

Machine Automation Controller NJ/NX-series

# EtherCAT<sup>®</sup> Connection Guide

## CKD Corporation

ABSODEX Driver  
(AXD Series)



Network  
Connection  
Guide

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## 1. Related Manuals

To ensure system safety, make sure you always read and follow the information provided in all *Safety Precautions* and *Precautions for Safe Use* in the manuals for each device used in the system.

The table below lists the manuals provided by CKD Corporation (hereinafter referred to as “CKD”) and OMRON Corporation (hereinafter referred to as “OMRON”), which pertain to this guide.

Manufacturer	Man. No.	Model	Manual name
OMRON	W500	NJ501-□□□□ NJ301-□□□□ NJ101-□□□□	NJ-series CPU Unit Hardware User's Manual
OMRON	W535	NX701-□□□□	NX-series CPU Unit Hardware User's Manual
OMRON	W629	NX502-□□□□	NX-series NX502 CPU Unit Hardware User's Manual
OMRON	W593	NX102-□□□□	NX-series NX102 CPU Unit Hardware User's Manual
OMRON	W578	NX1P2-□□□□	NX-series NX1P2 CPU Unit Hardware User's Manual
OMRON	W501	NX701-□□□□ NX502-□□□□ NX102-□□□□ NX1P2-□□□□	NJ/NX-series CPU Unit Software User's Manual
OMRON	W505	NJ501-□□□□ NJ301-□□□□ NJ101-□□□□	NJ/NX-series CPU Unit Built-in EtherCAT® Port User's Manual
OMRON	W504	SYSMAC-SE2□□□	Sysmac Studio Version 1 Operation Manual
CKD	SM-A83981-A	AX□R-□□□□-□□NN	AX1R/AX2R/AX4R Series Direct Drive Actuator INSTRUCTION MANUAL
CKD	SM-A63469-A	AXD-□A2-□	AXD SERIES DRIVER FOR DIRECT DRIVE ACTUATOR EtherCAT/EtherNet/IP Specifications INSTRUCTION MANUAL
CKD	SM-A63470-A	---	ABSODEX PC Setting Software AX-Tools INSTRUCTION MANUAL

## 2. Terms and Definitions

The terms and definitions used in this guide are given below.

Term	Explanation and Definition
PDO communications (Process Data Objects communications)	<p>PDO communications is used for constant data exchange between a master and slave units.</p> <p>PDO data (i.e., I/O data that is mapped to PDOs) that is allocated in advance is input and output in each EtherCAT process data communications cycle (i.e., the task period of primary periodic task).</p> <p>The NJ/NX-series Machine Automation Controllers use PDO communications for commands to refresh I/O data in a fixed control period, including I/O data for slave units and the position control data for servomotors.</p> <p>It is accessed from NJ/NX-series Machine Automation Controllers in the following ways.</p> <ul style="list-style-type: none"> <li>• With <i>device variables</i> for EtherCAT slave I/O</li> <li>• With <i>axis variables</i> for a Servo Drive and encoder input slaves to which an axis is assigned</li> </ul>
SDO communications (Service Data Objects communications)	<p>SDO communications is used to read and write specified slave unit data from a master when required.</p> <p>The NJ/NX-series Machine Automation Controllers use SDO communications for commands to read and write data, such as for parameter transfers, at specified times.</p> <p>The NJ/NX-series Machine Automation Controllers can read/write the specified slave unit data, such as parameters and error information, with the EC_CoESDORead (Read CoE SDO) instruction or the EC_CoESDOWrite (Write CoE SDO) instruction.</p>
Slave unit	<p>A generic name for a device that performs EtherCAT communications with an EtherCAT master. There are various types of slave units such as Servo Drives that handle position data and I/O terminals that handle bit signals.</p>
Node address	<p>An address to identify a slave unit connected to EtherCAT.</p>
ESI file (EtherCAT slave information file)	<p>It contains information unique to EtherCAT slave units in XML format. The ESI file can be loaded into Sysmac Studio, to allocate EtherCAT slave process data and make other settings.</p>

## 3. Precautions

- (1) Before building a system, understand the specifications of devices which are used in the system. Allow some margin for ratings and performance, and provide safety measures such as installing a safety circuit in order to minimize the risk in case of failure.
- (2) To ensure system safety, make sure you always read and follow the information provided in all *Safety Precautions* and *Precautions for Safe Use* in the manuals for each device used in the system.
- (3) The user is encouraged to confirm the standards and regulations that the system must conform to.
- (4) It is prohibited to copy, to reproduce, and to distribute a part or the whole of this guide without the permission of OMRON Corporation.
- (5) The information contained in this guide is current as of December 2025.  
It is subject to change for improvement without notice.

