clarifying causes

(Image)

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Control functions

High-capacity and
high-speed plant control

The control station has achieved high-speed control with minimum cycle of 1 ms as well as large capacity and high reliability. Integrating electrical machinery control and measurement control allows building of high-reliability plant control system despite compact configuration.

High-reliability CPU

A 1 GHz dual-core processor has been adopted for the CPU, achieving high-speed control with minimum cycle of 1 ms. This allows both high-speed electrical machinery control and high-functional measurement control to be performed with a single unit.
The CPU module has adopted multi-processor configuration architecture. It also provides advanced communication performance with scheduling technology to perform network processing concurrently with arithmetic processing of application programs.

Large-capacity memory

The control station includes large-capacity memory consisting of 512K steps of program memory and 2,368Kwords of data memory. Up to 4,096 words (32 nodes) of I/O can be connected per station.

High-speed LAN

The CPU module contains a 1 Gbps Ethernet-based control LAN, equalized bus, and 1 Gbps/100 Mbps Ethernet-based I/O network. With CPU processing scheduling technology, these high-speed LANs have achieved higher communication performance.
❶ Control LAN
The adoption of an FL-net Ver.3-compliant LAN allows high-speed and large-capacity data communication as well as the support for redundancy.
❷ Equalized bus
Large-capacity equalization technology enables high-speed transfer of large data, resulting in the achievement of full-range equalization of application data.
❸ Network adapter bus
A high-speed LAN for a network adapter to be connected with Fuji Electric's legacy networks or other different networks.
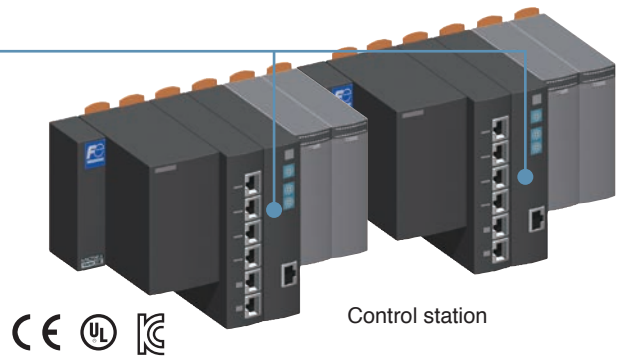❹ E-SX bus
A high-speed I/O network supporting redundancy.
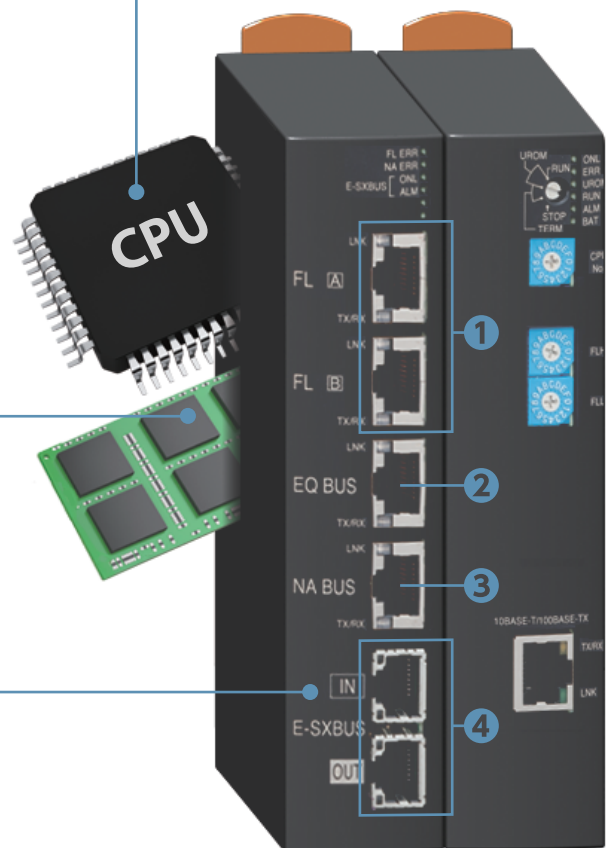
Control station
CPU module

High-reliability CPU

The CPU supports redundancy. The adoption of ECC (with error detection/correction function) memory and the enhancement of RAS function have achieved a high-reliability control station.

Control station

Remote I/O lineup for various applications

[High-reliability I/O]
The I/O network uses a 100 Mbps E-SX bus and inherits the features and specifications of existing I/O networks. Furthermore, the XCS-3000 control station supports mixed mounting with [E-SX I/O].
Moreover, this is highly reliable I/O that enables power supply redundancy, I/O network redundancy, and I/O module redundancy (module pair or node pair redundancy). An AI/AO module with HART communication was also added to the lineup, enabling connection to HART-compatible field devices.

