OMRON

Automation Software Package

AI Controller Standard Software

Operation Manual

SYSMAC-AICSTE□□L

SYSMAC
always in control

W611-E1-07

NOTE

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Introduction

Thank you for purchasing the AI Controller Standard Software.
This manual contains information that is necessary to use the AI Controller Standard Software. Please read this manual and make sure you fully understand the functionality and performance before you attempt to use it in a control system.
Keep this manual in a safe place where it will be available for reference during operation.

Intended Audience

This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent).

- Personnel in charge of introducing FA systems.
- Personnel in charge of designing FA systems.
- Personnel in charge of installing and maintaining FA systems.
- Personnel in charge of managing FA systems and facilities.

For programming, this manual is intended for personnel who understand the programming language specifications in international standard IEC 61131-3 or Japanese standard JIS B 3503, and who have knowledge about artificial intelligence.

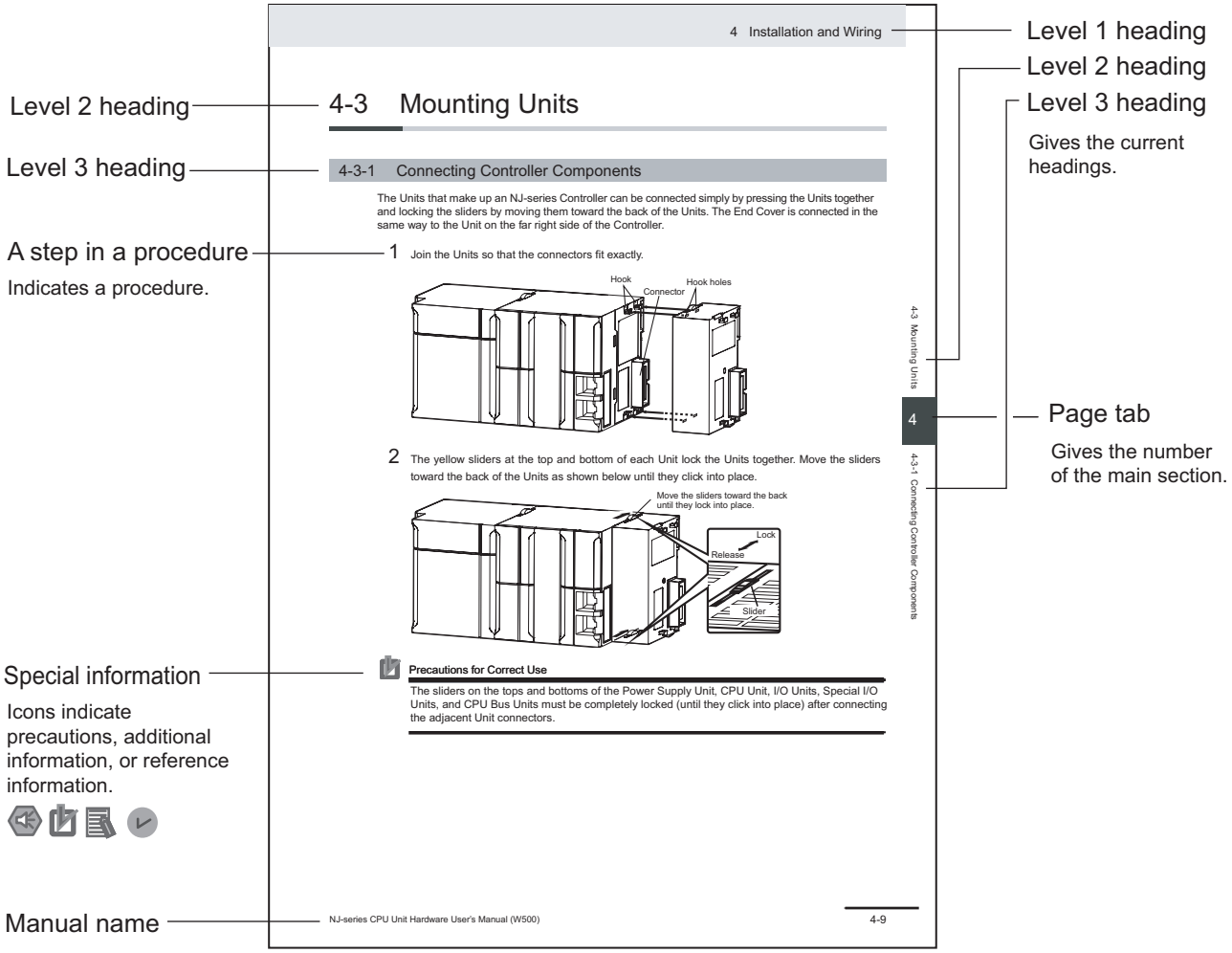
Notice

This manual contains information that is necessary to use the AI Controller Standard Software. Please read and understand this manual before using the software. Keep this manual in a safe place where it will be available for reference during operation.

Manual Structure

Page Structure and Symbols

The following page structure is used in this manual.



This illustration is provided only as a sample. It may not literally appear in this manual.

Special Information

Special information in this manual is classified as follows:

Precautions for Safe Use

Precautions on what to do and what not to do to ensure safe usage of the product.

Precautions for Correct Use

Precautions on what to do and what not to do to ensure proper operation and performance.

Additional Information

Additional information to read as required.

This information is provided to increase understanding or make operation easier.

 **Version Information**

Information on differences in specifications and functionality for Controller with different unit versions and for different versions of the Sysmac Studio is given.

Precaution on Terminology

- In this manual, "download" refers to transferring data from AI Controller Standard Software to a physical AI Controller, and "upload" refers to transferring data from a physical AI Controller to the AI Controller Standard Software.
- In this manual, the functions of a specific model of the NX-series CPU Units/Controllers may be described with its model specified, such as "NX701 CPU Unit/Controller".
- In this manual, the Controller functions that are integrated in the NY-series Industrial PC may be referred to as an "NY-series Controller".
- The AI Controller Standard Software supports the NX/NY-series Controllers. Unless another Controller series is specified, the operating procedures and screen captures used in the manual are examples of the NY-series AI Controllers.

Terminology

For descriptions of the Controller terms that are used in this manual, refer to information on terminology in the manuals that are listed in *Related Manuals* on page 18.

Sections in this Manual

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Section 3 Basic Software Configuration

Section 4 Description of the AI Operator Screen Components

Section 5 Description of the AI Viewer Screen Components

Section 6 Using AI Predictive Maintenance Library

Appendices

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Terms and Conditions Agreement

WARRANTY

- The warranty period for the Software is one year from the date of purchase, unless otherwise specifically agreed.
- If the User discovers defect of the Software (substantial non-conformity with the manual), and return it to OMRON within the above warranty period, OMRON will replace the Software without charge by offering media or download from OMRON's website. And if the User discovers defect of media which is attributable to OMRON and return it to OMRON within the above warranty period, OMRON will replace defective media without charge. If OMRON is unable to replace defective media or correct the Software, the liability of OMRON and the User's remedy shall be limited to the refund of the license fee paid to OMRON for the Software.

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APPLICABLE CONDITIONS

USER SHALL NOT USE THE SOFTWARE FOR THE PURPOSE THAT IS NOT PROVIDED IN THE ATTACHED USER MANUAL.

CHANGE IN SPECIFICATION

The software specifications and accessories may be changed at any time based on improvements and other reasons.

ERRORS AND OMISSIONS

The information in this manual has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

Safety Precautions

Definition of Precautionary Information

The following notation is used in this manual to provide precautions required to ensure safe usage of the AI Controller Standard Software and the Artificial Intelligence Machine Automation Controllers.
The safety precautions that are provided are extremely important to safety. Always read and heed the information provided in all safety precautions.
The following notation is used.

⚠ **WARNING**	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. Additionally, there may be severe property damage.
⚠ **CAUTION**	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

Precautions for Safe Use

Indicates precautions on what to do and what not to do to ensure safe usage of the product.

Precautions for Correct Use

Indicates precautions on what to do and what not to do to ensure proper operation and performance.

Symbols

	The ⃠ symbol indicates operations that you must not do. The specific operation is shown in the ⃠ symbol and explained in text. This example indicates prohibiting disassembly.
	The △ symbol indicates precautions (including warnings). The specific operation is shown in the △ symbol and explained in text. This example indicates a precaution for electric shock.
	The △ symbol indicates precautions (including warnings). The specific operation is shown in the △ symbol and explained in text. This example indicates a general precaution.
	The ● symbol indicates operations that you must do. The specific operation is shown in the ● symbol and explained in text. This example shows a general precaution for something that you must do.

WARNINGS

⚠ WARNING

Check the parameters for proper execution before you use them for actual operation.

Always confirm safety at the destination node before you transfer parameters from the AI Controller Standard Software. The devices or machines may perform unexpected operations regardless of the operating mode of the CPU Unit.

To prevent computer viruses, install antivirus software on a computer where you use this software. Make sure to keep the antivirus software updated.

Keep your computer's OS updated to avoid security risks caused by a vulnerability in the OS.

Always use the highest version of this software to add new features, increase operability, and enhance security.

Manage usernames and passwords for this software carefully to protect them from unauthorized uses.

Set up a firewall (E.g., disabling unused communication ports, limiting communication hosts, etc.) on a network for a control system and devices to separate them from other IT networks. Make sure to connect to the control system inside the firewall.

Use a virtual private network (VPN) for remote access to a control system and devices from this software.

To prevent information leaks and falsification due to unauthorized login to the computer, configure the account settings appropriately.

Cautions

⚠ Caution

Always confirm safety at the destination node before you transfer parameters or data to a node from the AI Controller Standard Software.
Not doing so may result in injury.

Precautions for Safe Use

Operation

- Confirm that the controlled system will not be adversely affected before you perform any of the following operations.
  a) Changing the operating mode of the CPU Unit (including changing the Startup Mode)
  b) Change the settings
- Before you use the system for the actual operation, make sure to verify that errors can be correctly detected by using the results analyzed by this tool. Upon verification, set the machine learning engine to start reading learning data and parameters. Inappropriate settings will result in misjudging errors.
- Before you start the operation, make sure to transfer parameters and data necessary for resuming the operation to the replaced CPU Unit.
- When you restore only part of the data that was backed up, confirm that no problems will occur if you do not restore all of the backup data. Otherwise, malfunction of the device may occur.

Unit Replacement

- The performance may be different if the hardware revisions are different. Before you transfer the user program, data, and parameter settings to the CPU Units with the different hardware revisions, check them for proper execution and then use them for actual operation.

Precautions for Correct Use

Observe the following precautions before you start the AI Controller Standard Software or any of the Support Software that is provided with it.

- Exit all applications that are not necessary to use the AI Controller Standard Software. For virus checker or other software that could affect the startup and operations of the AI Controller Standard Software, take measures such as to remove the AI Controller Standard Software from the scope of virus checking.
- If any hard disks or printers that are connected to the computer are shared with other computers on a network, isolate them so that they are no longer shared.
- With some notebook computers, the default settings do not supply power to the USB port or Ethernet port to save energy. There are energy-saving settings in Windows, and also sometimes disable all energy-saving features. Refer to the user documentation for your computer and disable all energy-saving features.

Regulations and Standards

Software Licenses and Copyrights

This product incorporates certain third party software. The license and copyright information associated with this software is available at ThirdPartyLicenses.txt in DVD media.

Versions

Hardware revisions and unit versions are used to manage the hardware and software in NX/NY-series Units and EtherCAT slaves. The hardware revision or unit version is updated each time there is a change in hardware or software specifications. Even when two Units or EtherCAT slaves have the same model number, they will have functional or performance differences if they have different hardware revisions or unit versions.

Checking Versions

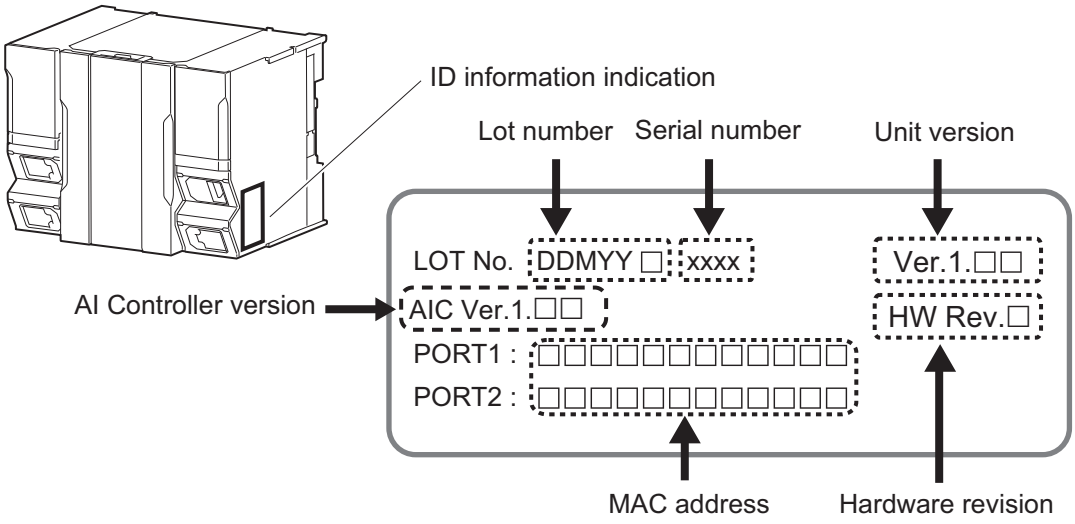
You can check versions on the ID information indications or with the Sysmac Studio.

Checking Unit Versions on ID Information Indications

The unit version is given on the ID information indication on the side of the product.

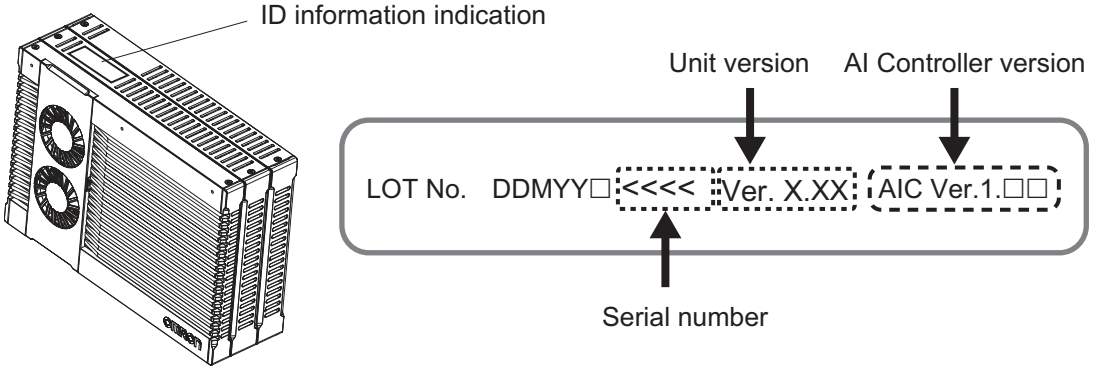
- **Checking the Unit Version of an NX-series CPU Unit**

The ID information on an NX-series NX701-Z□□□ CPU Unit is shown below.



- **Checking the Unit Version of an NY-series Controller**

The ID information on an NY-series NY5□2-Z□□□ Controller is shown below.



Checking Unit Versions with the Sysmac Studio

You can use the Sysmac Studio to check unit versions. The procedure is different for Units and for EtherCAT slaves.

● Checking the Unit Version of an NX-series CPU Unit

You can use the **Production Information** while the Sysmac Studio is online to check the unit version of a Unit. You can do this for the following Unit.

Model	Unit for which version can be checked
NX701-□□□□	CPU Unit

1 Right-click **CPU Rack** under **Configurations and Setup** - **CPU/Expansion Racks** in the Multiview Explorer and select **Display Production Information**.
The **Production Information** Dialog Box is displayed.

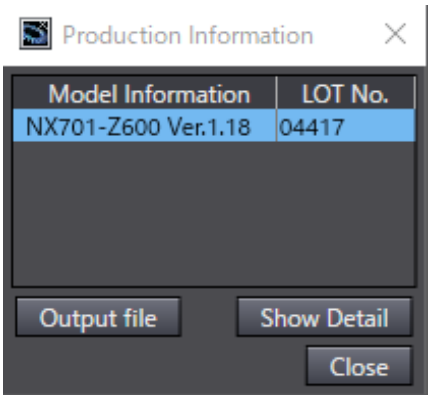
● Checking the Unit Version of an NY-series Controller

You can use the **Production Information** while the Sysmac Studio is online to check the unit version of a Unit. You can only do this for the Controller.

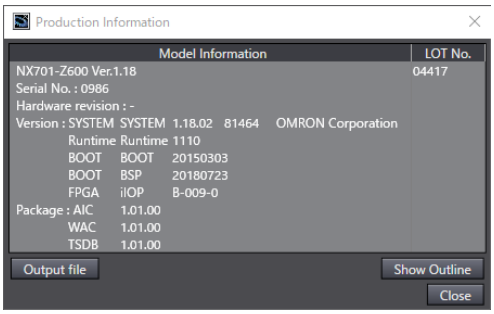
1 Right-click **CPU Rack** under **Configurations and Setup** - **CPU/Expansion Racks** in the Multiview Explorer and select **Display Production Information**.
The **Production Information** Dialog Box is displayed.

● Changing Information Displayed in Production Information Dialog Box

1 Click the **Show Outline** or **Show Detail** Button at the lower right of the **Production Information** Dialog Box.
The view will change between the **Production Information** details and outline.



Outline View



Detail View

The information displayed is different for the Outline View and the Detail View. The Detail View displays both the unit version and the AI Controller version. The Outline View displays only the unit versions.

Note The hardware revision is separated by "/" and is displayed on the right of the hardware version. The hardware revision is not displayed for the Unit that the hardware revision is in blank.

Related Manuals

The following manuals are related. Use these manuals for reference.

Manual name	Cat. No.	Model numbers	Application	Description
NJ/NX-series CPU Unit Software User's Manual	W501	NX701-□□□□ NX502-□□□□ NX102-□□□□ NX1P2-□□□□ NJ501-□□□□ NJ301-□□□□ NJ101-□□□□	Learning how to program and set up an NJ/NX-series CPU Unit. Mainly software information is provided.	The following information is provided on a Controller built with an NJ/NX-series CPU Unit. • CPU Unit operation • CPU Unit features • Initial settings • Programming based on IEC 61131-3 language specifications
Sysmac Studio Version 1 Operation Manual	W504	SYSMAC -SE2□□□	Learning about the operating procedures and functions of the Sysmac Studio.	Describes the operating procedures of the Sysmac Studio.
NX/NY-series Artificial Intelligence Machine Automation Controller User's Manual	W594	NZ701-Z□□□ NY532-Z□□□ NY512-Z□□□	Learning about the NX/NY-series AI-equipped Machine Automation Controllers	This manual describes the overview of the NX/NY-series Artificial Intelligence Machine Automation Controllers, the specifications of the AI functions, how to start the system, and maintenance and error details.
NY-series IPC Machine Controller Industrial Panel PC / Industrial Box PC Software User's Manual	W558	NY532-□□□□ NY512-□□□□	Learning how to program and set up the Controller functions of an NY-series Industrial PC.	The following information is provided on the NY-series Controller functions. • Controller operation • Controller features • Controller settings • Programming based on IEC 61131-3 language specifications
AI Controller Data Mining Software Operation Manual	W612	SYSMAC-AIC- STENGE□□L	Learning the outline and usage of the AI Controller Data Mining Software	The manual describes the outline of the AI Controller Data Mining Software (AI Easy Modeler, AI Easy Modeler for Model Setting), installation method, basic operations, connection, and operations of the main features.
Sysmac Library AI Predictive Maintenance Library User's Manual	W610	SYSMAC- ZPA00□000W	Learning about the specifications of the AI Predictive Maintenance Libraries and function blocks	Information necessary in using AI predictive maintenance library is described.

Revision History

A manual revision code appears as a suffix to the catalog number on the front and back covers of the manual.

Revision code	Date	Revised content
01	October 2018	Original production
02	July 2019	Revisions for improving description relating to equipment events.
03	April 2021	Revisions for an upgrade to AI Controller Standard Software version 1.01.
04	January 2022	Revisions for an upgrade to AI Controller Standard Software version 1.02.
05	April 2022	Revisions for an upgrade to AI Controller Standard Software version 1.03.
06	October 2022	Revisions for adding safety precautions regarding security.
07	July 2025	Revisions for an upgrade to AI Controller Standard Software version 1.06.