[E-SX I/O]
The I/O network uses a 100 Mbps E-SX bus and can be mounted to an XCS-3000 control station. In addition to I/O networks, communication modules such as Ethernet and RS-232C can be selected for mounted modules. It also enables power supply redundancy and I/O network redundancy.

High-reliability I/O

E-SX I/O

Various network connections

The network adapter connects the control station to up to four networks, including our legacy networks such as DPCS-F, PE-link, or T-link and open networks such as FL-net. Moreover, the network adapter can also be redundant together with the control station, which enables building of a highly reliable system.

● **Supported networks**
DPCS-F
FL-net Ver.2-compliant LAN
PE-link
T-link
Ethernet

Network adapter

Supporting global standards

The control station complies with the CE marking, UL and KC marking. High-reliability I/O complies with the CE marking and KC marking.

High security

As a response to the domestic and international efforts toward higher security, the control station is currently being redesigned to support ISASecure EDSA (Embedded Device Security Assurance).
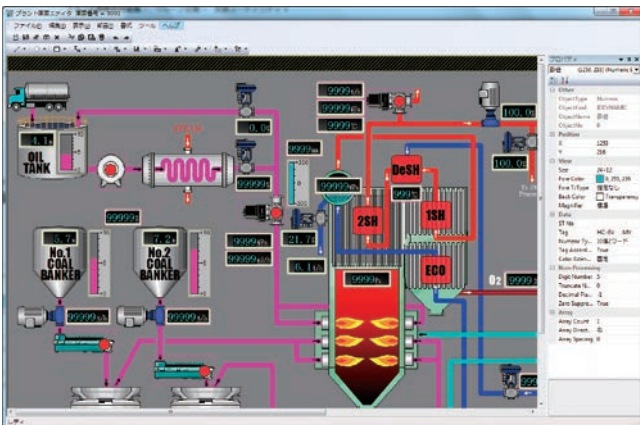
Engineering function

The engineering station integrated the engineering environments of the HCI[*1] (panel, database) and control station. It also has full functionality such as parts packages and machine-less simulation function to provide an effective engineering environment.

*1: Human Communication Interface (operator station, database station)
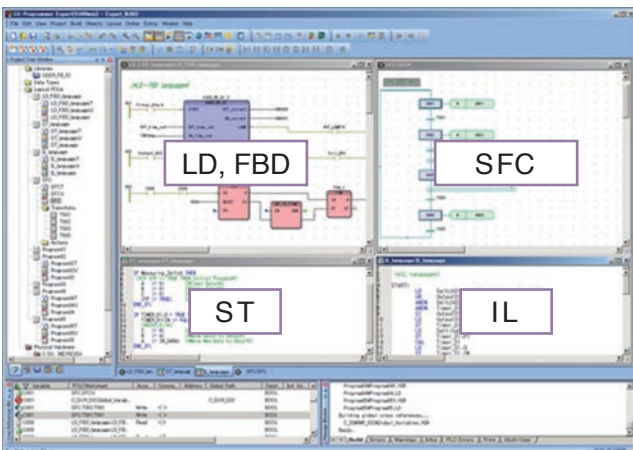
Integrated engineering environment

This has achieved the vertical cooperation of HCI engineering and control station engineering through integrated management of TAG and the horizontal cooperation of engineering between control stations through integrated management of inter-station communication memory. There are also various excellent operation functions for effective engineering, such as drag-and-drop or copy-and-paste from a program tree and exporting/importing definitions.

HCI engineering tool

Control station engineering tool

IEC 61131-3 compliant

The engineering tool for the control station (Expert D300win) supports five program representations that conform to the IEC 61131-3 international standard (JIS B3503), allowing engineering using best combination.

● **Supported representations**
IL (Instruction List)
LD (Ladder Diagram)
FBD (Function Block Diagram)
ST (Structure Text)
SFC (Sequential Function Chart)

High-efficiency engineering tool HEART-BELIEVE-ESPER/SELECT (optional)

It is a control program containing the specifications. Since the software is automatically generated from the specifications, human errors such as program omissions and input errors can be eliminated.

* For details, refer to Catalog No."21E1-E-0101"

Quality improvement points

● Elimination of human error through automatic generation

● Exact matching of specification and software

Specification = Control program

**Integration**

Automatic generation

PLC / DCS
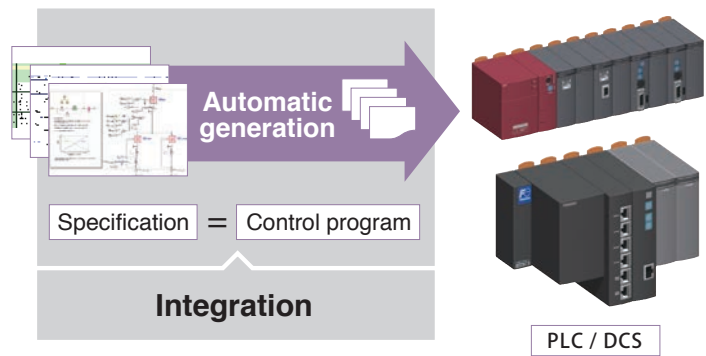
Navigation Features

Process operation and abnormal conditions can be monitored easily from the plant panel, thereby helping to check operating conditions and facilitating data analysis. The monitor panel is displayed in an easy-to-understand instrument flow diagram.

Plant panel

Select numerical values
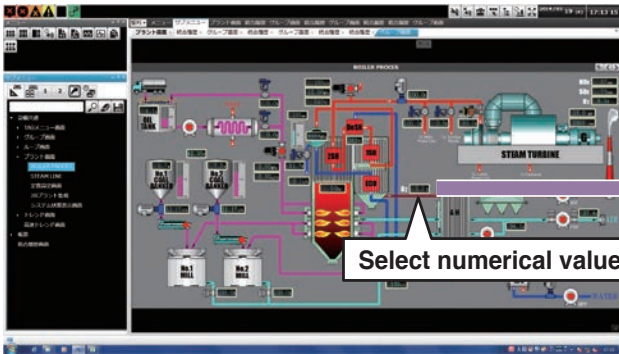
XCS-3000 (control circuit) monitoring panel
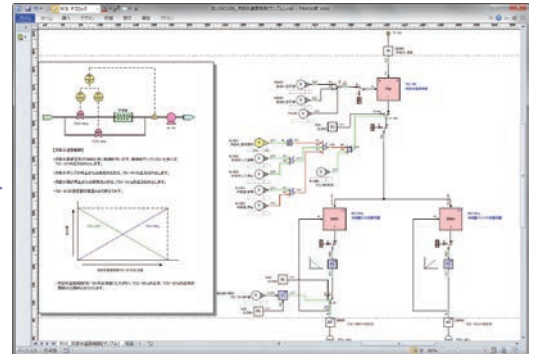
Machine-less simulation*2

By using the simulator, you can configure system devices such as the control station and operator station on the PC and operate them. For example, you can check the function that combines the control station control function and panel function while simulating I/O signals, or check the data of inter-station communication, without using actual machines. This allows efficient and high-quality engineering.