1

Overview of the AI Controller Standard Software

This section provides an overview and lists the specifications of the AI Controller Standard Software and describes its features and components.

1-1 The AI Controller Standard Software

The AI Controller Standard Software is a software package designed to provide tools for installing the AI-embedded Machine Automation Controller (AI Controller to be short) and for the operation of the installed controller. The AI Controller Standard Software consisting of the AI Operator, the AI Viewer and the AI licence registration software runs on Windows. These tools are used in each phase of the AI Controller including data collection, data analysis, and data utilization.
The AI Controller Standard Software is designed to provide optimum functionality and operability when it is used with the AI Controller, and the automation software called Sysmac Studio.
Refer to *NX/NY-series Artificial Intelligence Machine Automation Controller User's Manual (Cat. No. W594)* for the system configuration of the AI Controllers.

Main Features

● Making Data Collection, Data Analysis, and Data Utilization Easier

The AI Operator is a tool allowing you to transfer settings for the AI Controller's AI functions as well as to monitor the status. In addition, it is equipped with a function allowing you to transfer analysis data, feature data, and equipment event monitoring score data from the AI Controller to your computer. (Even if you are logged off from Windows, the transfer can be executed as Windows services.)
The functions are configured for the following use cases.

- Data Collection: Collects analysis data
- Data Analysis: Generates data necessary for monitoring equipment events
- Data Utilization: Transfers a CSV file to a computer and monitors equipment events/transfers data to a web server.

● Easy Operation

The AI Viewer is a tool allowing users to visualize results of equipment event monitoring that was performed by the Feature Value/Machine Learning Function. This tool makes it easy for users to view monitoring results without the need for the controller programming knowledge.

1-2 Specifications

Product Model Numbers

The product AI Controller Data Mining Software consists of a DVD media and a license, each of which is given a model number.
If you are purchasing the AI Controller Data Mining Software for the first time, purchase both a DVD and one or more licenses. The media is the same for all of the licenses. If you are purchasing the product for additional licenses, you can purchase only the licenses. You can also purchase the DVD separately.
The DVD is not included with the licenses.

● DVD

Product	Media	Model number
AI Controller Standard Software Ver.1.□□	DVD	SYSMAC-AICSTE00D

● Licenses

Product	Number of licenses	Model number
AI Controller Standard Software Ver.1.□□	1 license	SYSMAC-AICSTE01L
	10 licenses	SYSMAC-AICSTE10L
	30 licenses	SYSMAC-AICSTE30L
	50 licenses	SYSMAC-AICSTE50L

Support Software That You Can Install from the DVD media of AI Controller Standard Software and Enclosed Data

The following table lists the Support Software that you can install from the DVD media of AI Controller Standard Software and the data that is included in the DVD media.

Installable Software	Version
AI Operator	Ver.1.□
AI Viewer	Ver.1.□
AI License Registration Software	Ver.1.□

Supported Languages

AI Controller Standard Software supports the following languages.
Japanese, English

Applicable Models

The models that you can select when you create a project on the AI Controller Standard Software are given in the following tables.

Model numbers	Unit version
NX701-Z□00	Ver.1.18 or later
NY5□2-Z□00	Ver.1.18 or later

Applicable Computers

The AI Controller Standard Software is a Microsoft Windows-based software.
The supported operating systems are listed below.

- Windows 7 (32-bit or 64-bit edition)
- Windows Embedded Standard 7 (64-bit edition)
- Windows 10 (32-bit or 64-bit edition)

Apply the latest updates to the OS installed on your computer to ensure that it is always up-to-date.

Installation of the following applications is a system requirement for the AI Controller Standard Software.

- .NET Framework3.5
- .NET Framework4.6.1

It is installed automatically if it is not already installed on the computer when the AI Controller Standard Software is installed.

● System Requirements

The system requirements for the AI Controller Standard Software are given in the following table.

OS	CPU		RAM	Display
Windows 7 (32-bit or 64-bit edition) Windows Embedded Standard 7 (64-bit edition) (NY-series IPC Machine Controller) Windows 10 (32-bit or 64-bit edition) Windows 10 IoT Enterprise 2019 (64-bit edition) (NY-series IPC Machine Controller)	Required	IBM AT or compatible with Intel® Celeron® processor 540 (1.8 GHz)	2 GB	XGA 1024 x 768 16 million colors
	Recommended	IBM AT or compatible with Intel® Core™ i5 M520 processor (2.4 GHz) or the equivalent	4 GB or more	WXGA 1280 x 800 16 million colors

In addition, the following are also required.

System requirement	Specification
Free HDD space required for software installation	4.6 GB or more
Optical drive type	DVD-ROM drive
Communications port	Ethernet

2

Software Setup and Operation Flow

This chapter describes the procedure to install and uninstall the AI Controller Standard Software, and usage flow.

2-1 Confirmations before Installation

Check the following items before you install the AI Controller Standard Software.

- To install the AI Controller Standard Software, log onto Windows as the administrator or as a user with administrator rights. There are files that a user without administrator rights cannot write. An access error will occur if you log on without administrator rights.
- Apply the latest updates to the OS to ensure that it is always up-to-date.
- Exit all applications that are running on the computer before you install the AI Controller Standard Software.
- You cannot install the AI Controller Standard Software from a network drive, such as a DVD drive or hardware drive that is shared on a network. Always install the AI Controller Standard Software from a DVD drive on the computer onto which you need to install the AI Controller Standard Software.
- Corrupted files cannot be restored on a compressed drive. Do not install the AI Controller Standard Software on a compressed drive.
- Do not cancel the setup while it is in progress. Files that were copied may remain in the installation directory.
- Do not turn OFF the power to the computer or reset the computer while the installation is in progress. Computer data may be corrupted.
- You may need to restart Windows after you install the AI Controller Standard Software. Restart as required according to Installation Wizard messages.

2-2 Installation Procedure

1 Start Windows and insert the installation disk into the DVD- ROM drive.
The setup program starts automatically and the **Select Setup Language** dialog box appears.

Additional Information

- If .NET Framework is not installed on the computer, the .NET Framework Installation dialog box is displayed. Follow the instructions to install it.
- When .NET Framework is installed, a confirmation dialog box to restart the computer is displayed. Always click the **Yes** button to restart the computer. After the computer is restarted, the Setup Wizard will automatically continue to the next step.

2 Follow the instructions shown on the screen to install the software.

Precautions for Correct Use

To create a project and select an AI Controller model on Sysmac Studio, you need to register a license number for the AI Controller Standard Software on Sysmac Studio's license screen.
Refer to *3-3-12 Displaying and Registering Licenses* of the *Sysmac Studio Version 1 Operation Manual (Cat. No. W504)* for detailed procedure to register license.
Refer to the file below in the NY-series AI Controllers.
D:\OMRON-NY\Installers\AI_Controller_Standard_Software\README.txt

Additional Information

- For the NY-series AI Controllers, the setup program is stored in the Windows folder below. Start setup.exe and begin installation.
  D:\OMRON-NY\Installers\AI_Controller_Standard_Software
- When you install the AI Controller Standard Software to an NY-series AI Controller, you don't have to register a license number.

2-3 Uninstallation Procedure

1 Open Windows Control Panel*1 and select **Add or Remove Programs**.

2 Select **AI Controller Standard Software** and uninstall the application.

*1. The procedure for opening Control Panel differs depending on the operating system.
Windows 7: Select Control Panel from the Start menu
Windows10: Right-click the Start button and select Control Panel.

2-4 Usage Flow

For the startup procedure of the AI Controllers, refer to Section 6 Startup Procedure for the AI Controller in *NX/NY-series Artificial Intelligence Machine Automation Controller User's Manual (Cat. No. W594)*.

For the build procedure of an AI machine learning model, refer to 2-2 Basic Flow of Operation in *AI Controller Data Mining Software Operation Manual (Cat. No. W612)*.

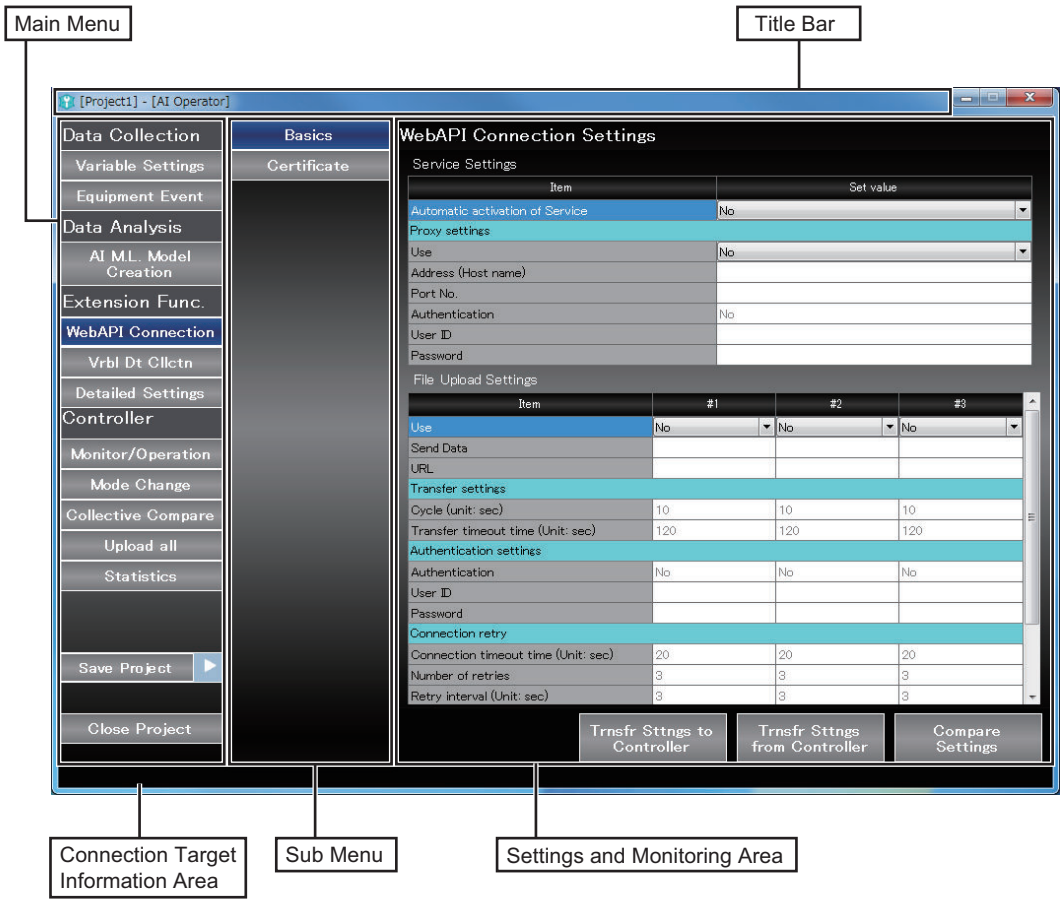
3

Basic Software Configuration

This section describes the basic configurations of AI Operator and AI Viewer.

3-1 Window Configuration

The application window in AI Operator and AI Viewer consists of the title bar, main menu, sub menu that appears according to the function selected in the main menu, and setting and monitoring area. The function overview of each area is described below.



Area name	Outline of function
Title Bar	Displays the open project name and software name in the following format. **Project Name - Controller Name (Serial No.) - Software Name** Example: **MyProject - new_Controller(1234) - AI Operator**
Main Menu	Displays a list of functions. The specifications for buttons are as follows: • When you press a button for each function, the Settings and Monitoring Area is updated. • If the Settings and Monitoring Area has been updated, a confirmation dialog to save the information appears before transiting to another screen.
Sub Menu	If more than one function is selected in the main menu, a list of the functions will appear. • The specifications for buttons are same as those for the main menu.
Settings and Monitoring Area	You can specify various settings and perform monitoring. The Trnsfr Sttngs from/to Controller, and Compare Settings buttons are located at the bottom of the Settings and Monitoring Area.
Connection Target Information Area	When communications with the AI Controller are in progress, the connected AI Controller's IP address, Controller name, and serial number are displayed here.

3-2 List of the AI Operator Functions

The following list specifies the functions of AI Operator.

Function name		Description
Data Collection		
	Variable Setting	Allows you to register variables.
	Equipment Event	Allows you to register equipment events.
Data Analysis		
	AI Machine Learning Model	Displays the import status of an AI machine learning model used for monitoring equipment events.
Extension Function		
	WebAPI Connection	Allows you to configure Web API connection settings and manages transfer, operation, and certificates.
	Variable Data Collection	Allows you to select variable data to collect.
	Detailed Settings	Allows you to configure settings for data collection and CSV file transfer.
Controller		
	Monitor/Operation	Displays the status of services and settings.
	Mode Change	Changes the operating mode of the AI Controller.
	Collective Compare	Allows you to compare all the data in a project against the Controller data.
	Collective Upload	Transfers all the project data from the Controller.
	Statistics	Retrieves and clears statistical information.

3-3 List of the AI Viewer Functions

The following table lists the AI Viewer functions.

Function name		Description
Event Placement		
	Screen Placement	Allows you to register an equipment event or a group of multiple equipment events at the position of a button.
	Group Settings	Allows you to register, edit, and delete a group.
	Number of Events Setting	Allows you to specify the number of events displayed on the event status monitoring screen.
Monitor/Operation		Allows you to start and stop the transfer of a CSV file containing equipment event monitoring scores and feature values for each AI Controller.
Event Monitoring		
	Event Status Monitoring	Displays equipment event monitoring results.
	History	Displays the history of Alrt Lv2 and Alrt Lv1.
	Trend Graph	Displays the trend of equipment event monitoring scores and feature values.

3-4 Connecting to the AI Controller

For the NX-series AI Controllers, the AI Controller connection is supported only when you use the built-in EtherNet/IP port while specifying the IP address.
For the NY-series AI Controllers, communications are established by using the EtherNet/IP port that is built into the Controller or by using the internal communications port.
Note that the AI Operator and the AI Viewer do not have the equivalent status to online connection on the Sysmac Studio. Depending on the function you use, you can establish a connection to the AI Controller automatically and perform operations on the AI Controller.
For detailed information on connection configuration between an AI Controller and AI Operator/AI Viewer, refer to *1-3 System Configuration* of the *NX/NY-series Artificial Intelligence Machine Automation Controller User's Manual (Cat. No. W594)*.

4

Description of the AI Operator Screen Components

This section describes names and functions of the AI Operator screen components.

4-1 Creating an AI Controller Project

This section describes the AI OperatorAI Operator's basic operation, such as the procedure of starting and shutting down the AI Operator, how to create a new project, and how to save a project.

4-1-1 Starting and Exiting the AI Operator

Starting the AI Operator

1 Use the following procedure to start the AI Operator.

- On Windows, select **Start** - **All Programs** - **OMRON** - **AI Controller Standard Software** and then select **AI Operator**.

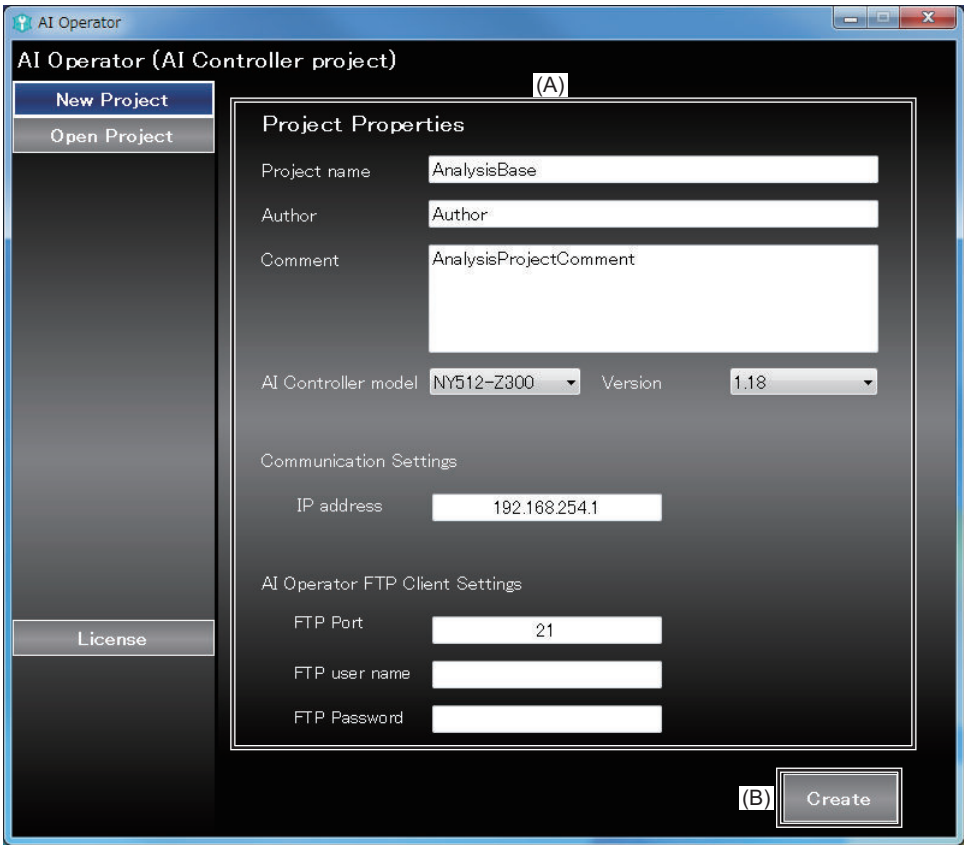
The AI Operator starts up.

Exiting the AI Operator

1 Click the **x** button on the right end of the title bar.
The AI Operator will close.

4-1-2 Creating a New AI Controller Project

To perform data collection and data analysis on the AI Controller, you need to create an AI Controller project on the AI Operator. This section describes the procedure to create a new AI Controller project. Select **New Project** to open the **New Project** screen. Next, specify each item and click the **Create** button.



Sym-bol	Item	Description
(A)	Project Properties	Allows you to enter the settings for an AI Controller project. Shown below are the settings you can specify and their initial values.
		Project name - Enter a project name. Initial value: AnalysisBase
		Author - Enter an author name. Initial value: Author
		Comment - Enter a comment. Initial value: AnalysisProjectComment
		AI Controller model - Select an AI Controller model to use. Initial value: NY512-Z300 Options: NY512-Z300, NY512-Z400, NY512-Z500, NY532-Z300, NY532-Z400, NY532-Z500, NX701-Z600, NX701-Z700
		Version - Select the version of the selected AI Controller. See the following table for functions available for a version in the drop-down list. Initial value: 1.18 Options: NY5□2-Z□00: V1.18, V1.26 (AIC1.02) NX701-Z□00: V1.18, V1.28, V1.29
		IP address - Enter the IP address set in Sysmac Studio. Initial value: 192.168.254.1
		FTP Port - Enter the FTP port set in Sysmac Studio. Initial value: 21
		FTP username - Enter the FTP username set in Sysmac Studio. Initial value: None
		FTP Password - Enter the FTP password set in Sysmac Studio. Initial value: None

Sym-bol	Item	Description
(B)	**Create** button	Creates a project and opens the **Variable Settings** screen.

Controller Model	Version	Function
NY5□2-Z□00	V1.18 or higher	Average, standard deviation, skewness, kurtosis, maximum value, and minimum value are available for feature values applicable to a LREAL variable.
	V1.26 (AIC 1.02) or higher	In addition to the above, amplitude, median, and effective value can be used as feature value.
NX701-Z□00	V1.18 or higher	Average, standard deviation, skewness, kurtosis, maximum value, and minimum value are available for feature values applicable to a LREAL variable.
	V1.28 or higher	In addition to the above, amplitude, median, and effective value can be used as feature value.

Skewness and kurtosis are not available in default. Refer to *Appendices A-3 "Changing Feature Calculation Method in AI Easy Modeler"* for details.