*2: Next development
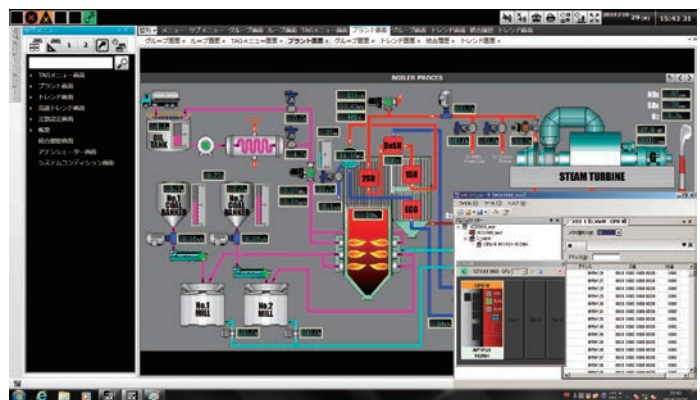
High reliability

Contiunuous operation rate improvement through full redundancy

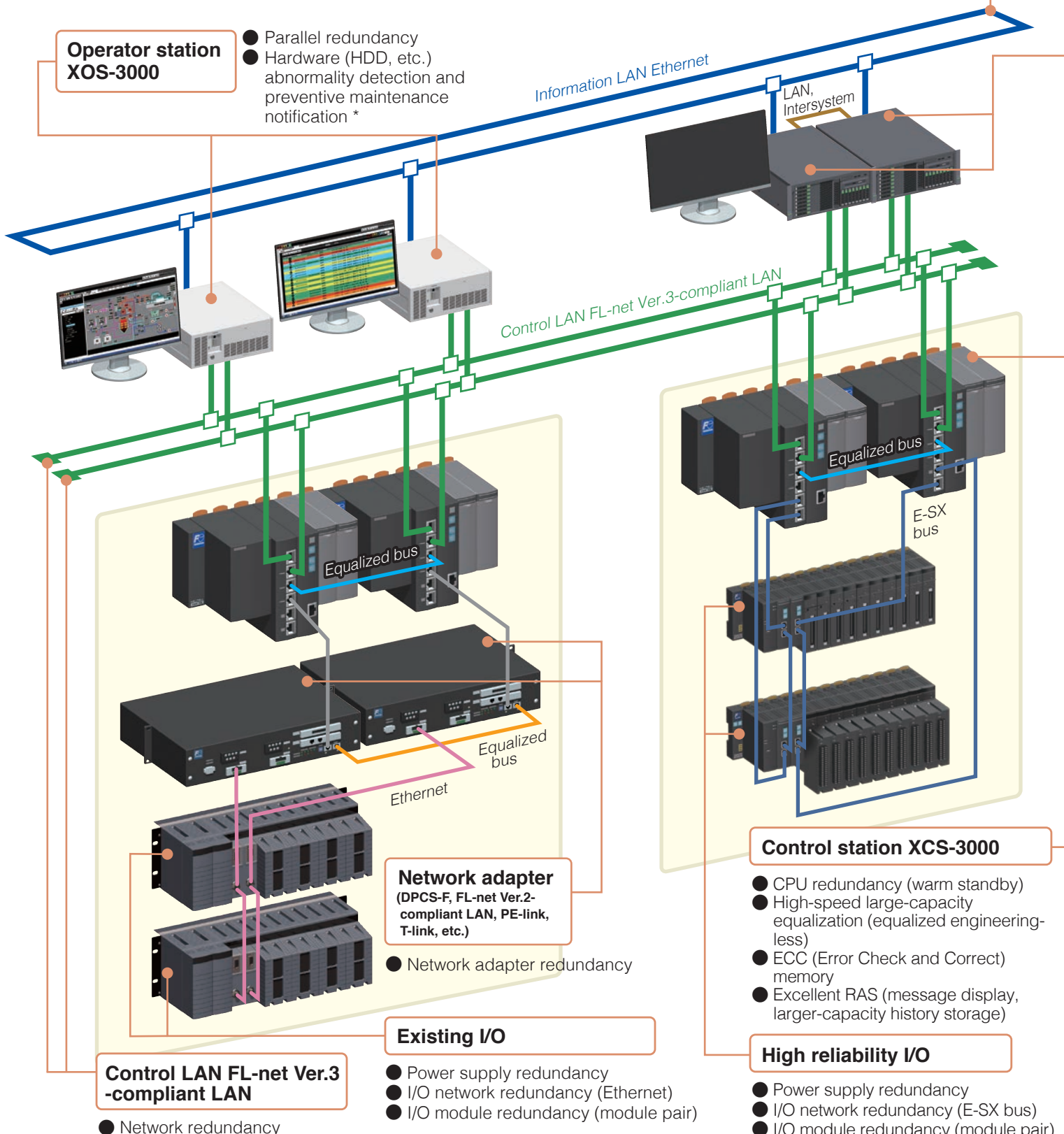The **MICREX-VieW XX** achieves better reliability by providing redundancy for all system components, including operator stations, control stations, power supplies, control LANs, and I/O networks.

Operator station XOS-3000
- Parallel redundancy
- Hardware (HDD, etc.) abnormality detection and preventive maintenance notification *

Information LAN Ethernet

LAN, Intersystem

Control LAN FL-net Ver.3-compliant LAN

Equalized bus

Equalized bus

E-SX bus

Equalized bus

Ethernet

Network adapter
(DPCS-F, FL-net Ver.2-compliant LAN, PE-link, T-link, etc.)
- Network adapter redundancy

Existing I/O
- Power supply redundancy
- I/O network redundancy (Ethernet)
- I/O module redundancy (module pair)

Control LAN FL-net Ver.3 -compliant LAN
- Network redundancy

Control station XCS-3000
- CPU redundancy (warm standby)
- High-speed large-capacity equalization (equalized engineering-less)
- ECC (Error Check and Correct) memory
- Excellent RAS (message display, larger-capacity history storage)

High reliability I/O
- Power supply redundancy
- I/O network redundancy (E-SX bus)
- I/O module redundancy (module pair)
- Node pair redundancy
- E-SX bus loop

*: In conjunction with vendor-provided tools, the database station automatically detects when a hardware (HDD, etc.) abnormality occurs or when replacement is recommended and notifies the monitoring system of such information (Please contact us for more information on vendor-provided tools).

E-SX bus loop

The E-SX bus supports line looping. In the event of a transmission line failure, the system maintains operation without having to initiate its redundancy features. It eliminates the need to perform complicated tasks, such as checking plant control and recovery point behavior, through redundant system switchover.
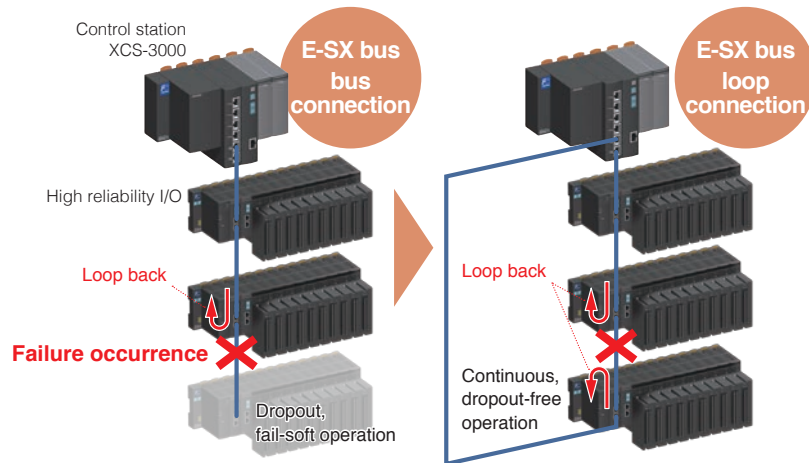
Furthermore, when performing maintenance work at times of failed cable replacement, connector detachment, etc., the system maintains reliable dropout-free operations and achieves maintainability and availability.

Control station
XCS-3000

E-SX bus bus connection

E-SX bus loop connection

High reliability I/O

Loop back

Loop back

Failure occurrence

Continuous, dropout-free operation

Dropout, fail-soft operation

I/O redundancy

High-reliability I/O is an E-SX bus interface I/O configuration that enables module pair redundancy and node pair redundancy. In the event of an I/O module failure, module replacement and maintenance is performed for each node (baseboard on which the I/O module is mounted) where the failed module is mounted. In the case of module pair redundancy, it enables continuous operations by performing module replacement and maintenance with power on. In the case of node pair redundancy, since redundancy is configured with two nodes (a pair), it enables easy module replacement and maintenance by turning off the power supply of the node undergoing maintenance.

Equalized bus

EX bus loop

I/O redundant pair node

At I/O failure

Power supply OFF

Standby

Operating

I/O module
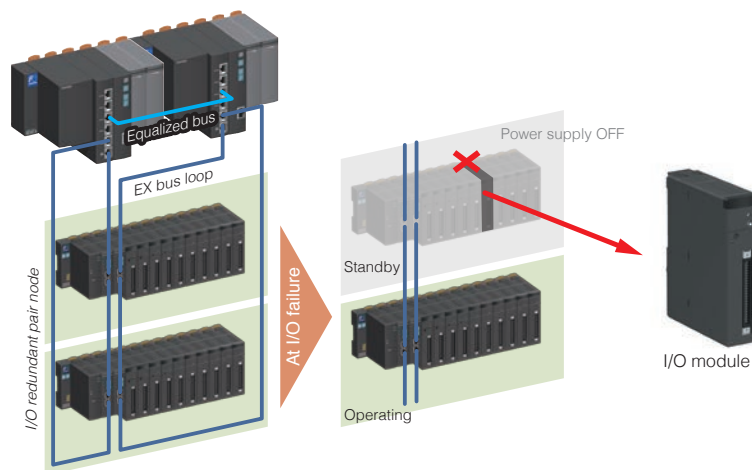
HART communication compliant

Compliant with the HART communication standard for the HART protocol. Supports maintainability of field devices and stability of plant operations.

Standardization of I/O panel wiring

External terminal I/O direct configuration eliminates internal wiring. Also enables conventional cabling to support various installation environments. Shortens construction period during switchover through reuse of existing terminal blocks. Furthermore, decreases costs through node reduction via high-density mounting of I/O modules.

High inheritability

MICREX-VieW XX can inherit much from the conventional MICREX Series. You can use the existing assets effectively during system updating to ensure switchover to a highly reliable system. This contributes to further stable and safe plant operation.