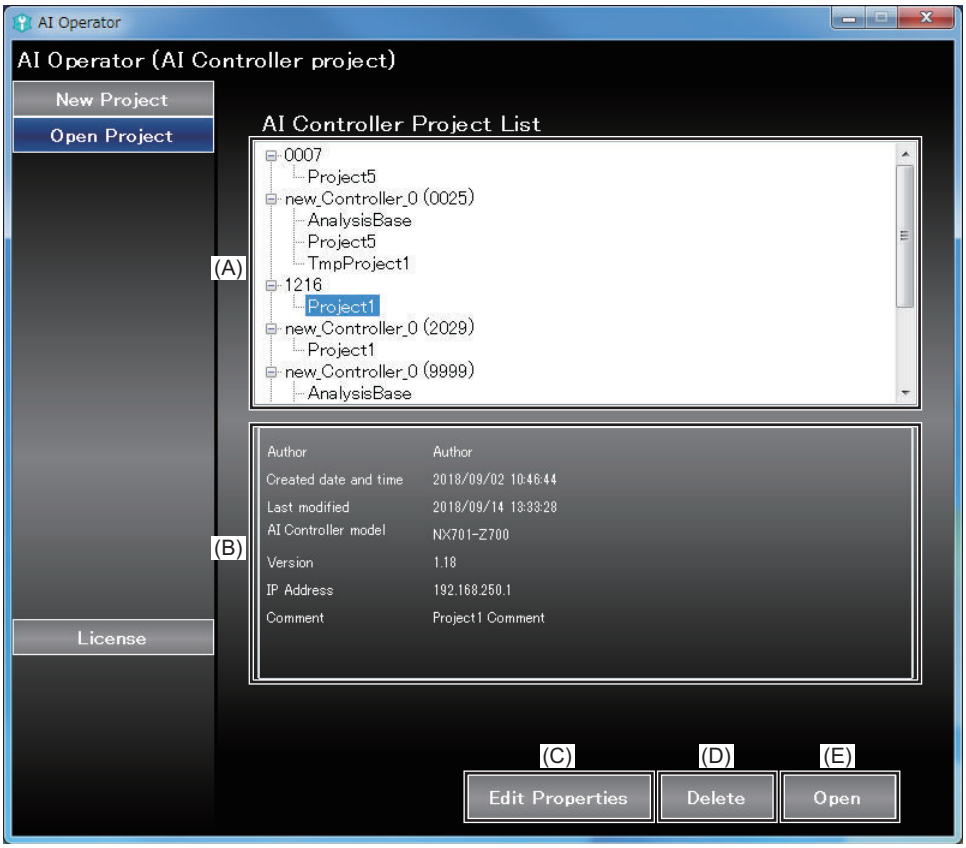
Precautions for Correct Use

To be able to use an analysis data file and an equipment event monitoring score file that are stored in the AI Controller's storage on the AI Operator and the AI Viewer, you will use the FTP communication protocol for transferring data files. The AI Controller is equipped with the FTP server function. You need to configure the FTP server settings in advance. Be sure to set up your FTP user name and password in the Controller settings of Sysmac Studio.

4-1-3 Opening an AI Controller Project

This section describes the procedure to open an existing AI Controller Project.

Select **Open Project** to open the **AI Controller Project List** screen. Next, go to **AI Controller Project List** and select an AI Controller project. Then, click the **Open** button.



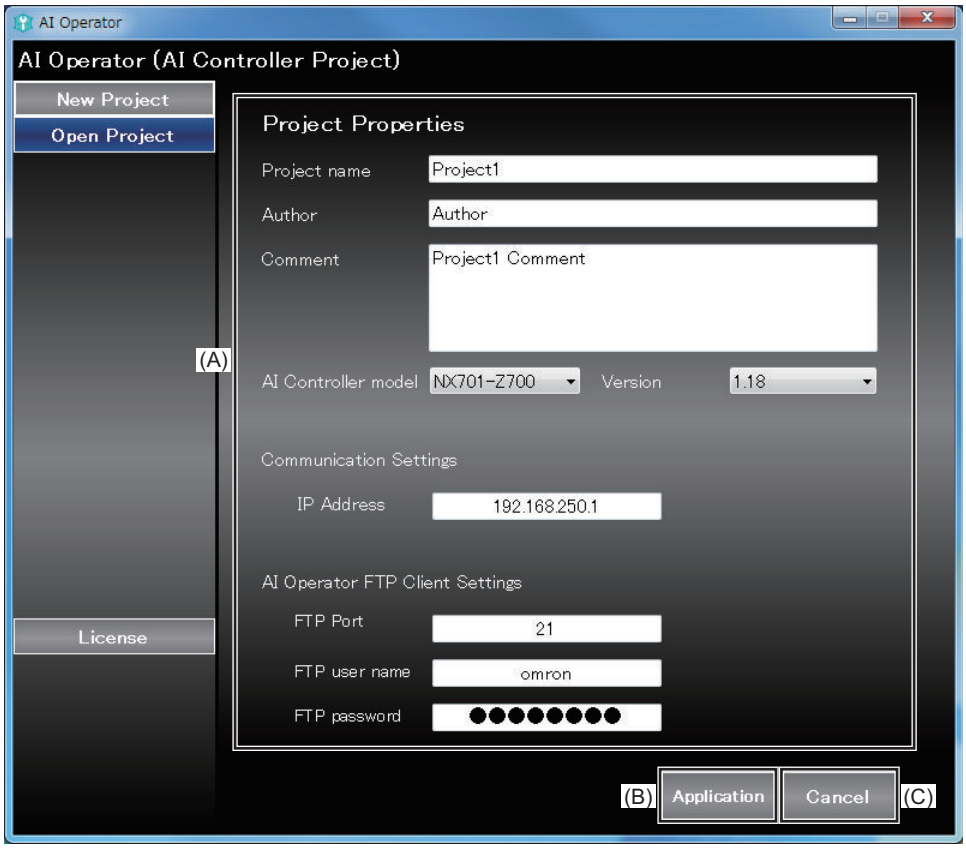
Sym-bol	Item	Description
(A)	AI Controller Project List	Shows the list of AI Controller projects in the tree view. Display format: • The higher hierarchy is the **Controller Name (Serial ID)** • The lower hierarchy is the project name.
(B)	Project Properties	Displays the properties of a project selected in AI Controller project list.
(C)	**Edit Properties** button	Opens the screen to edit project for a project selected in AI Controller project list.
(D)	**Delete** button	Deletes a project selected in AI Controller project list.
(E)	**Open** button	Opens a project selected in AI Controller project list. When you click this button, the **Variable Settings** screen opens.

Additional Information

The AI Controller project data is stored under C:\OMRON\Application\AIOperator\SettingProjects\AnalysisProjects\[Serial_No.]\[Project_Name]. To use an AI Controller project you created here on another computer, find a folder named the same as the project you want to use and copy the entire folder.

4-1-4 Editing Properties of an AI Controller Project

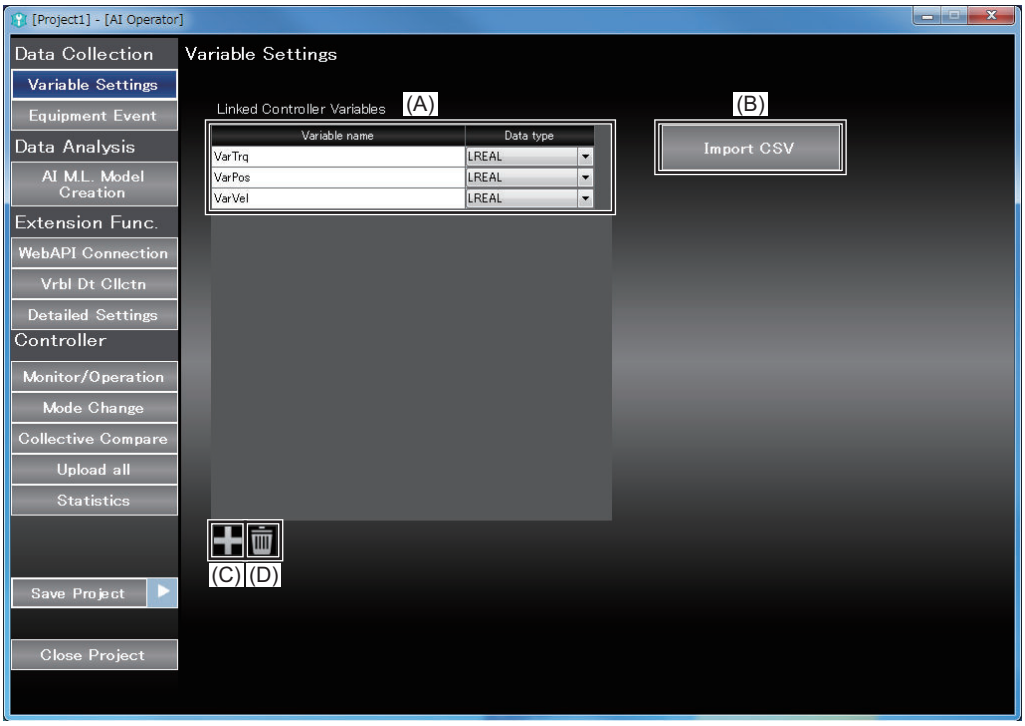
This section describes the procedure to edit properties of an AI Controller project.
Select a project from **AI Controller Project List** and click the **Edit Properties** button as described in *4-1-3 Opening an AI Controller Project* on page 4-4.



Sym-bol	Item	Description
(A)	Project Properties	Allows you to edit the setting on AI Controller projects.
(B)	**Application** button	Applies the changes.
(C)	**Cancel** button	Cancels the changes.

4-2 Setting Variable Data

This section describes the procedure to register variable data in an AI Controller project.
Select **Variable Settings** to open the **Variable Settings** screen.



Symbol	Item	Description
(A)	Linked Controller Variables	Displays the list of variables and allows you to input variables. Global variables including system-defined variables can be specified as variable names. Structure members and elements of array variables can be specified, too. The data type is selectable from the combo box. The selectable data type are shown below. BOOL BYTE WORD DWORD LWORD SINT INT DINT LINT USINT UINT UDINT ULINT REAL LREAL DATE TIME_OF_DAY DATE_AND_TIME TIME
(B)	**Import CSV** button	Imports a CSV file and adds a variable. The CSV file format that can be imported must have a variable name set to the first column and a data type set to the second column. Data after the second column will be ignored even if it exists, and data of next row will be imported. If you import an CSV file when variables are already registered to Linked Controller Variables, the following behaviors are expected. • Same name of variable exists in Linked Controller Variables: Not overwritten • Same name of variable does not exist in Linked Controller Variables: Added If data types other than those specified in the **Linked Controller Variables** list is set to the second column, the import will be aborted because an error occurs at the corresponding row. In this case, data before the aborted row is imported.
(C)	**Add** button 	Adds a row in the variables list.
(D)	**Delete** button 	Deletes a selected variable.

Additional Information

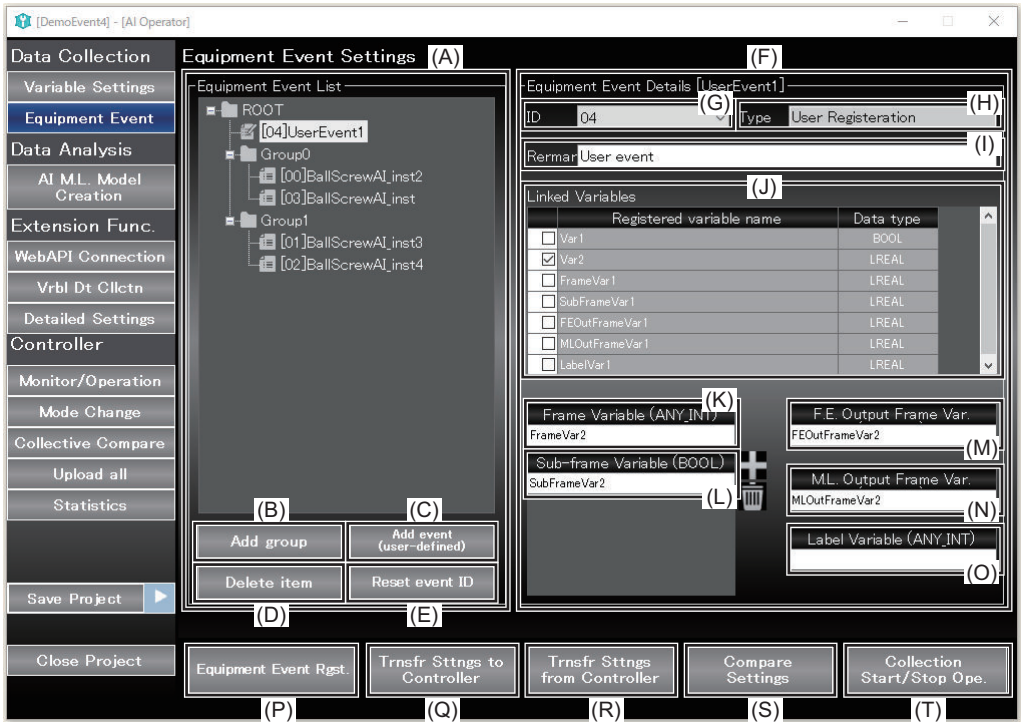
The CSV import function makes it easy for you to work with the global variables table in Sysmac Studio by copying the data into a text editor or to a spreadsheet application. However, array-type and structure-type variables need to be converted into individual elements.
Example: Var1 ARRAY[0..9] OF BOOL → VAR1[0] BOOL
MC_Axis000 _sAXIS_REF → MC_Axis000.Act.Trq LREAL

Precautions for Correct Use

Variables selected in equipment events and variable data collection cannot be deleted. Remove such data from equipment events and variable data collection beforehand.

4-3 Setting Equipment Event

This section describes how to set up equipment events.
Select **Equipment Event** to open the **Equipment Event Settings** screen.



Sym-bol	Item	Description
(A)	Equipment Event List	Displays the registered groups and equipment events in the tree view. Up to 128 equipment events are shown. Drag and drop an equipment event to add a group.
(B)	**Add group** button	Adds a group. The group can include up to 50 equipment events and have a sub-group.
(C)	**Add event (user-defined)** button	Adds a user-defined equipment event.
(D)	**Delete item** button	Deletes a selected equipment event. This button ungroups a selected group.
(E)	**Reset event ID** button	Re-numbers all the registered equipment events ID numbers from the top of the tree starting with 0. See Precautions for Correct Use below.
(F)	Equipment Event De-tails	Displays detailed information on an equipment event selected in the *Equipment Event List* area.
(G)	ID	Equipment event's ID. See Precautions for Correct Use below.
(H)	Type	Equipment events registered by the AI Predictive Maintenance Library are displayed as **AI FB**. Any other equipment events are displayed as **User Registration**.
(I)	Remarks	Allows you to input description of an equipment event.

Sym-bol	Item	Description
(J)	Linked Variables	Shows the list of variables that were entered on the Variable Settings screen. Only the BOOL or LREAL-type variables are displayed. Check variable(s) you want to collect for analysis data on an equipment event.
(K)	Frame Variable	Allows you to register a frame variable. Registrable type: SINT, INT, DINT, LINT, USINT, UINT, UDINT, and ULINT One frame variable can be specified for each equipment event.
(L)	Sub-frame Variable	Allows you to register subframe variables. Registrable type: BOOL Up to six subframe variables can be specified for each equipment event. This setting is not mandatory. Configure this setting as needed.
(M)	F.E. Output Frame Var.	Allows you to register an F.E. output frame variable. Only one F.E. output frame variable can be specified for each equipment event. Please specify the same data type as *(K) Frame Variable*.
(N)	M.L. Output Frame Var.	Allows you to display and edit output frame variables for machine learning. Only one M.L. output frame variable can be specified for each equipment event. Please specify the same data type as *(K) Frame Variable*.
(O)	Label Variable	Allows you to register a label variable. Only one label variable can be specified for each equipment event. Data type of the Label Variable is selectable from SINT, INT, DINT, and LINT. This setting is not mandatory. Configure this setting as needed. If there is (labeling) information for determining the specified frame status as being either normal or abnormal, the variable must be specified here. (0=Normal, 1=Abnormal, -1=Invalid)
(P)	**Equipment Event Rgst.** button	Displays the AI Predictive Maintenance Library List that the AI Controller uses. Registers a library selected from the List as an equipment event. Refer to *Section 6 Using AI Predictive Maintenance Library* on page 6-1 for details.
(Q)	**Trnsfr Sttngs to Controller** button	Transfers the settings in the **Equipment Event Settings** screen from the computer to the AI Controller.
(R)	**Trnsfr Sttngs from Controller** button	Transfers the settings in the **Equipment Event Settings** screen from the AI Controller to the computer.
(S)	**Compare Settings** button	Compares the settings on the **Equipment Event Settings** screen against settings in the AI Controller.
(T)	**Collection Start/Stop Ope.** button	Open the **Monitor/Operation** screen to start/stop the collection of analysis data.

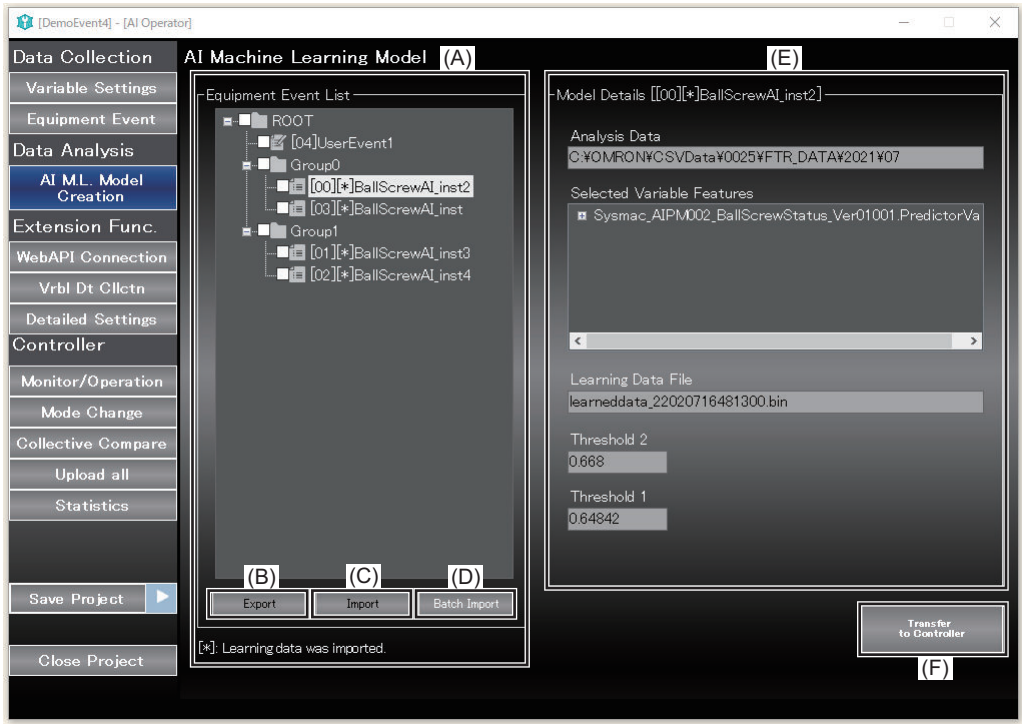
Precautions for Correct Use

- Variables selected in equipment events and variable data collection cannot be deleted. Remove such data from equipment events and variable data collection beforehand.
- An equipment event ID is used as an array index for an AI unction-related system variable. If you use an AI function-related system variable in a user program, review the user program based on the event ID numbering.
- When you have changed an ID of the learned equipment event, export it in the **AI Machine Learning Model** screen to a different folder from the existing export folder.

4-4 AI Machine Learning Model

The **AI Machine Learning Model** screen allows you to export the data to analyze to the AI Controller Data Mining Software (AI Easy Modeler, AI Easy Modeler for Model Setting). Also, you can import an AI machine learning model created with the AI Controller Data Mining Software to transfer to the AI Controller.

Refer to 2-2 Basic Flow of Operation in the *AI Controller Data Mining Software Operation Manual (Cat. No. W612)* for the operation flow chart.



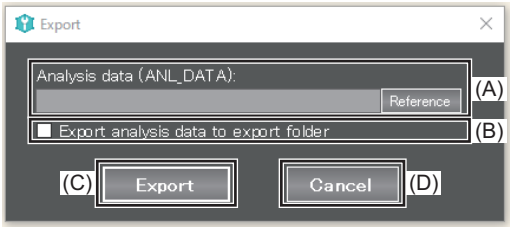
Symbol	Item	Description
(A)	Equipment Event List	• Displays the registered groups and equipment events in the tree view. ID and equipment event name are displayed. • An asterisk "[*]", which indicates the learned data, will be added ahead of the name of an event imported with the **Import** or **Batch Import** button. • Check the boxes of groups and equipment events to determine the scope of operation.
(B)	**Export** button	• Exports the data analyzed by AI Easy Modeler or AI Easy Modeler for Model Setting. • Exports the checked equipment event(s) shown in the Equipment Event List area. • An unlearned user-defined equipment event can be exported if it is checked alone. • Refer to *4-4-1 Export Dialog* on page 4-13.
(C)	**Import** button	Imports an AI machine learning model for equipment event created with AI Easy Modeler for Model Setting. Imports learning data on the equipment event(s) in the Equipment Event List area.
(D)	**Batch Import** button	Imports an AI machine learning model created with AI Easy Modeler for Model Setting.