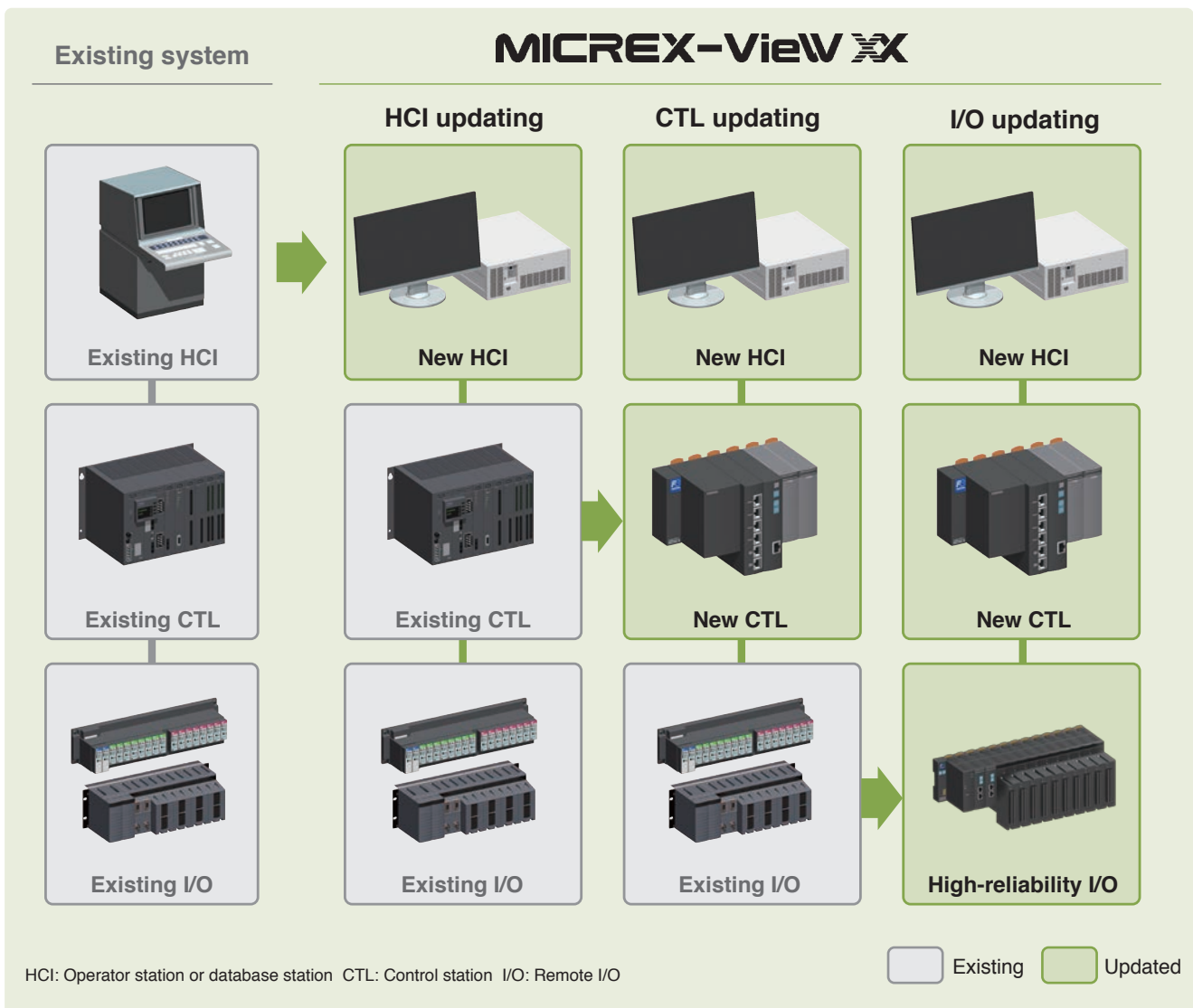## Inheritance of existing application assets

Since the system can inherit the existing system's panels and the control station application assets, it can be updated to a highly reliable system within a short period.

Inheritance of existing hardware assets

Reduces wiring work and shortens construction periods by enabling connection with existing Fuji Electric system networks (DPCS-F, PE-link) and existing I/O networks via network adapters.

Step-by-step update

Since the modules can be connected seamlessly with the existing system, the system can be updated in a stepwise manner.

Existing system

MICREX-VieW XX

HCI updating   CTL updating   I/O updating

Existing HCI | New HCI | New HCI | New HCI

Existing CTL | Existing CTL | New CTL | New CTL

Existing I/O | Existing I/O | Existing I/O | High-reliability I/O

HCI: Operator station or database station CTL: Control station I/O: Remote I/O

Existing   Updated

System specifications list

System components specifications	
Operator station (XOS-3000)	16 units (for database station deployment. 8 units when using the Plant Data Recorder) 8 units (for all-in-one station deployment) OS*¹ : Windows 10 IoT Enterprise 2019 LTSC (64bit) Windows 10 IoT Enterprise 2016 LTSB (64bit) LCD : 1,920 x 1,080 (Full HD) USB mouse, USB general purpose keyboard / USB application keyboard (optional)
Database station (XDS-3000)	1 unit (single or redundant) Monitoring and control loop points (Module TAG): 8,640 points (288 x 30), State change points such as contacts (bit state change): 61,440 points, User TAG : 32,752 points LCD : 15 inch or larger and 1,024 × 768 or greater resolution are recommended. OS*¹ : Windows Server IoT 2019 standard (64bit) Windows Server 2016 Standard (64bit)
All-in-one station (XAL-3000)	1 unit (single or redundant) OS*¹ : Windows Server IoT 2019 standard (64bit) Windows Server 2016 Standard (64bit) LCD : 1,920 x 1,080 (Full HD)
Control station (XCS-3000/XCS-3000R)	30 units (for database station deployment. 15 units when using the Plant Data Recorder) 10 units (for all-in-one station deployment) Note: All units are standalone or redundant I/O : High-reliability I/O and SX-I/O (E-SX bus) IPU-I (T-link), IPU-II (Ethernet) (However, SX-I/O is only available for XCS-3000) Control LAN: FL-net Ver.3-compliant LAN Legacy networks: DPCS-F, PE-LINK
Network printer	8 units
Engineering station (XES-3000)	4 units (FPROCES/Expert/HEART) Computer : Windows PC (IBM PC/AT compatible) OS*¹ : Windows 10 IoT Enterprise 2019 LTSC (64bit) Windows10 IoT Enterprise 2016 LTSB (64bit) LCD : 1,024 × 768 or 1,280 × 1,024 (1,920 x 1,080 or more is recommended for drawing interactive panels)
OPC UA server	16 units (total number of OPC UA servers and XOS-3000 units) OS*¹ : Windows 10 IoT Enterprise 2019 LTSC (64bit) Windows 10 IoT Enterprise 2016 LTSB (64bit) (Same as the operator station) Number of connected clients: Up to 8 clients Number of subscriptions: Up to 20 subscriptions Number of monitored items: up to 20,000 items (Up to 2,500 monitored items per subscription) Data update cycle: 1 second
Remote connection station (XRS-3000)	4 units OS*¹ : Windows Server IoT 2019 standard (64bit) Windows Server 2016 Standard (64bit) LCD : 1,024 × 768 or higher
Plant Data Recorder (XDR)	1 unit OS : Windows Server IoT 2019 standard (64bit) Windows Server 2016 Standard (64bit) LCD : 1,920 x 1,080 (full HD)

*1 : If the system versions of MICREX-VieW XX are the same, old and new operating systems can be used together.

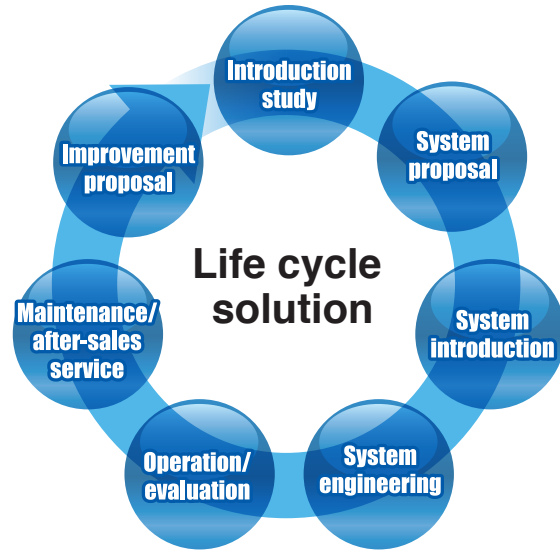| Control LAN (FL-net Ver.3-compliant LAN)	
Topology	Star
No. of stations	Max. 64 units (total number of system components connected to the control LAN; similar to single units, redundant XDS and XCS are calculated as one single unit.)
Cable	・100 Mbit/s: Twisted pair cable (STP, straight, Cat5 or higher), fiber-optic cable (100BASE-FL) ・1,000 Mbit/s: Twisted pair cable (STP, straight, Cat5e or higher, with ferrite core), fiber optic cable (1000BASE-SX, 1000BASE-LX)
Transmission distance	・STP: Uses a switching hub (SW-HUB) or fiber optic port based switching hub (optical SW-HUB) for cable extensions with a maximum length of 100 m/segment. ・Optical fiber cable: (1) 100BASE-FX (max. 2 km / segment); (2) 1000BASE-SX (max. 550 m / segment); (3)1000BASE-LX (max. 5 km / segment)
Protocol	FA link protocol/FL-net Ver.3-compliant LAN protocol, UDP/IP, TCP/IP, ICMP, ARP
Communication speed	100 Mbits/sec, 1,000 Mbits/sec
Conformed standard	IEEE 802.3u / IEEE 802.3ab /IEEE 802.3z, FL-net (OPCN-2)*²

*2: FL-net (OPCN-2) is an FA network standardized by JEMA (Japan Electrical Manufacturers' Association).