Symbol	Item	Description
(E)	Model Details	Analytics of a selected equipment event are shown. **Analysis Data** Pressing the Export or Batch Export button displays specified analysis data path. **Selected Variable Features** Variables and features adopted to AI machine learning models are shown in this area when a selected equipment event marked with an asterisk (*) in the Equipment. The following items are displayed: • Variable name • Subframe name*1 • Feature calculation method **Learned Data File** Displays the imported learned data file path. **Threshold 1/Threshold 2** Threshold values are shown when the selected equipment events indicate **Completed** in the Equipment Event List area.
(F)	**Transfer to Controller** button	Transfers AI machine learning models of the equipment events indicating **Completed** (E) to the Controller.

*1. The item is shown when a subframe is registered.

4-4-1 Export Dialog

Pressing the **Export** button displays the dialog below.



Symbol	Item	Description
(A)	Analysis data (xxx_DATA)	Specifies the path where the analysis data fetched from the AI Controller stored. **[User-defined equipment event]** The label shows **Analysis data (ANL_DATA)**. Specifies the path of the analysis data (ANL_DATA) collected through the AI Controller. The analysis data (ANL_DATA) is stored under the following path: C:\OMRON\CSVData\[Controller's serial ID]\ANL_DATA\[yyyy]\[mm]\[dd] **[Equipment event that uses AI Predictive Maintenance Library]** The label shows **Feature data (FTR_DATA)**. Specifies the path of the feature data (FTR_DATA) collected through the AI Controller. The data (FTR_DATA) is stored under the following path: C:\OMRON\CSVData\[Controller's serial ID]\FTR_DATA\[yyyy]\[mm]\[dd] If there are 100,000 or more rows of data in total, AI Easy Modeler or AI Easy Modeler for Model Setting will decimate the data to read.

Sym-bol	Item	Description
(B)	Export analysis data to export folder	If you analyze the data on another PC (i.e., AI Easy Modeler/AI Easy Modeler for Model Setting is installed on another PC), you must export the analysis data to that PC. When this option checked, the analysis data will be copied to an export destination folder. See Precautions for Correct Use below.
(C)	**Export** button	Exports the data analyzed by AI Easy Modeler or AI Easy Modeler for Model Setting.
(D)	**Cancel** button	Pressing this button aborts the export.

Precautions for Correct Use

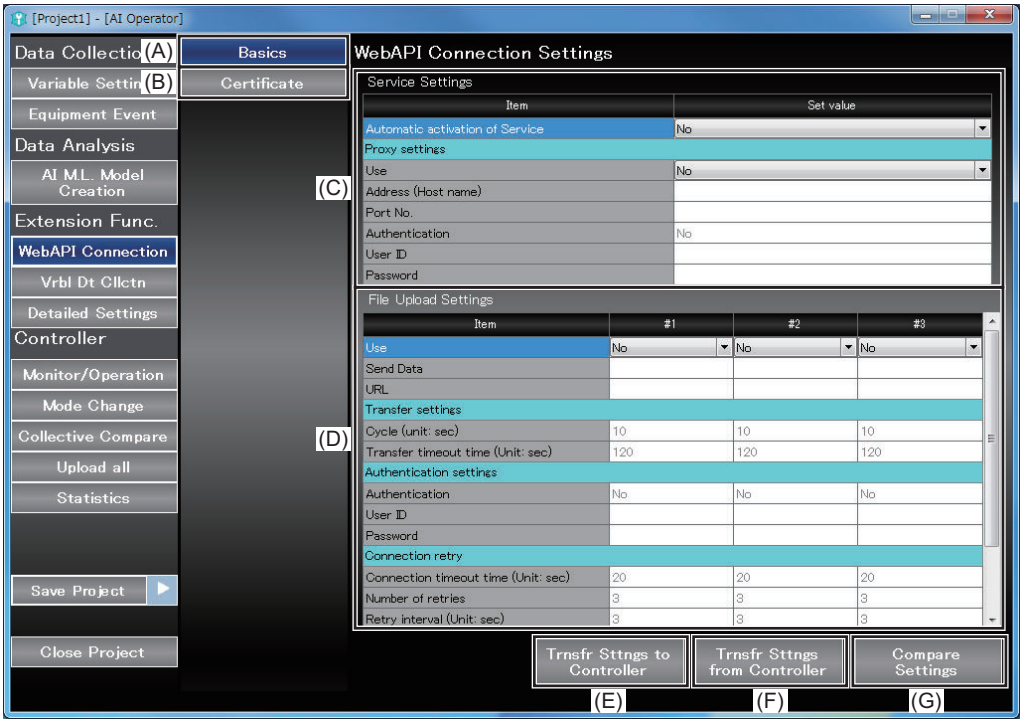
Copying a large size analysis data with the **Export analysis data to export folder** option will require large disk space and longer copying duration. In that case, avoid using the **Export analysis data to export folder** option, but manually copy the analysis data to another PC by compressing and uncompressing.

4-5 Setting WebAPI Connection Function

This section describes the procedure to set up the WebAPI connection function of an AI Controller.

4-5-1 Basic Settings of the WebAPI Connection Function

Select **WebAPI Connection** and open the **Basics** screen.

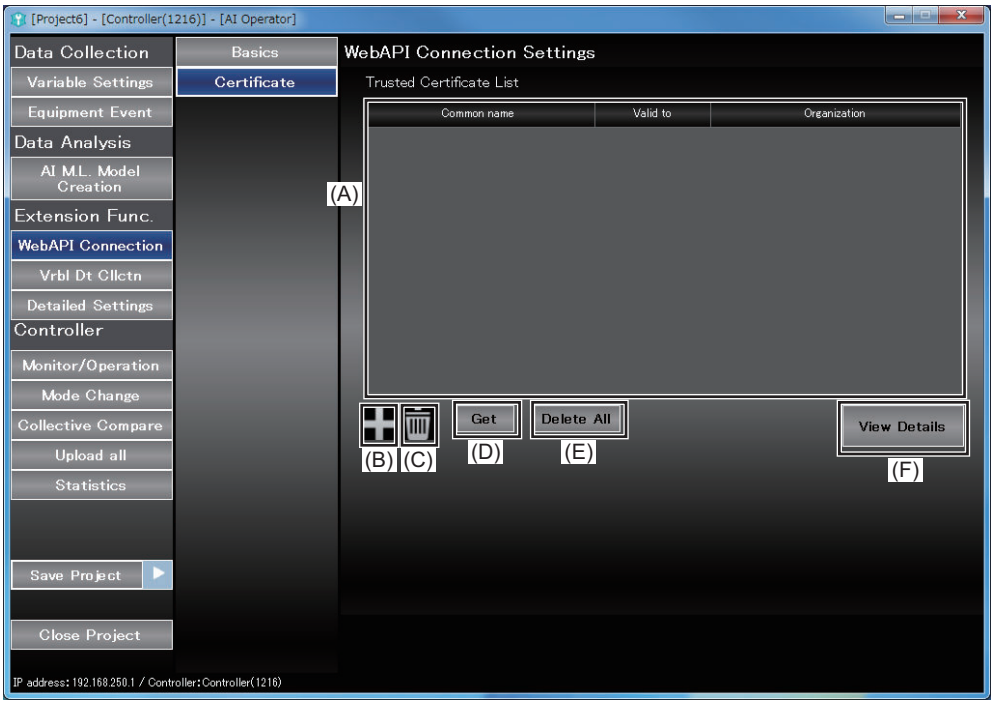


Sym-bol	Item	Description
(A)	**Basics** button	Displays the WebAPI basic settings.
(B)	**Certificate** button	Displays the issuer information specified in the WebAPI certificate.
(C)	Service Settings	The settings of WebAPI Connection Service are displayed in the list. The values for the settings are editable. Display item list (bold letters indicate category name): • Automatic activation of service: Yes, No **Proxy settings** • Use: Yes, No • Address (Host name) • Port No. • Authentication: Yes, No • User ID • Password

Sym-bol	Item	Description
(D)	File Upload Settings	Displays a list of file upload settings in the Basics settings of the WebAPI connection. Display item list (bold letters indicate category name): • Use: Yes, No • Send Data: Analysis Data, Feature Value, Equipment Event Monitoring Score Items selected in another server cannot be selected. • URL **Transfer settings** • Cycle (Unit: sec) • Transfer timeout time (Unit: sec) **Authentication settings** • Authentication: Yes, No • User ID • Password **Connection retry** • Connection timeout time (Unit: sec) • Number of retries • Retry interval (Unit: sec) **Security Settings** • TSL version: 1.0, 1.1, 1.2 The setting is valid when the transmission URL is HTTPS. • Transfer when the server certificate is expired: Yes, No The setting is valid when the transmission URL is HTTPS. • OCSP stapling: Yes, No The setting is valid when the transmission URL is HTTPS.
(E)	**Trnsfr Sttngs to Controller** button	Transfers the WebAPI connection settings from the computer to the AI Controller.
(F)	**Trnsfr Sttngs from Controller** button	Transfers the WebAPI connection settings from the AI Controller to the computer.
(G)	**Compare Settings** button	Compares the WebAPI connection settings of the computer and the AI Controller.

4-5-2 Certificate Settings for WebAPI Connection

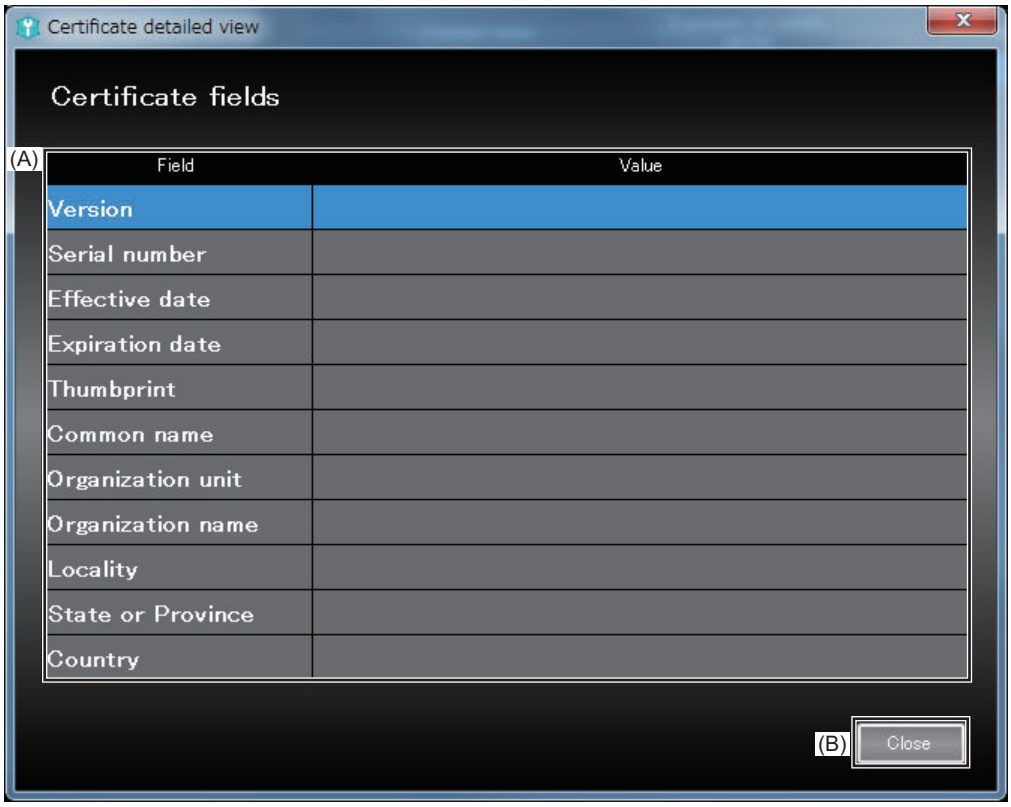
This section describes the procedure to display a list of root certificates to be imported into the AI Controller and how to add and delete certificates.
Select **WebAPI Connection** to open the **Certificate** screen.



Sym-bol	Item	Description
(A)	Trusted Certificated List	Displays a list of trusted certificates.
(B)	**Add Trusted Certificate** button	Adds a trusted certificate. Click this button to open the **Select File** dialog. When you select a file and click the **Open** button, the selected file is registered to the AI Controller.
(C)	**Delete Trusted Certificate** button	Deletes a trusted certificate from the AI Controller. When you select a certificate from **Trusted Certificate List** and click this button, the certificate is deleted.
(D)	**Get** button	Transfers a certificate from the AI Controller to the computer. When you select a certificate from **Trusted Certificate List** and click this button, the **Save as** dialog opens. Specify a file name and press the **Save** button to transfer the certificate to the computer.
(E)	**Delete All** button	Deletes all the trusted certificates from the AI Controller.
(F)	**View Details** button	Displays details of a trusted certificate.

4-5-3 Detailed View of Trusted Certificates

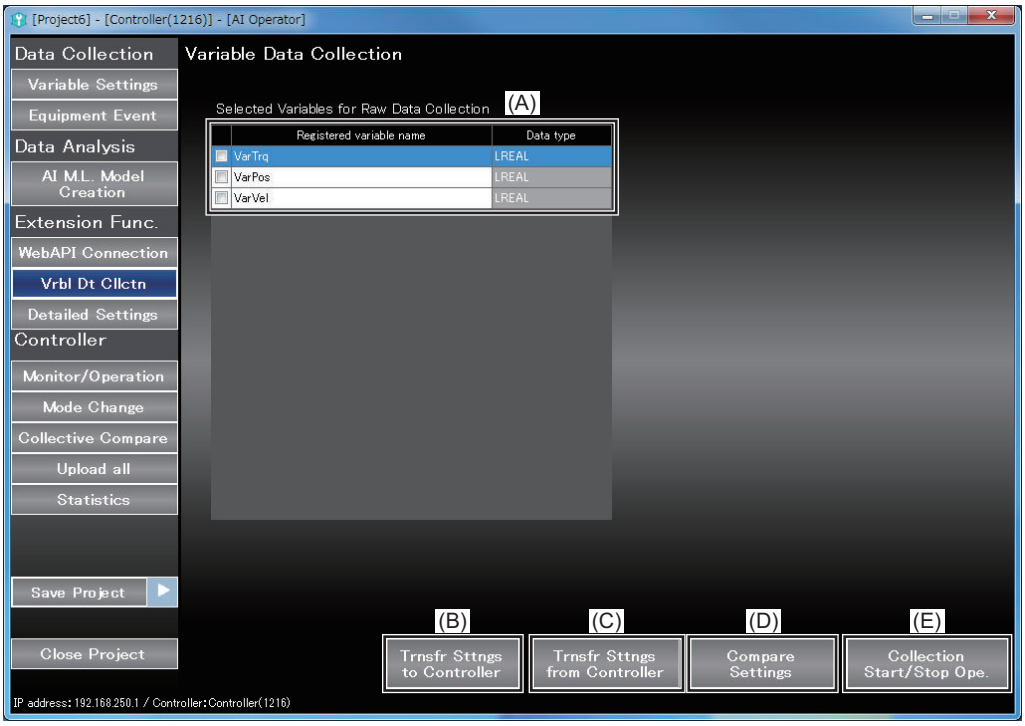
When you open the **Certificate** screen and select **View Details**, the **Certificate detailed view** opens.



Symbol	Item	Description
(A)	Certificate fields	Displays details of a certificate. The following items will appear: Version, Serial number, Effective date, Expiration date, Thumbprint, Common name, Organization unit, Organization name, Locality, State or Province, Country
(B)	**Close** button	Closes the **Certificate detailed view**.

4-6 Collecting Variable Data

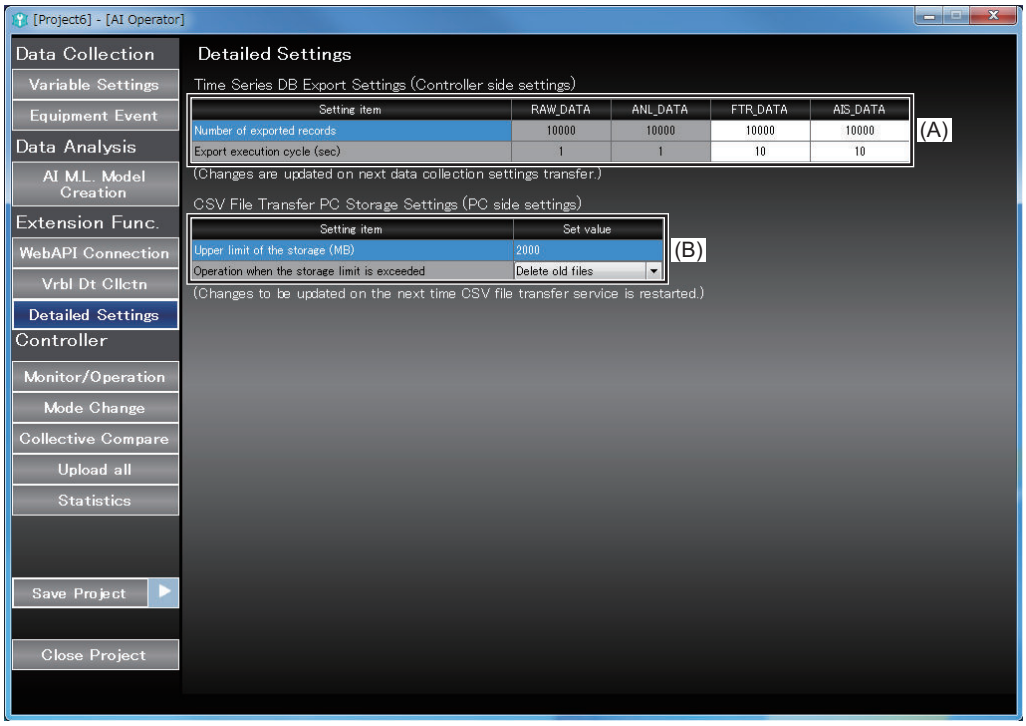
This section describes the procedure to collect variables data without having to configure equipment events or frame variables.
Select **Vrbl Dt Cllctn** button to open the **Variable Data Collection** screen.



Symbol	Item	Description
(A)	List of Registered variable name	Shows the list of variables set on the **Variable Settings** screen.
(B)	**Trnsfr Sttngs to Controller** button	Transfers the settings configured on the **Variable Data Collection** screen from the computer to the AI Controller.
(C)	**Trnsfr Sttngs from Controller** button	Transfers the settings configured on the **Variable Data Collection** screen from the AI Controller to the computer.
(D)	**Compare Settings** button	Compares the settings on the **Variable Data Collection** screen against those on the AI Controller.
(E)	**Collection Start/Stop Ope.** button	Open the **Monitor/Operation** screen to start or stop the collection of variable data.

4-7 Detailed Settings for Data Collection

You will configure the export settings for the TSDB function and the settings for transferring CSV files from the AI Controller to the computer.
Select **Detailed Settings** and open the **Detailed Settings** screen.



Sym-bol	Item	Description
(A)	Time Series DB Export Settings	Shows the settings and values of the TSDB function of the AI Controller. Setting items: • Number of exported records: If the number of records specified in this setting is stored in TimeSeries, the data will be exported. • Export execution cycle (sec): Specify an export cycle here. Even if the number of records specified for **Number of exported records** is not stored in TimeSeries, the data will be exported in the cycle specified in this setting.
(B)	CSV File Transfer PC Storage Settings	Shows the settings of your computer's storage. Setting items: • Upper limit of the storage (MB): Specify an upper limit of your computer's storage here. Your computer's storage usage will not exceed the value set here. • Operation when the storage limit is exceeded: Specify a behavior when the storage limit is exceeded. Options: Delete old files, Stop data collection

4-8 Monitor and Operation

This section describes the procedure to use AI functions of an AI Controller as well as the procedure to monitor the status of the functions.

Symbol	Item	Description
(A)	**TSDB Function** button	Opens the monitoring screen of the time series database function.
(B)	**F.E/M.L. Function** button	Opens the monitoring screen of the Feature Extraction/Machine Learning Function.
(C)	**WebAPI Connection** button	Opens the service status monitoring screen of the WebAPI connection function.
(D)	Status Bar	When the **Monitor/Operation** screen is displayed, the following items also appear in addition to the standard display items. • Connection status: Connected/Disconnected • Mode: Program/Run • Error: Yes/None

● Time-series DB Function Monitor and Operation

This section describes the procedure to use the Time Series Database Function of an AI Controller as well as the procedure to monitor the status of the function.

Symbol	Item	Description
Data Collection Phase		
(A)	Start/Suspend buttons for **Data Collection for Analysis**	Starts and stops the following collection of analysis data (ANL_DATA). This will start and stop the sampling and export of the TSDB function as well as the transfer of CSV files from the AI Controller to your computer.
Extension Functions		
(B)	Start/Suspend buttons for **Variable Data Collection**	Starts/stops the collection of variable data (RAW_DATA). This will start and stop the sampling and export of the TSDB function as well as the transfer of CSV files from the AI Controller to your computer.
TimeSeries DB Monitor/Operation		
(C)	TSDB Service	Shows the TSDB service status of the AI Controller. One of the following status will appear: • Idle, Running, Error Stop, Shutdown Press the **Start**, **Suspend**, or **Shutdown** button to start, stop, or shutdown the TSDB service.
(D)	TimeSeries	Shows the creation status and the open state of each TimeSeries. One of the following status will appear for the creation status: • Created, Not created One of the following status will appear for the open status: • Open, Close Press **Reconstruct** button to reconstruct each TimeSeries.
(E)	Sampling	Shows the sampling status of each TimeSeries. One of the following status will appear: • Running, Idle Press the **Start**, **Suspend**, or **Clear** button to start, stop, or clear sampling of each TimeSeries. The feature values (FTR_DATA) and equipment event monitoring scores (AIS_DATA) cannot be controlled by the **Start** and **Suspend** buttons.

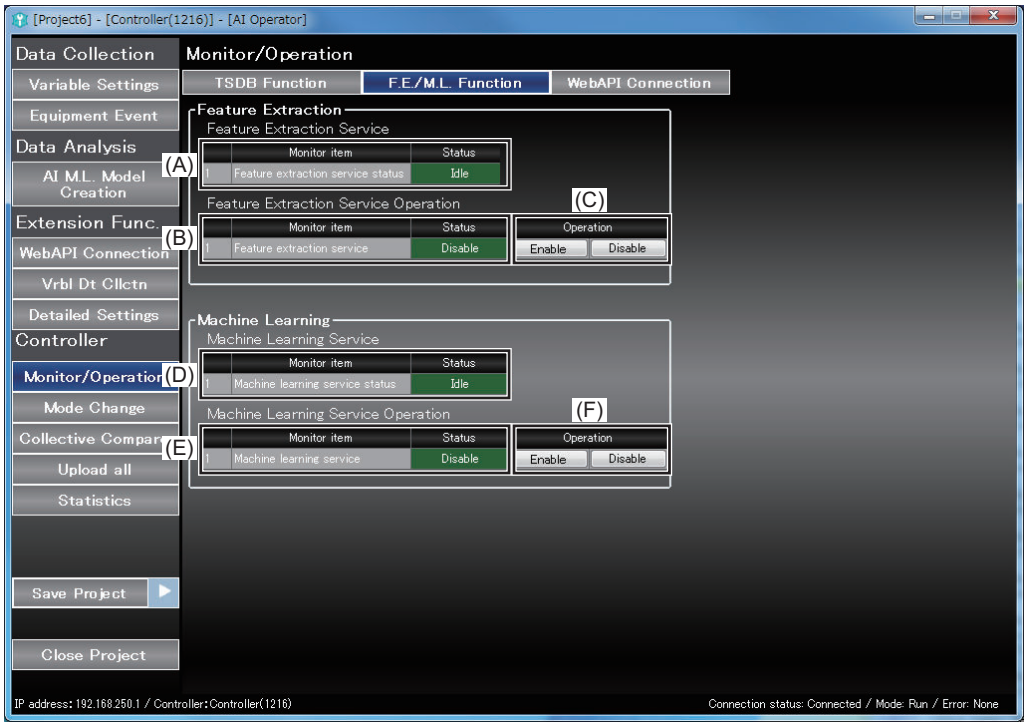
Symbol	Item	Description
(F)	Export	Shows the export status of each TimeSeries. One of the following status will appear: • Running, Idle Press the **Start**, **Suspend**, or **Delete CSV** button to start or stop export of each TimeSeries or delete its CSV file.
CSV File Transfer Function		
(G)	**History** button	Shows the CSV file transfer service operation history. One of the following categories will appear: • Information, error
(H)	CSV File Transfer Service	Shows the status of the CSV file transfer service. Retrieves and displays the corresponding service of Windows.
(I)	CSV File Transfer Status	Shows the transfer status of each TimeSeries in the CSV file from the AI Controller to the computer. Press the **Start** or **Suspend** button to start or stop the CSV file transfer.

Precautions for Correct Use

The log file for the CSV file transfer service contains the Controller name when the collection of analysis data and variable data was started. If you change the Controller name after data collection was started, the Controller name appearing in the log file may not be consistent with the actual Controller name.

● Monitor and Operation of the Feature Extraction/Machine Learning Function

This section describes the procedure to use the Feature Extraction/Machine Learning Function of the AI Controller as well as the procedure to monitor the status of the function.

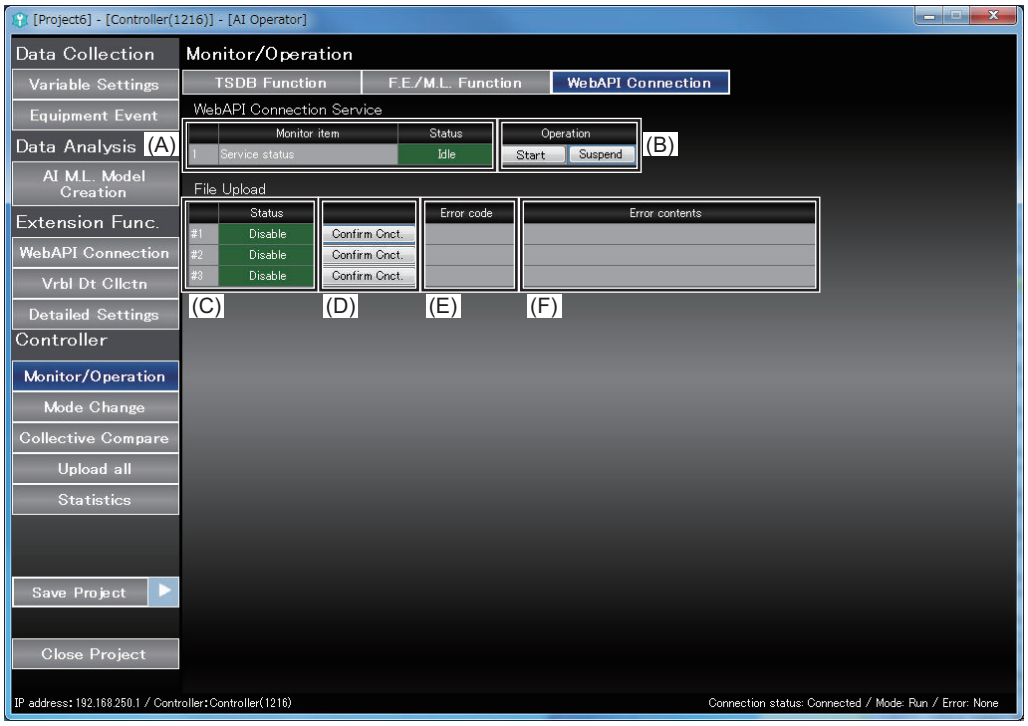


Symbol	Item	Description
Feature Extraction		

Symbol		Item	Description
	(A)	Feature Extraction Service Status	Shows the operating status of the feature extraction service. One of the following status will appear: Running, Idle
	(B)	Feature Extraction Service Operation	Shows the status of the feature extraction service being enabled or disabled. When the system-defined variable Feature Extraction Service Operation (_FE_Enable) is True, the service status is **Enable**. When it is False, the service status is **Disable**.
	(C)	**Enable**/**Disable** buttons	Enables or disables the feature extraction service. Changes the system-defined variable Feature Extraction Service Operation (_FE_Enable) to True or False. • Enable: Set _FE_Enable to True • Disable: Set _FE_Enable to False
Machine Learning			
	(D)	Machine Learning Service Status	Shows the status of the machine learning service. One of the following status will appear: Running, Idle
	(E)	Machine Learning Service Operation	Shows the status of the machine learning service being enabled or disabled. When the system-defined variable Machine Learning Service Operation (_MLE_Enable) is True, the service status is **Enable**. When it is False, the service status is **Disable**.
	(F)	**Enable**/**Disable** buttons	Enables or disables the machine learning service. Changes the system-defined variable Machine Learning Service Enable Command (_MLE_Enable) to True or False. • Enable: Set _MLE_Enable to True • Disable: Set _MLE_Enable to False

● WebAPI Connection Function Monitor and Operation

This section describes the procedure to use the WebAPI connection function of an AI Controller as well as the procedure to monitor the status of the function.



Symbol	Item	Description
WebAPI Connection Service		
(A)	Service status	Shows the WebAPI connection service status. One of the following status will appear: • Initializing, Idle, Running, Error Stop
(B)	**Start**/**Suspend** buttons	Starts or stops the WebAPI connection service.
File Upload		
(C)	Status	Shows the upload status of each file used with the WebAPI connection function. One of the following status will appear: • No transmission record, success, failure, service stopped
(D)	**Confirm Cnct.** buttons	Performs a connection test whether a file can be uploaded to the specified URL.
(E)	Error code	Shows the error code in case of a file update failure.
(F)	Error contents	Shows the error contents in case of a file update failure.

4-9 Mode Changes

This section describes the procedure to change the AI Controller's operating mode.

When you select **Mode Change**, a message box appears.

When the operating mode of the Controller is *PROGRAM mode*, you can switch it to *RUN mode*.

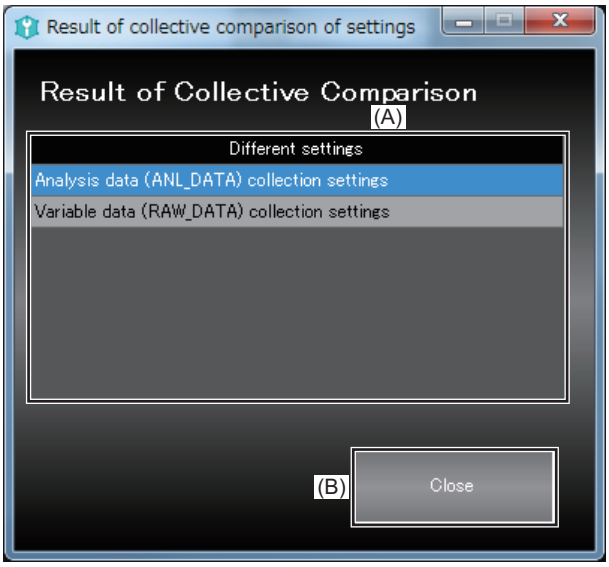
When it is in *RUN mode*, you can switch the mode to *PROGRAM mode*.

Precautions for Safe Use

Before you switch the operating mode of the Controller, ensure that changing the mode will not affect the system.

4-10 Collective Comparison

This section describes the procedure to compare settings between the computer and the AI Controller and how to display the differences in a list. When you select **Collective Compare**, the function is executed. Then, the **Result of collective comparison of settings** dialog opens.



Symbol	Item	Description
(A)	Different settings	Compares the settings in the computer and the AI Controller and then displays the settings that are different. This function compares the following settings. • Data Collection Common Setting • Variable Data (RAW_DATA) Collection Settings • Analysis Data (ANL_DATA) Collection Settings • Feature Value (FTR_DATA) Collection Settings • Equipment Event Monitoring Score (AIS_DATA) Collection Settings • WebAPI Connection Function Setting • Feature Extraction Function Settings • Machine Learning Function Settings • AI Machine Learning Model
(B)	**Close** button	Closes the setting comparison screen.

Precautions for Correct Use

When different settings are displayed, execute **Partial Transfer to Controller** from the screens listed below.

Different settings	Screen to perform partial transfer to Controller
Data Collection Common Setting	Equipment Event Settings WebAPI Connection Settings Variable Data Collection
Variable Data (RAW_DATA) Collection Settings	Variable Data Collection
WebAPI Connection Function Setting	WebAPI Connection Settings
Analysis Data (ANL_DATA) Collection Settings, Feature value (FTR_DATA) Collection Settings, Equipment Event Monitoring Score (AIS_DATA) Collection Settings, Feature Extraction Function Settings, Machine Learning Function Settings, or AI Machine Learning Model	Equipment Event Settings

4-11 Collective Uploading

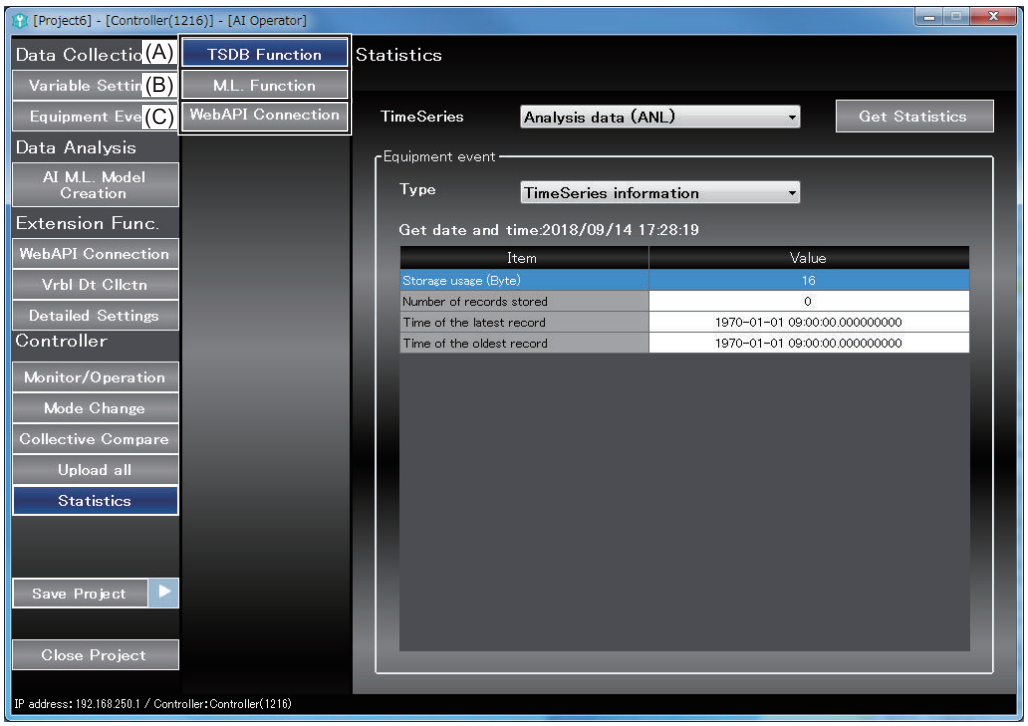
By uploading all the information on the AI functions from the AI Controller, you can update data of the project that is currently open.
When you select **Upload all** and click the **Yes** button on the message box that appears, the upload starts.

Precautions for Correct Use

Once you execute the collective upload, all of the project data is overwritten by the information uploaded from the AI Controller. Before you execute the collective upload, close the current project and create a new project as needed.

4-12 Statistical Information

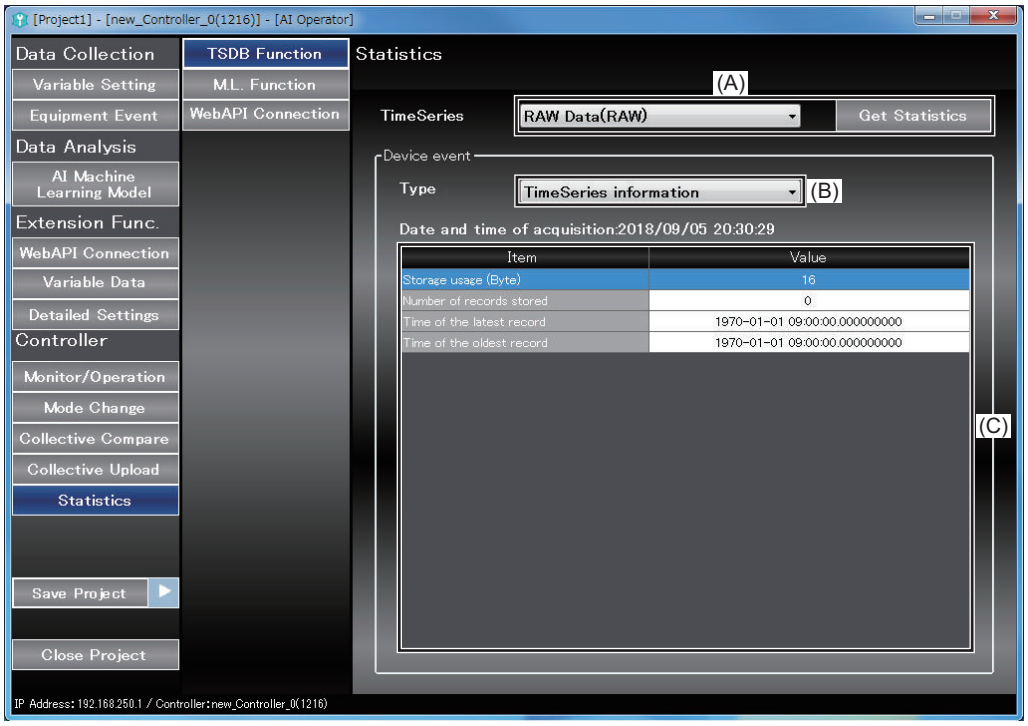
This section describes the procedure to show statistical information of the AI Controller's AI functions.



Sym-bol	Item	Description
(A)	**TSDB Function** button	Displays statistical information of the time series database function.
(B)	**M.L. Function** button	Displays statistical information of the machine learning function.
(C)	**WebAPI connection function** button	Displays statistical information of the WebAPI connection function.

● Statistical Information of the Time-series DB Function

This section describes the procedure to show statistical information of the Time Series Database Function.