Information LAN (Gigabit Ethernet)	
Topology	Star or ring shape (ring shape depends on the features of the SW-HUB)
Cable	Twisted pair cable (UTP, straight, Cat5e or higher), optical fiber cable
Transmission distance	・UTP: 1000BASE-T (max. 100 m / segment); when extending cable, use SW-HUB or optical SW-HUB (optical fiber cable is used for optical SW-HUB) ・Optical fiber cable: (1) 1000BASE-SX (max. 550 m / segment); (2)1000BASE-LX (max. 5 km / segment)
Protocol	TCP/IP, UDP/IP
Communication speed	1,000 Mbits / sec.; full duplex
Conformed standard	IEEE 802.3ab /IEEE 802.3z

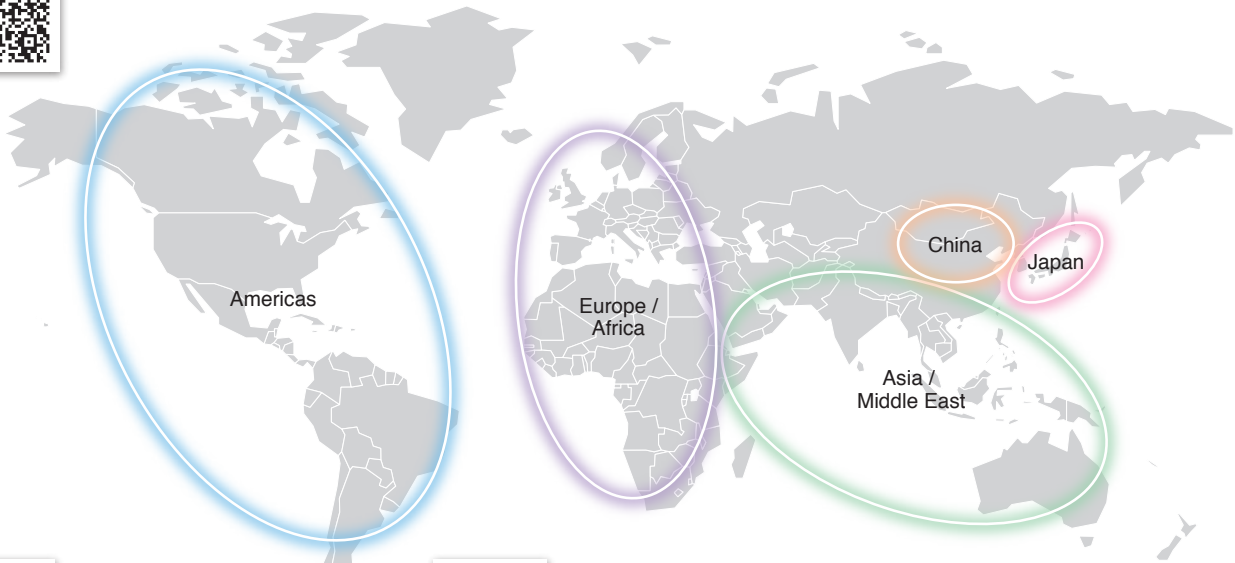| XCS-3000 / XCS-3000R Ethernet	
Topology	Star
Cable	Twisted pair cable (UTP/STP, straight, Cat5 or higher), optical fiber cable
Transmission distance	・UTP/STP: 100BASE-TX (max. 100 m / segment); when extending cable, use SW-HUB or optical SW-HUB (optical fiber cable is used for optical SW-HUB) ・Optical fiber cable: 100BASE-FX (max. 2 km / segment)
Protocol	TCP/IP, UDP/IP
Communication speed	10 Mbits / sec., 100 Mbits / sec.; automatic switching; full duplex
Conformed standard	IEEE 802.3u

Life cycle solution and service locations

Fuji Electric provides a life cycle solution to minimize your investment from introduction study, introduction, operation, maintenance to improvement proposal.

Life cycle solution

- Introduction study
- System proposal
- System introduction
- System engineering
- Operation/evaluation
- Maintenance/after-sales service
- Improvement proposal

Global Network

www.fujielectric.com/

Americas

Europe / Africa

Asia / Middle East

China

Japan

Sales Network in Americas
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Sales Network in Japan
www.fujielectric.com/company/japan.php

The most up-to-date information is available on the following website.
For inquiries and further information, please use the Contact Us link on the website.

www.fujielectric.com/products/micrex_view/index.html

⚠ Safety precautions

- Before use, please read the "Operation Manuals" and "Specifications" thoroughly or consult us or the sales agent from which you purchased this equipment to ensure it is used correctly.
- This system must only be handled and operated by relevant specialists.

The company names, product names, and service names listed herein are the trademarks or registered trademarks of their respective companies.

Fuji Electric Co., Ltd.

Gate City Ohsaki, East Tower, 11-2, Osaki 1-chome,
Shinagawa-ku, Tokyo 141-0032, Japan
Phone : +81-3-5435-7111

Internet address : www.fujielectric.co.jp

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