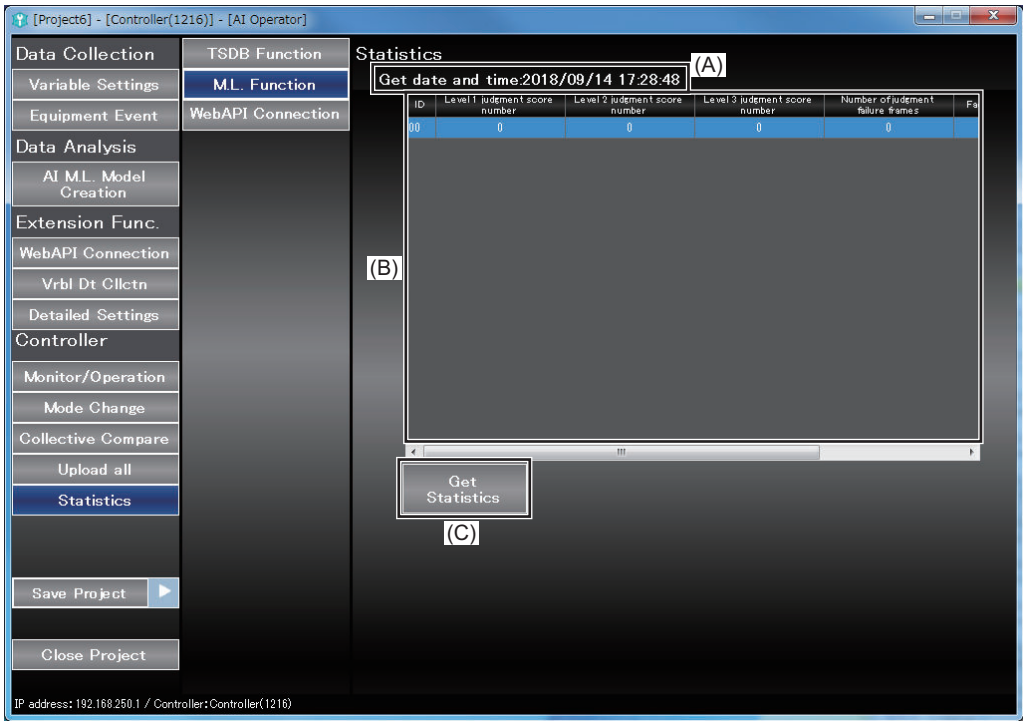


Sym-bol	Item	Description
(A)	**TimeSeries** combo box	Allows you to select a TimeSeries in which statistical information you want to retrieve. You can select any of the following: • Analysis data (ANL) • Feature data (FTR) • Equipment event monitoring score data (AIS) • RAW Data (RAW) Press the **Get Statistics** button to retrieve data.
(B)	**Type** combo box	Allows you to select a category of statistical information. You can select any of the following: • TimeSeries information • Sampling processing • Internal buffer • Export processing

Symbol	Item	Description
(C)	List of Statistical Information (TSDB Function)	Displays the retrieved statistical information (TSDB function). The information displayed for each **Type** is as follows: TimeSeries information • Storage usage (Byte) • Number of records stored • Time of the latest record • Time of the oldest record Sampling processing • Number of executed samplings • Sampling execution failure count • Maximum sampling time (ms) • Average sampling time (ms) Internal buffer • Maximum number of records accumulated in the internal buffer • Number of records discarded by internal buffer • Number of records currently accumulated in the internal buffer Export processing • Maximum export time (ms) • Average export time (ms) • Export execution count

● Statistical Information of Machine Learning Function

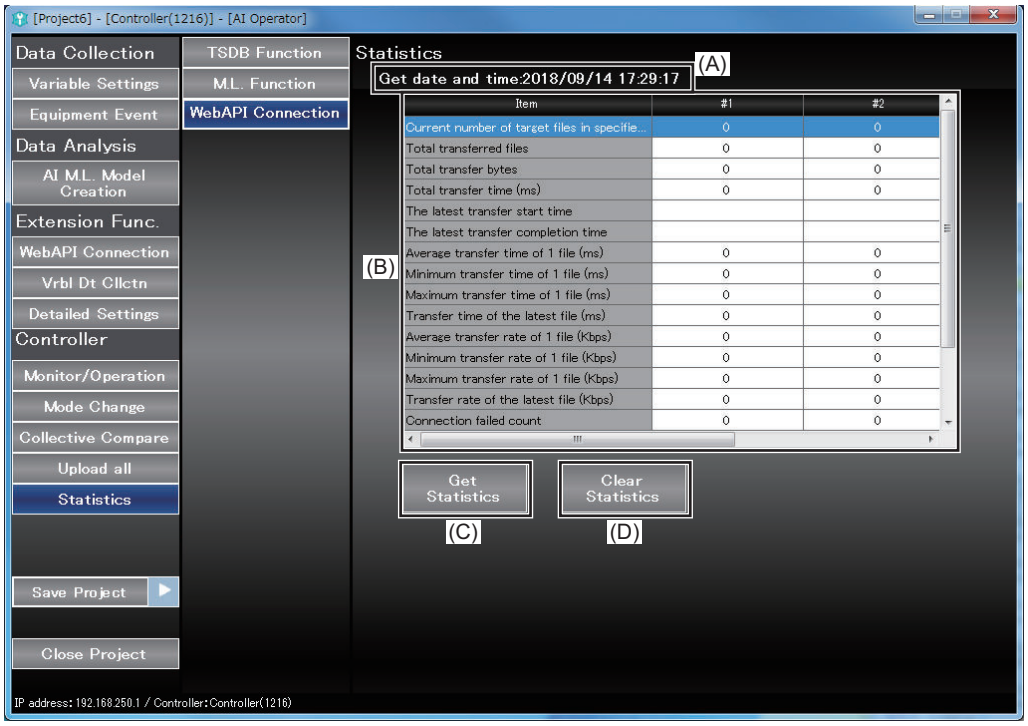
This section describes the procedure to show statistical information of the machine learning function.



Sym-bol	Item	Description
(A)	Get date and time	Displays date and time when the statistical information was retrieved.
(B)	List of Statistical Information	Displays the retrieved statistical information (machine learning function). The following information is displayed. • Level 1 judgment score number • Level 2 judgment score number • Level 3 judgment score number • Number of judgment failure frames • Factors of the last judgment failure frame
(C)	**Get Statistics** button	Retrieves the statistical information.

● Statistical Information of the WebAPI Connection Function

This section describes the procedure to show and clear statistical information of the WebAPI function.



Sym-bol	Item	Description
(A)	Get date and time	Displays date and time when the statistical information was retrieved.

Symbol	Item	Description
(B)	List of Statistical Information	Displays statistical information of each node connected. Statistical information is displayed for each target number **#****** (**** is the target number) of upload specified in the WebAPI connection settings. The following information is displayed. • Current number of target files in specified folder • Total transferred files • Total transfer bytes • Total transfer time (ms) • The latest transfer start time • The latest transfer completion time • Average transfer time of 1 file (ms) • Minimum transfer time of 1 file (ms) • Maximum transfer time of 1 file (ms) • Transfer time of the latest file (ms) • Average transfer rate of 1 file (Kbps) • Minimum transfer rate of 1 file (Kbps) • Maximum transfer rate of 1 file (Kbps) • Transfer rate of the latest file (Kbps) • Connection failed count • Transfer failed count • Latest send error error code • Latest send error detection time • Latest send error recovery time
(C)	**Get Statistics** button	Retrieves the statistical information.
(D)	**Clear Statistics** button	Clears the currently displayed statistical information of the connection target. When you click this button, a confirmation message box appears.

4-13 Authority Verification for AI Controller Operation

If the operation authority verification is configured for the AI Controller on Sysmac Studio, a password entry may be required. In that case, enter a password on a dialog prompting you to enter your password when you connect an AI Controller using the AI Operator.

Precautions for Correct Use

The operation authority verification cannot be configured on the AI Operator. Use Sysmac Studio.
Refer to *8-3-1 Operation Authority Verification* of the *Sysmac Studio Version 1 Operation Manual (Cat. No. W504)* for details.

4-14 Security Settings for the AI Controller

Security Settings for the AI Controller

When the **Secure Communication Version** is set in the Security Settings for the AI Controller, the AI Controller can be connected using the AI Operator in the following combinations of versions.

Secure communication	NX701-Z□00 AI Controller unit version	AI Controller Standard Software	Sysmac Studio
Secure Communication Version setting supported (Secure Communication Versions 1 and 2 are supported)	Ver.1.36 or later	Ver.1.06 or later	Ver. 1.63 or higher
Secure Communication Version setting not supported (Operates as Secure Communication Version 1)	Ver.1.29 to Ver.1.35	Ver.1.04 and Ver.1.05	Ver.1.50 to Ver.1.62
Secure communications is not supported	Ver.1.28 or earlier	Ver.1.03 or earlier	Ver.1.49 or lower

Refer to the *NJ/NX-series CPU Unit Software User's Manual (Cat. No. W501)* for details on the **Secure Communication Version**.

User Authentication for the AI Controller

When Sysmac Studio has enabled user authentication for the AI Controller, a username and password may be required. Enter the username and password in the dialog box to connect the AI Controller using the AI Operator. When user authentication is enabled, the AI Controller can be connected using the AI Operator in combination with AI Controller version 1.29 or later, as shown in the table in *Security Settings for the AI Controller* on page 4-36.

Precautions for Correct Use

You cannot set user authentication using the AI Operator. Use Sysmac Studio.
Refer to the *Sysmac Studio Version 1 Operation Manual (Cat. No. W504)* for details.

5

Description of the AI Viewer Screen Components

This section describes names and functions of the AI Viewer screen components. The AI Viewer function allows you to monitor the status of equipment events in the AI Controller by referencing the AI Controller project that was created on the AI Operator.

5-1 Creating an AI Viewer Project

This section describes the basic operations of starting and shutting down the AI Viewer, how to create a new project, and how to save a project.

5-1-1 Starting and Shutting Down the AI Viewer

Starting the AI Viewer

1 Use the following procedure to start the AI Viewer.

- On Windows, select **Start** - **All Programs** - **OMRON** - **AI Controller Standard Software** and then select **AI Viewer Settings**.

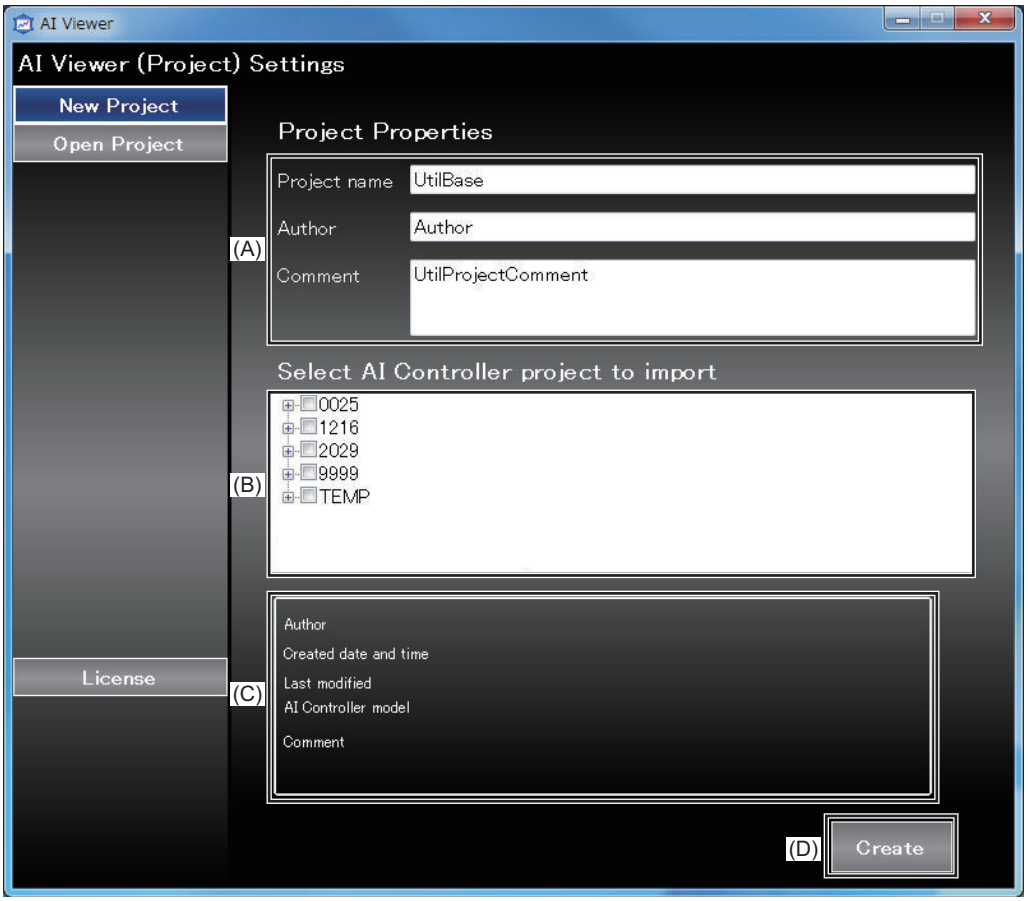
The AI Viewer starts up.

Exiting the AI Viewer

1 Click the **x** button on the right end of the title bar.
The AI Viewer will close.

5-1-2 Creating a New AI Viewer Project

To utilize data in an AI Controller, you need to create an AI Viewer project on the AI Viewer. This section describes the procedure to create a new AI Viewer project.
Select **New Project** to open the screen to start creating a new project. Next, specify each item and click the **Create** button.



Sym-bol	Item	Description
(A)	Create New Project	Fill in the following items when you create a new project. • Project name (Text) • Author (Text) • Comment (Text)
(B)	Select AI Controller project to import	Displays a list of AI Controller projects.*1 Allows you to select an AI Controller project used for the AI Viewer project by selecting a check box.*2
(C)	Project Properties	Displays properties of the AI Controller project selected in the selection field of AI Controller projects.
(D)	**Create** button	Allows you to create a new AI Viewer project from the AI Controller project selected in the selection field of AI Controller projects.

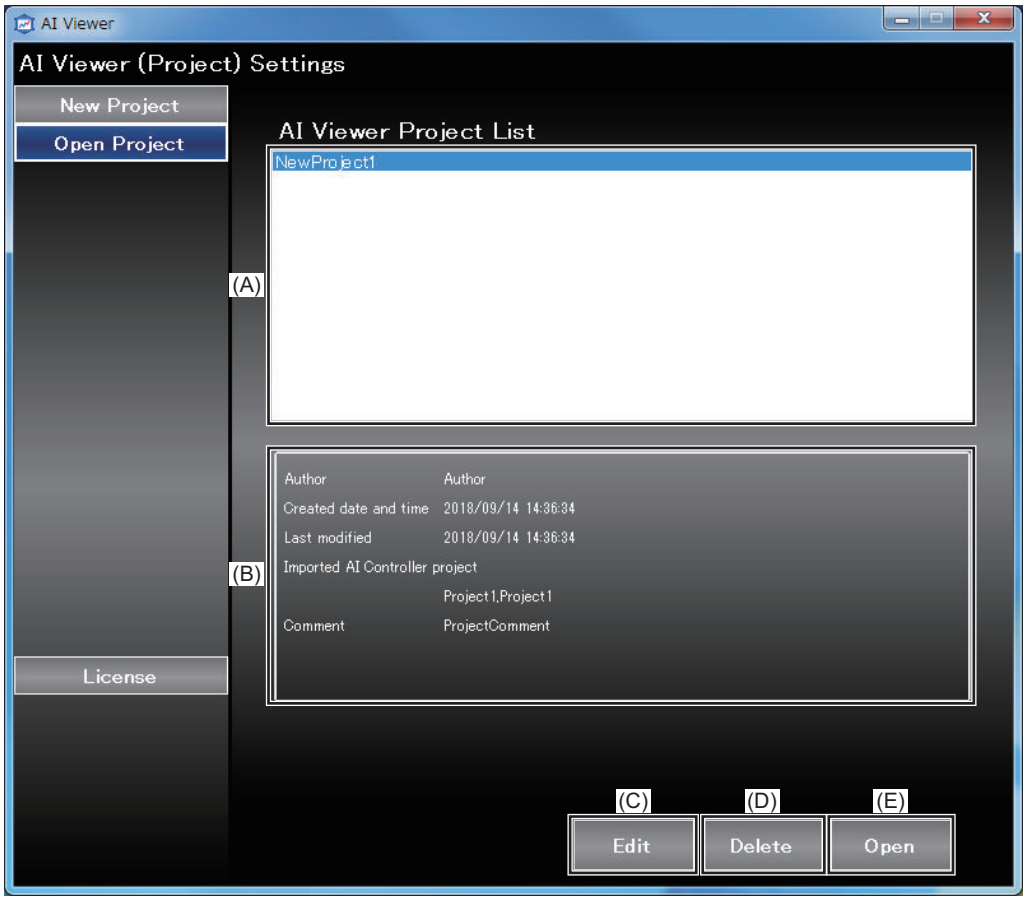
*1. The list does not show an AI Controller project if it does not contain any equipment event whose learning status is completed.

*2. You cannot select more than one AI Controller project from a same Controller.

5-1-3 Opening an AI Viewer Project

This section describes the procedure to open an existing AI Viewer project.

Select **Open Project** and open the **AI Viewer Project list** screen. Next, go to **AI Viewer Project List** and select a project. Then, click the **Open** button.



Sym-bol	Item	Description
(A)	AI Viewer Project List	Displays a list of created AI Viewer projects. Select an AI Viewer project from the list.
(B)	Project Properties	Displays the properties of an AI Viewer project selected in AI Viewer project list. The following information is displayed. • Author • Created date and time • Last modified • Imported AI Controller project • Comment
(C)	**Edit** button	Allows you to edit properties of the selected AI Viewer project.
(D)	**Delete** button	Deletes the selected AI Viewer project.
(E)	**Open** button	Opens the selected AI Viewer project.

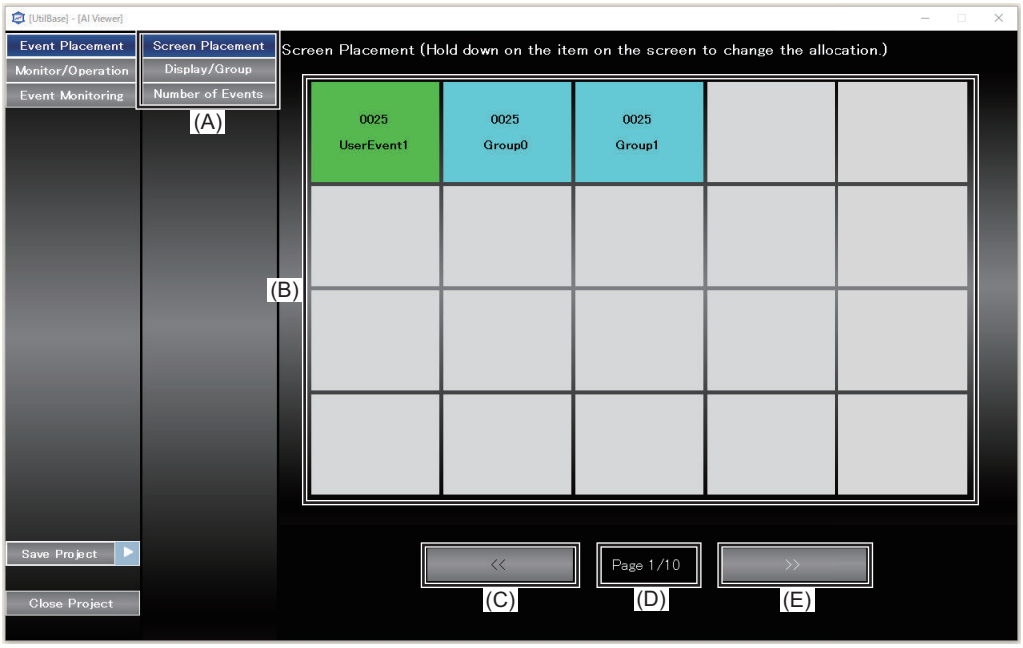
Additional Information

The AI Viewer project data is stored under C:\OMRON\Application\AIOperator\SettingProjects\UtilProjects\[Project_Name]. To use an AI Viewer project you have created here on another computer, find the folder named the same as the project you want to use and copy the entire folder.

5-2 Placing Equipment Events

This section describes the procedure to set up the windows used for monitoring equipment events from the AI Controller.

Select **Event Placement** - **Screen Placement** to open the **Screen Placement** screen.



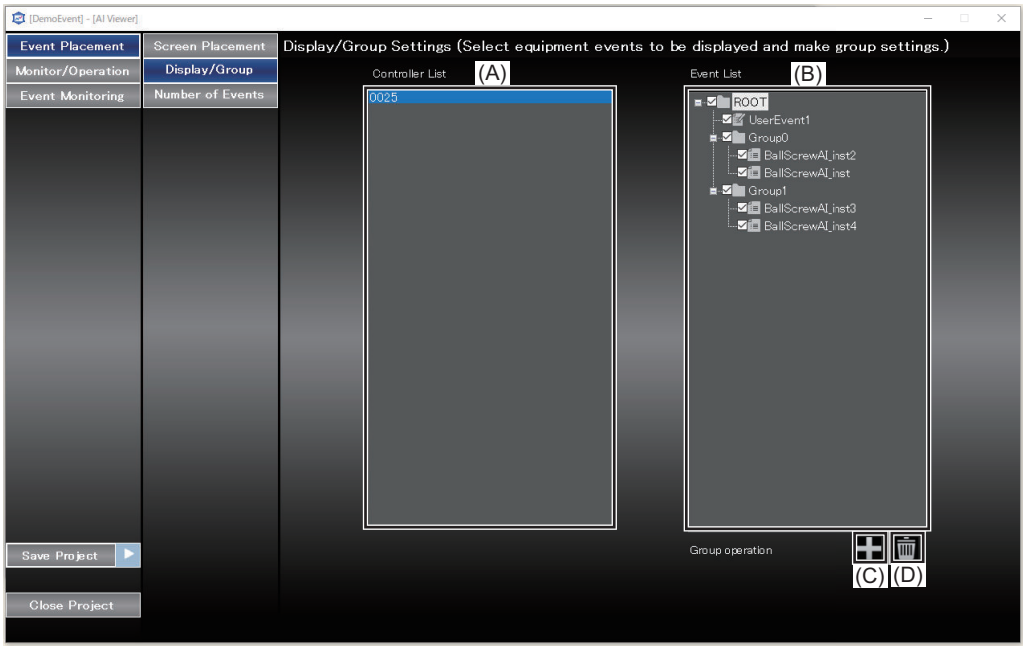
Symbol	Item	Description
(A)	Window Transition buttons	Open each window. • Screen Placement: Displays the screen layout. • Display/Group: Displays the Display/Group Setting dialog. • Number of Events: Shows the Number of Events Setting dialog.
(B)	**Event Placement** button	Hold down a group or event on the screen to select and arrange the layout. • The selected item is boxed in orange. Click the place you want to put the selected item. • Light blue indicates groups, and green indicates equipment events. • A displayed text string includes is an AI Controller's serial number and group/event name.
(C)	<< button	Switches to the previous page.
(D)	Page Number	Shows the current page number and the total number of pages. The maximum number of pages is 10.
(E)	>> button	Switches to the next page.

In the default display, equipment events are placed from the upper-left corner to the lower-right corner of the screen in the order created in the AI Controller project.

5-2-1 Configuring Display/Group Settings

Select **Event Placement** - **Display/Group** to open the **Display/Group Setting** dialog.

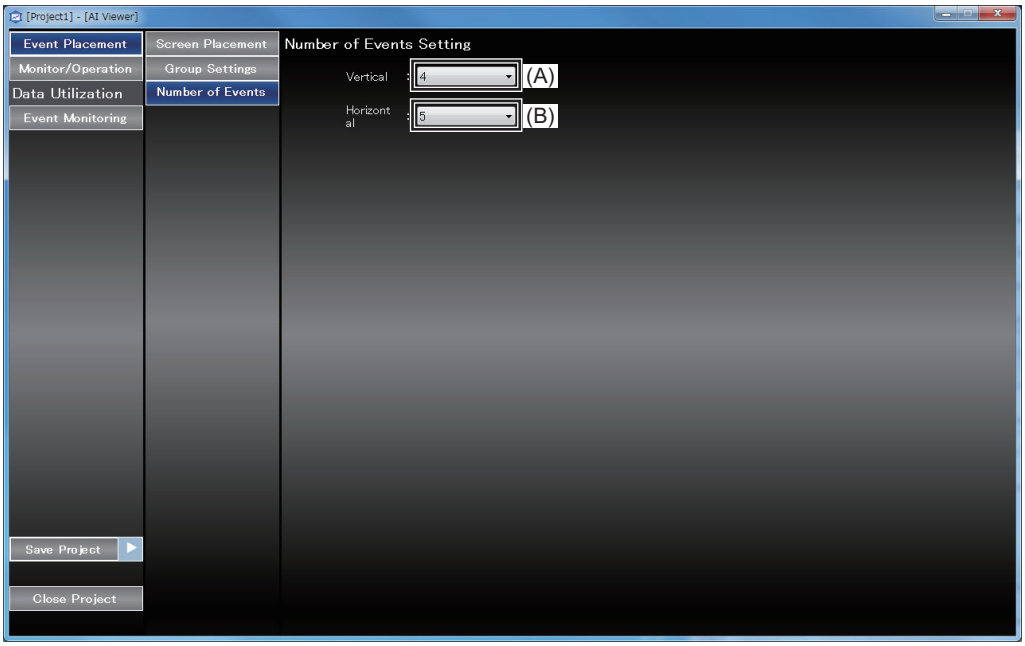
Each AI Controller's equipment events are displayed, and you can select an equipment event that AI Viewer shows.
In addition, setting up a group and putting equipment events in it enable you to monitor multiple equipment events on a single screen.



Symbol	Item	Description
(A)	Controller List	Allows you to select an AI Controller's serial number from the list.
(B)	Event List	Displays a list of equipment events of the selected AI Controller. AI Viewer shows equipment events with the check boxes are marked. You can register an equipment event to a group by dragging and dropping.
(C)	+ button	Adds a group.
(D)	Trash button	Ungroups a group.

5-2-2 Specifying the Number of Equipment Events on a Single Window

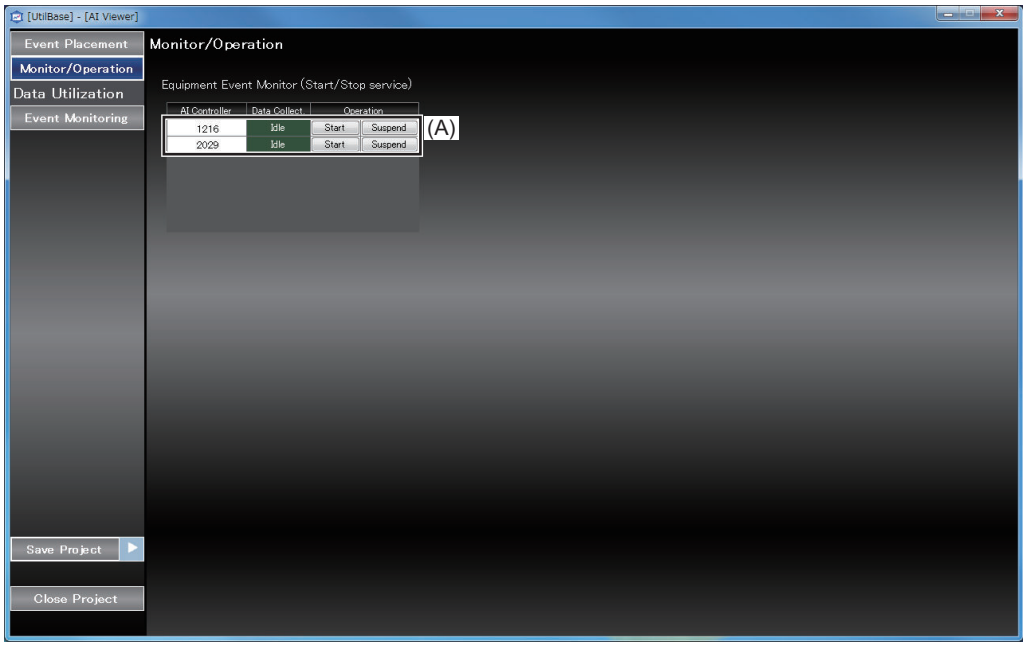
This section describes the procedure to specify the number of equipment events displayed on a single window.
Select **Event Placement** and **Number of Events** to open the **Number of Events Setting** screen.



Sym-bol	Item	Description
(A)	Vertical	Allows you to specify the number of equipment events that are vertically placed on the screen. Values from 1 to 5 can be specified. The default is set to 4.
(B)	Horizontal	Allows you to specify the number of equipment events that are horizontally placed on the screen. Values from 1 to 8 can be specified. The default is set to 5.

5-3 Monitor and Operation

This section describes the procedure to monitor the transfer status of feature value files and equipment event monitoring score files by using AI Viewer.
Select **Monitor/Operation** to open the **Monitor/Operation** screen.

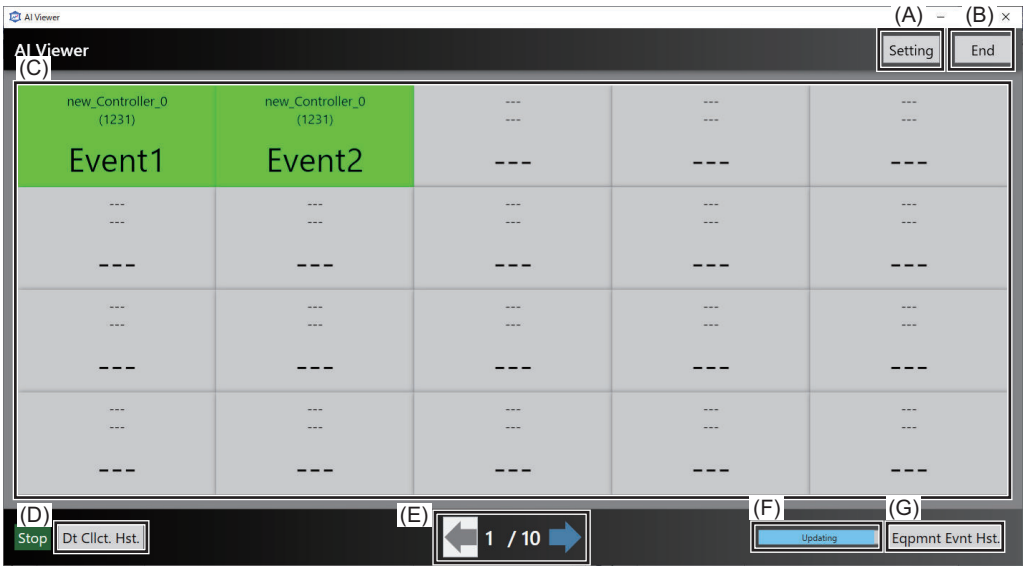


Symbol	Item	Description
(A)	Equipment Event Monitor	Displays the transfer status of feature values (FTR_DATA), equipment event monitoring score (AIS_DATA) for each AI Controller. The following operations can be performed for "FTR_DATA" and "AIS_DATA". • Starts and stops the transferring CSV files from the AI Controller to the computer.

5-4 Monitoring Equipment Events

This section describes the procedure to monitor the status of equipment events in the AI Controller by using the AI Viewer.

Select **Event Monitoring** and open the **Event Status Monitoring** screen.



Sym-bol	Item	Description
(A)	**Setting** button	You can determine the trend graph setting.
(B)	**End** button	Stops the event status monitoring.

Symbol	Item	Description
(C)	Equipment Event Status button	Displays the status of equipment events and groups. Text for each button is displayed as follows: • "Controller Name (Serial number)" • "Event name" or "[Group name]" The equipment event group name is displayed inside the square brackets "[ ]". The square brackets are used for distinguishing groups from equipment events. The status of each equipment event and equipment event group can be identified by the button color. The meaning of the status and color is as follows:*1 *2 • Dark green: Standby Status where data transfer from the AI Controller to the AI Viewer has not been executed. • Light green: Normal Status of an equipment event for which equipment event monitoring score is less than Threshold 1 while data transfer from the AI Controller to the AI Viewer has been executed. • Yellow: Alert Level 1 Status of an equipment event for which equipment event monitoring score is equal to or greater than Threshold 1 but less than Threshold 2 while data transfer from the AI Controller to the AI Viewer has been executed. • Red: Alert Level 2 Status of an equipment event for which equipment event monitoring score is equal to or greater than Threshold 2 while data transfer from the AI Controller to the AI Viewer has been executed. • Gray: State where equipment events cannot be monitored. Refer to *Cases Where Equipment Events Cannot Be Monitored* on page 5-11 for information on possible cases. When you click the button indicating the group status, it opens the group monitoring screen displaying the status of equipment events that are registered to the group. When you click the button showing the status of equipment events, it opens the trend graph screen.
(D)	**Dt Cllct. Hst.** button	If an error exists in the CSV file transfer service, the following messages will appear. • Can not connect (FTP) to the controller. • Failed to delete the file in the controller. • No storage space is left.
(E)	 button	If the monitoring target is registered across pages, use the buttons to switch pages. The current page and the total number of pages are displayed between these buttons to switch pages.
(F)	History generation progress bar	Indicates the progress in history generation of Alert Level 1 and 2 equipment events.
(G)	**Eqpmnt Evnt Hst.** button	Displays the history screen of *Alert Level 1* and *Alert Level 2* errors that occurred after starting the AI Viewer.

*1. For equipment event groups, if any of the equipment events in a group contains an warning-level error, the status is “Warning”. If it contains no warning but one or more caution exists, the status is “Caution”. If it is free from warning or caution, the event status is displayed as “Normal”.

*2. Equipment events for which CSV file was not retrieved are displayed in gray.

● Cases Where Equipment Events Cannot Be Monitored

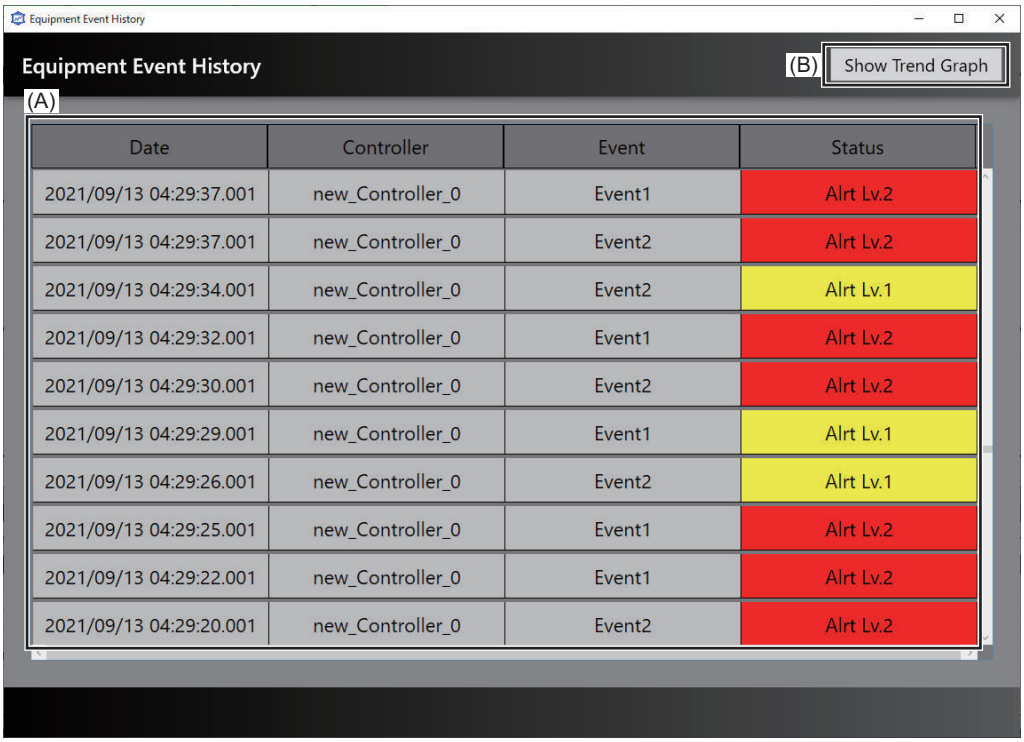
You cannot monitor equipment events while the system is in unmonitored state or in a monitoring score judgment failure state.
The **Equipment Event Status** button is displayed in gray.
Equipment events cannot be monitored in the following cases.

Status	Possible cases	Correction
Unmonitored state	Waiting for the operation of the monitored mechanism to stabilize.	-
	Execution of AI FB was interrupted.*1	-
Monitoring score judgment failure state	Input parameters for AI FB are out of range.*1	Check the input parameters.
	Inputs for monitor target are incorrect.	Check the allocation of input variables and wirings.
	The specified sub-frame does not exist in the frame.	Check the input timing of the input variables.
	An error occurred in a monitored motion control instruction or the instruction was aborted.	Check the input values of the motion control instruction and its execution results.

*1. For details on corrections for the AI FB, refer to *Sysmac Library AI Predictive Maintenance Library User's Manual (Cat. No. W610)*.

5-4-1 Displaying History

This section describes the procedure to display the history of Alert Level 1 and Alert level 2 errors that occurred in the monitored equipment events after starting the **Event Status Monitoring** screen.
Press the **Eqpmnt Evnt Hst** button on the **Event Status Monitoring** or the **Trend Graph** screen.
Then the history is displayed.



Sym-bol	Item	Description
(A)	History	Displays the history of *Alert Level 1* and *Alert Level 2* errors after starting the Event Status Monitoring screen. The errors are displayed in chronological order in an AI Controller.*1*2
(B)	**Show Trend Graph** button	Displays a trend graph of the selected date and time.

*1. Even if a *Alert Level 1* error is already recorded, the error will be recorded again if the status changes to *Alert Level 2*.

*2. Up to 1000 entries are recorded in the history. After exceeding the limit, entries are deleted from the oldest one.

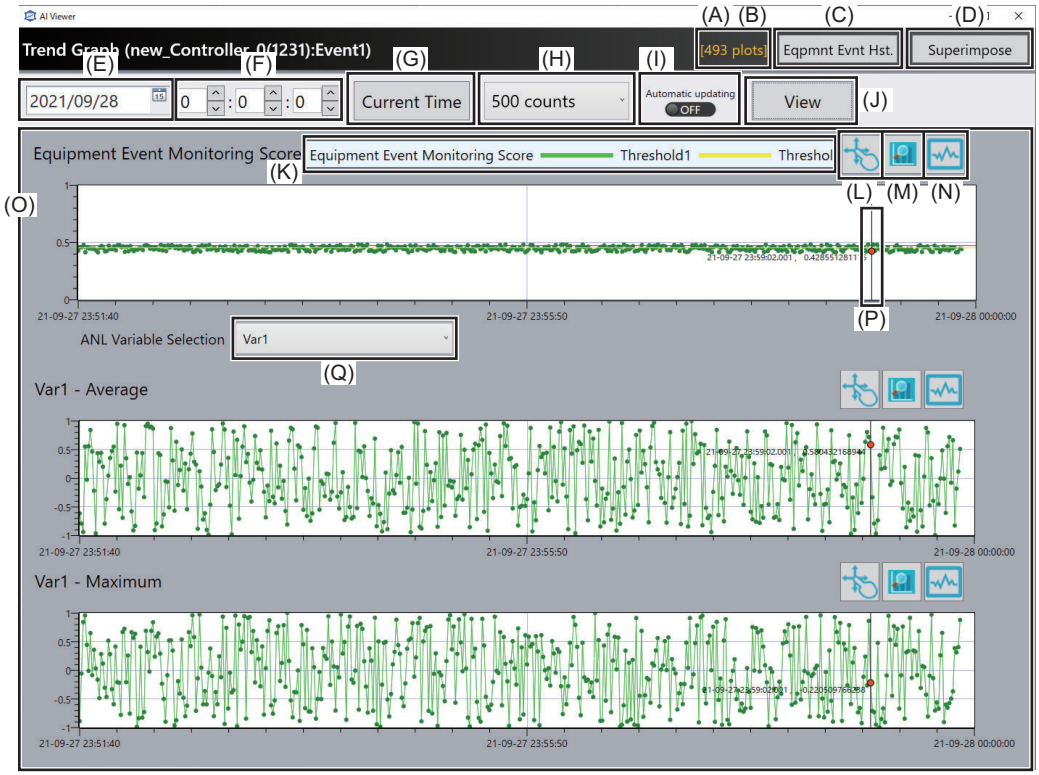
The **Eqpmnt Evnt Hst** button on the **Event Status Monitoring** screen shows all the equipment events that registered to the **Event Status Monitoring** screen. The **Eqpmnt Evnt Hst** button on the **Trend Graph** screen shows only the equipment events that are displayed in the trend graph.

Additional Information

- Results of equipment event monitoring (date and time) will be registered to the history under either of the following condition:
  a) A normal equipment event monitoring score goes Alert Level 1 or 2 in the subsequent state.
  b) An Alert Level 1 equipment event monitoring score goes Alert Level 2 in the subsequent state.
- The history is created while the AI Viewer is running. Therefore, the history on CSV files that transferred through the CSV File Transfer Service before the AI Viewer boots up will be created in the background after the AI Viewer starts. During a generation, the history is not displayed, but the progress bar is shown.

5-4-2 Displaying the Trend Graph

After starting the **Event Status Monitoring** screen, open the past **Event Status Monitoring** screen of the monitored equipment event and press the **Equipment Event Status** button for the target equipment event. The trend graph appears.



Sym-bol	Item	Description
(A)	Data counts	The number of data on a trend graph is shown.
(B)	Decimated	**Decimated** will be displayed if the data is decimated to plot on a trend graph in a specified period.
(C)	**Eqpmnt Evnt Hst** button	Shows the history of Alert Level 1 and 2 events occurred in the currently displayed equipment event.
(D)	**Superimpose** button	Superimposes the equipment event monitoring scores and features in the single graph area.
(E)	Target Date	Allows you to select a date for the equipment event monitoring score to display.
(F)	Time selection combo boxes	Allow you to select the time to show an equipment event monitoring score.
(G)	**Current Time** button	Updates the date and time to current values.
(H)	Period	You can select a period or counts of the data for a trend graph display from the following: • 500 counts: Last 500 counts of data since the selected date and time[*1] • 5 minutes: Current 5 minutes since the selected date and time • 1 hour: Current 1 hour since the selected date and time • 24 hours: Current 24 hours since the selected date and time • 7 days.: Current 7 days since the selected date and time • 30 days.: Current 30 days since the selected date and time • 3 months.: Current 3 months since the selected date and time • 6 months.: Current 6 months since the selected date and time • 1 year.: Current 1 year since the selected date and time • 2 year.: Current 2 year since the selected date and time
(I)	**Auto Update** ON/OFF toggle button	While the button is ON, the trend graph will be updated on the latest CSV file data in every transfer of the CSV file from the Controller to your PC. Auto-updating is available for **500 counts**[*1] in the Period drop-down.

Symbol	Item	Description
(J)	**View** button	Displays a trend graph on the selected date, time, and period.
(K)	Legend	Displays the legend of each plot in the graph of the equipment event monitoring score.
(L)	Graph Operation Mode button	Allows you to work with the graph by using the mouse.
(M)	Zoom In/Out Mode button	Allows you to increase or decrease the size of the graph.
(N)	Graph Reset	Restores the initial display of the graph.
(O)	Trend Graph Display	Displays the feature value's trend graph for each equipment event monitoring score and variable. • Equipment Event Monitoring Score: The horizontal scale is dependent on the number of frames for the CSV file(s) specified in the time selection combo box. • Feature data: The vertical scale automatically changes according to the values. The horizontal scale is dependent on the number of frames for the CSV file(s) specified in the time selection combo box.
(P)	Graph cursor	Shows date, time, and value of the selected data. The cursors on the Equipment Event Monitoring Score and feature value areas move in conjunction.
(Q)	Variable name selection combo box	The variable data selected here will be shown when you select the variable data (ANL_DATA) graph function.

*1. You can change the data counts in the **Setting** dialog box.

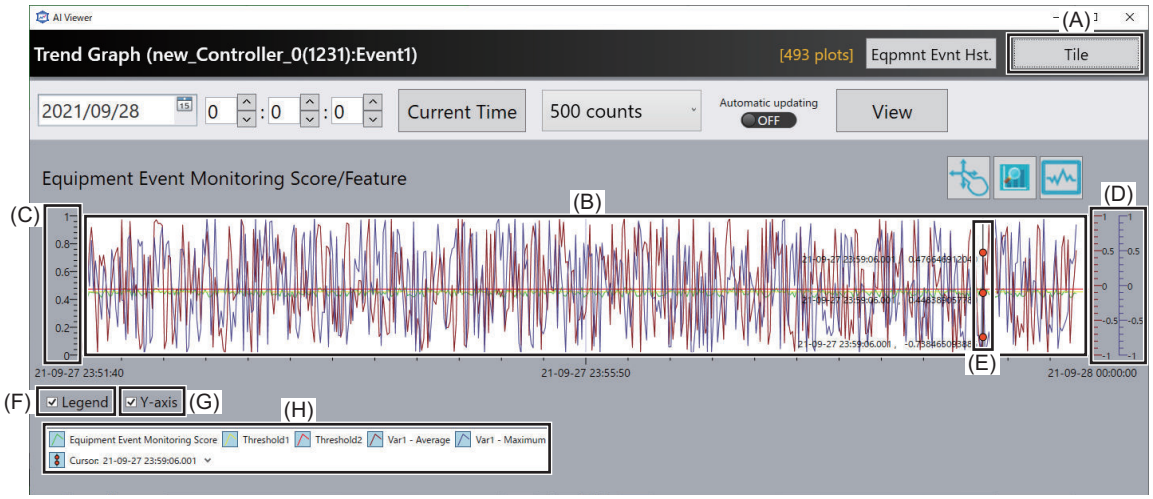
Click any Equipment event monitoring score data on the trend graph to show a variable data graph for the frame, if the analysis data (ANL_DATA) has been transferred to your PC.

Precautions for Correct Use

- When you select time, day, or year (e.g., 1 hour, 24 hours, 1 year) other than 500 counts in the Period option, the trend graph will show the data counts specified in the **Data Counts** on Trend Graph in the **Setting** dialog box. If more than the specified counts are in the designated period, the data will be reduced to the set number to display.
  Select **500 counts** in the Period menu to see a single occurrence of Alert Level 1 or 2 event. Otherwise, you can check it pressing the **Eqpmnt Evnt Hst** button.
- Displaying a trend graph for the period that includes many intervals where no CSV file exists may take a longer time.

5-4-3 Superimposing Trend Graphs

The **Superimpose** button at the upper right allows you to display equipment event monitoring scores and feature values on the single graph area.

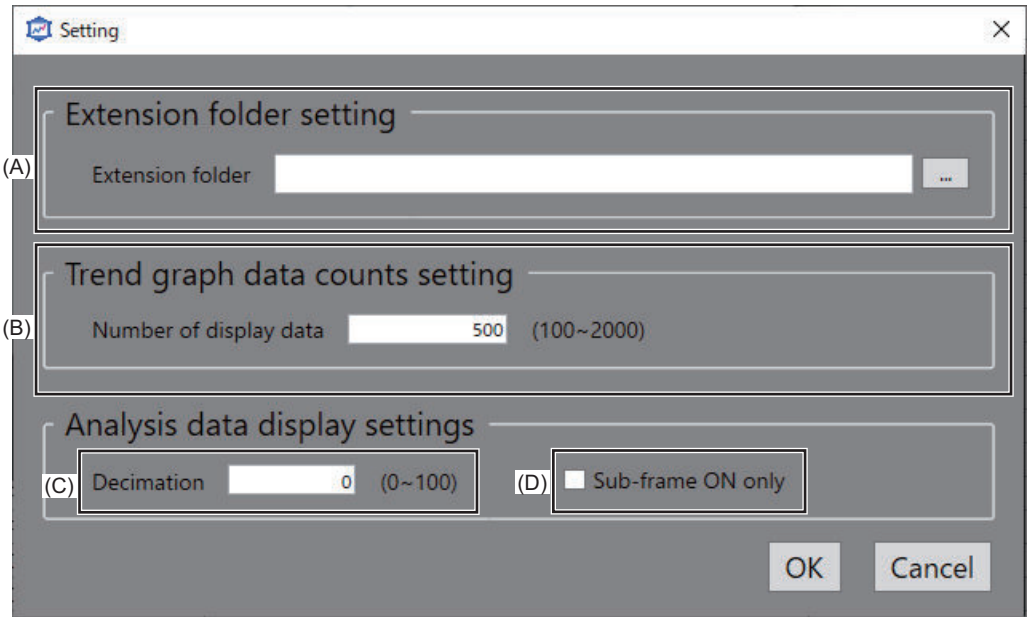


Sym-bol	Item	Description
(A)	**Tile** button	Displays the Equipment event monitoring scores and features in each graph area, respectively.
(B)	Trend graph area	Shows trend graphs on the Equipment event monitoring scores and all features.
(C)	Equipment event monitoring score scale	The scale for Equipment event monitoring scores which always ranges from 0.0 to 1.0.
(D)	Feature scales	A scale for a feature is the same color as the feature graph, and the scales will range according to the data range.
(E)	Graph cursor	Shows date, time, and value of the selected data.
(F)	**Legend** check box	Checking the box shows or the legend.
(G)	**Y-axis** check box	Checking the box shows the feature scales on the right of the trend graph.
(H)	Legend	The legend of plots on the trend graph. Check the box of an item to display its graph.

5-4-4 Operation Settings

This section describes how to make a graph based on a backed-up CSV file, aside from the data folder transferred to your PC through the CSV File Transfer Service. In addition, you can learn how to change the counts of the data you want to plot on a trend graph.

Press the **Setting** button on the **Event Status Monitoring** screen. The **Setting** dialog box is shown.



Sym-bol	Item	Description
(A)	Extension Folder	If you want to make a trend graph on a CSV file stored other than the folder C:\OMRON\CSVData, specify the folder where the desired CSV file is. The folder structure must be the same as the folder under C:\OMRON \CSVData, with the sub-folder named **Controller's serial ID**. AI Viewer references the folder specified here when it does not find the date and time data designated in the Trend Graph view in C:\OMRON\CSVData.
(B)	Trend Graph Data Counts	You can determine the number of data on a trend graph. A value ranges from 100 to 2000. The default value is 500.
(C)	Decimation	Enter a value to thin out the analysis data (ANL_ADATA) for a variable data graph. The value ranges from 0 to 100. The default value is 0, which means no data will be decimated.
(D)	Sub-frame ON Only	Specifies the analysis data (ANL_ADATA) plotted on a variable data graph: checking the check box displays only the time data whose sub-frame variable is ON.

6

Using AI Predictive Maintenance Library

This chapter explains functions that are necessary to use the AI Predictive Maintenance Library.
When you use the AI Predictive Maintenance Library - one of the Sysmac libraries, it makes it easier for you to monitor the status of equipment events on the AI Controller.
This chapter describes operations to use the AI Predictive Maintenance Library.
Refer to the *Sysmac Library AI Predictive Maintenance Library User's Manual (Cat. No.W610)* for details on the AI Predictive Maintenance Library.

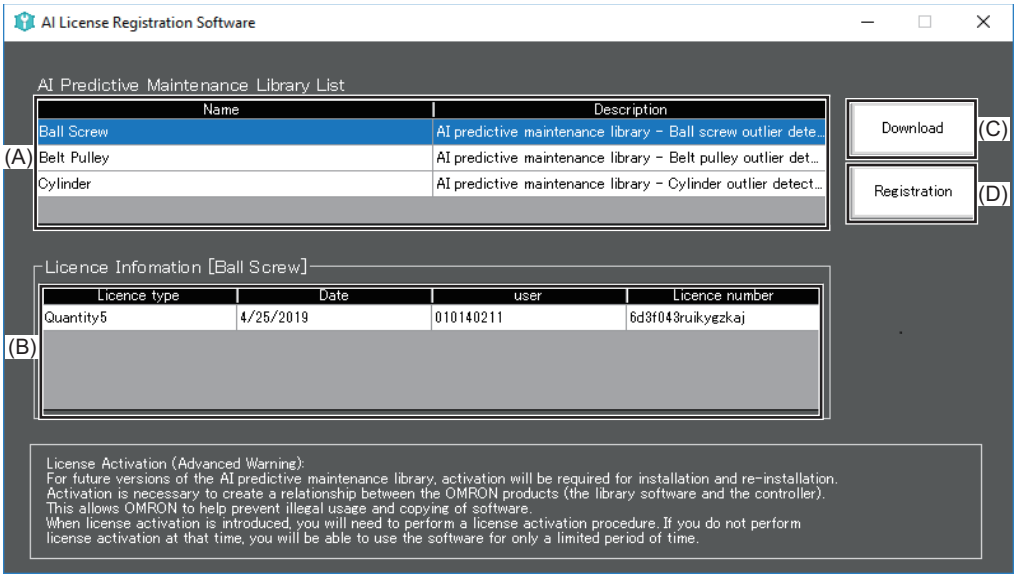
6-1 Installing AI Predictive Maintenance Library

Install the AI Predictive Maintenance Library into the computer.

1 Start the AI License Registration Software in the following methods.

- On Windows, select **Start** - **All Programs** - **OMRON** - **AI Controller Standard Software** and then select **AI License Registration Software**

The AI License Registration Software starts up.



Symbol	Item	Description
(A)	AI Predictive maintenance library list	Displays a list of AI Predictive Maintenance Library installed in the computer. The following items and description will appear: • Name: Name of the product • Description: Brief description of the product When you select a display item in the App Parts list, the license information of the selected AI Predictive Maintenance Library appears in **Licence information**.
(B)	Licence information	Displays the license information of the selected AI Predictive Maintenance Library.*1 The product name selected in the list of AI Predictive Maintenance Library is displayed inside the square brackets []. The following items and description will appear: • Licence type: Number of licenses • Date: Date of license activation (YYYY/MM/DD) • User: Name of the user who activated the license • Licence number: License key (encrypted) issued at the time of activation
(C)	**Download** button	Opens the web page of the AI Predictive Maintenance Library. You will download and install the AI Predictive Maintenance Library.

Sym-bol	Item	Description
(D)	**Registration** button	Displays the **License Registration Dialog**.

*1. Unactivated licenses are not displayed.

2 Click the **Download** button.
The web page of the AI Predictive Maintenance Library will open.

3 You will download and install the AI Predictive Maintenance Library from the web page.

6-2 Registering License for AI Predictive Maintenance Library

You need to register your license of the installed AI Predictive Maintenance Library.

1. On the **AI Predictive Maintenance Library List** of the AI License Registration Software, select an AI Predictive Maintenance Library for which license you want to register.

2. Select the **Registration** button, and then enter the license number printed on the license sheet that you purchased.
   The registered license information is displayed on the **License Registration** screen.

Precautions for Correct Use

Please purchase the licenses of AI Predictive Maintenance Library for the number of the mechanism that you use.

6-3 Registering Equipment Events by Using the AI Predictive Maintenance Library to the AI Operator

Download a user program created on Sysmac Studio to an AI Controller, and then perform the following settings to register equipment events by using the function blocks (AI FB) of the AI Predictive Maintenance Library.

1. Start the AI Operator and open an AI Controller project.
2. Connect the AI Controller with your computer.
3. Select **Equipment Event** and open the **Equipment Event Setting** screen.
4. Click the **Equipment Event Rgst.** button.
   The AI Operator reads out information of the function blocks (AI FB) of the AI Predictive Maintenance Library used in the AI Controller's program and registers it as an equipment event.
   When the following screen opens, select equipment event(s) to register.

Symbol	Item	Description
(A)	AI FB List	Displays the information that was retrieved from the AI Controller's user program. The following information is displayed. • Event name • Description • Mechanism Type • FBType • FB Version (Controller) • FB Version (Event definition file) The items you can select must have the same version numbers (both the major and minor version numbers) for the FB version of the Controller and the FB version of the event definition file.
(B)	Check box to select AI FB for registration	Select a check box for the item you want to register as a equipment event.*1

Sym-bol	Item	Description
(C)	**OK** button	Adds the selected item as the equipment event.
(D)	**Cancel** button	Cancels the registration of the equipment event.

*1. The number of check boxes you can select is “Maximum number of registered events” >= “Number of events currently registered + Number of AI FB items selected”.

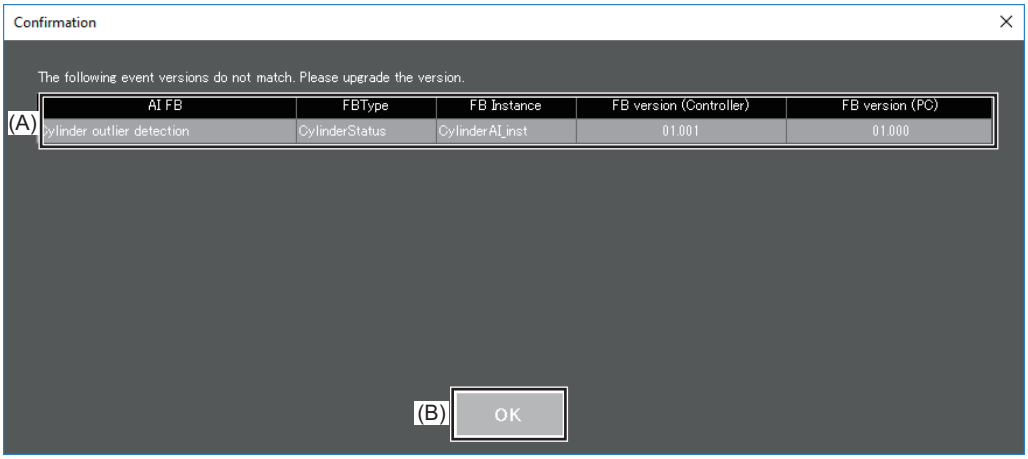
Precautions for Correct Use

When you read the function block information again for the AI Controller to which equipment event is already registered after reading the function block (AI FB) information, the function block (AI FB) information that was already registered will be loaded again and displayed in the list. To prevent this, you can choose not to register the function block as an equipment event or register the function block again after deleting the equipment event that was already registered.

6-4 Checking the Versions of the AI Predictive Maintenance Library

When the AI Operator reads out information of the function blocks (AI FB) used in the AI Controller's user program, the AI Operator checks the version of the AI Predictive Maintenance Library installed in your computer against the version of the AI FB on the Controller side. If they are different versions, the dialog shown below will appear.

You can either install the same version of the function blocks (AI FB) of the AI Predictive Maintenance Libraries used in the AI Controller to your computer or replace the function blocks (AI FB) of the AI Predictive Maintenance Libraries used in the AI Controller to those corresponding to the version of the AI Predictive Maintenance Library that is installed in your computer.



Symbol	Item	Description
(A)	AI FB List	Displays the information that was retrieved from the event definition file. The following information is displayed. • AI FB • FBType • FB Instance • FB Version (Controller) • FB Version (Event definition file)
(B)	**OK** button	Closes the dialog.

A

Appendices

A-1 Errors and Troubleshooting

This section describes the error messages displayed during the AI Controller operations performed on the AI Operator and the AI Viewer, along with the troubleshooting methods. For the AI Controller errors, refer to the *NX/NY-series Artificial Intelligence Machine Automation Controller User's Manual (Cat. No. W594)*.

List of Error Messages during AI Controller Operations by AI Operator

Message	Cause	Correction
Failed to connect to the controller.	Cable disconnected	Check the cable connection and try again.
	No access privilege	Forcibly release the access privilege on Sysmac Studio and try again.
	Write protected	Release the write protect for the CPU Unit on Sysmac Studio and try again.
	The AI Controller's version that supports secure communication is not set to the project's version.	To connect to the AI Controller that supports secure communication, set the version of the target AI Controller to the project's version.
	AI Controller does not permit packets from AI Operator.	If Packet Filter in the AI Controller is enabled, permit the packets from AI Operator, then try again.*1
	Downloading by another tool is in progress	Try again after a while. (Wait for the download by another tool to complete)
	The operation cannot be executed because the Controller is in the error state.	Check the AI Controller error, reset the error and try again.
A communications error occurred./ Communications were disconnected.	An error occurred in the communication message.	Check the cable connection and try again.
		Try again after a while. (Wait for the download by another tool to complete)
	No response from the Controller was received.	Check the cable connection and try again.
		Cycle the power supply to the AI Controller.
Cannot connect to the controller whose version is earlier than the version set on AI Operator.	Invalid controller version is set for a project.	Correct the controller's version in the Project Properties pane.
The controller contains data that is not supported by the controller version set on AI Operator. Change the controller version on AI Operator.	Invalid controller version is set for a project.	Correct the controller's version in the Project Properties pane.

Message	Cause	Correction
The controller contains unsupported data. Use the latest version of AI Operator.	Application with the previous version is installed.	Upgrade your AI Controller Standard Software to the latest version.

*1. AI Operator transmits the following packets to the AI Controller. Check the Packet Filter settings of the AI Controller in Sysmac Studio.
- Secure communication: Destination TCP port 80
- No secure communication: Destination TCP port 443
- Data file transfer: Destination TCP port "any" (Since the port to be used for the FTP data connection is not determined uniquely, it must be set as "any.")

List of Error Messages during Loading a Project or Importing a Learning Model

Message	Cause	Correction
Data that is not supported by the controller version set on AI Operator is included. Change the controller version on AI Operator.	Invalid controller version is set for a project	Correct the controller's version in the Project Properties pane.
It contains unsupported data. Use the latest version of AI Operator.	Application with the previous version is installed.	Upgrade your AI Controller Standard Software to the latest version.

List of Error Messages during Data Collection with an AI Controller Connected

Message	Cause	Correction
Can not connect (FTP) to the controller.	FTP connection error	Check to see if the FTP connection settings of the project are consistent with the Controller's system settings.
	Cable disconnected	Check the cable connection and try again.
	The operation cannot be executed because the Controller is in the error state.	Check the AI Controller error, reset the error and try again.
Failed to acquire the file in the controller./ Failed to delete the file in the controller.	The operation cannot be executed because the Controller is in the error state.	Check the AI Controller error, reset the error and try again.
Failed to read the data collection service configuration file.	See the message for details.	Pause the data collection and start again.
No storage space is left.	The storage media in the computer does not have enough free space.	Increase free space by deleting unnecessary files, and so on.

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