The following notations are used in this guide.



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



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.



### Precautions for Correct Use

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

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### Additional Information

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Additional information to read as required.

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

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### Symbol

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The filled circle symbol indicates operations that you must do.  
The specific operation is shown in the circle and explained in text.  
This example shows a general precaution for something that you must do.

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## 4. Overview

This guide describes procedures for connecting a CKD ABSODEX Driver AXD Series (hereinafter referred to as the “ABSODEX Driver”) and an OMRON NJ/NX-series Machine Automation Controller (hereinafter referred to as the “Controller”) via EtherCAT and for checking their communication status.

Refer to *Section 6. EtherCAT Settings* and *Section 7. EtherCAT Connection Procedure* to understand setting methods and key points to perform PDO communications via EtherCAT.

## 5. Applicable Devices and Device Configuration

### 5.1. Applicable Devices

The applicable devices are as follows:

Manufacturer	Name	Model
OMRON	NJ/NX-series CPU Unit	NX701-□□□□
		NX502-□□□□
		NX102-□□□□
		NX1P2-□□□□
		NJ501-□□□□
		NJ301-□□□□
		NJ101-□□□□
CKD	ABSODEX Driver	AXD-□A2-EC
CKD	Actuator	AX1R Series
		AX2R Series
		AX4R Series



#### Precautions for Correct Use

The connection and connection check procedures described in this guide use the devices listed in section 5.2, from among the above applicable devices.

You cannot use devices with versions earlier than the versions listed in section 5.2.

To use models that are not listed in section 5.2. or versions that are later than those listed in section 5.2., check the differences in the specifications according to their instruction manuals before operating the devices.



#### Additional Information

This guide describes the procedures for establishing the network connection. It does not provide information on operation, installation, wiring method, device functionality, or device operation, which is not related to the connection procedures. Refer to the manuals or contact the manufacturers of the applicable devices for other information.

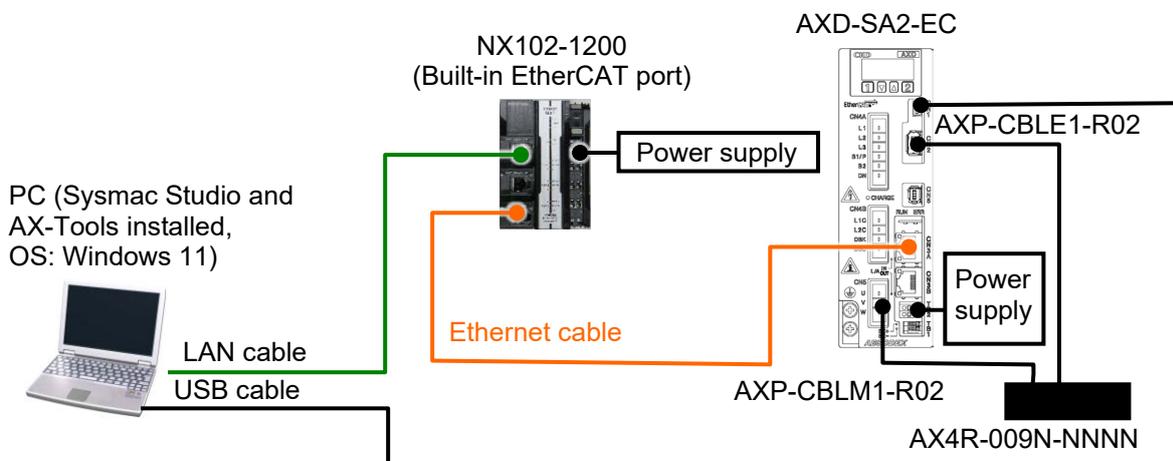


#### Additional Information

For the configuration of actuators that can be connected to the ABSODEX Driver, please contact CKD Corporation.

**5.2. Device Configuration**

The system components required for reproducing the connection procedures described in this guide are as follows.



\*AX-Tools and USB cable are used in 7.4.2. Checking the Sent and Received Data.

Manufacturer	Name	Model	Version
OMRON	NX-series CPU Unit (Built-in EtherCAT port)	NX102-1200	Ver. 1.60
---	Power supply (24 VDC for Controller)	---	
OMRON	Sysmac Studio	SYSMAC-SE2□□□	Ver. 1.63
---	PC (OS: Windows 11)	---	
---	LAN cable (STP (shielded, twisted-pair) cable of Ethernet category 5 or higher)	---	
OMRON	Ethernet cable (with industrial Ethernet connector)	XS5W-T421-□M□-K	
CKD	ABSODEX Driver	AXD-SA2-EC	Rev. 0x00000001
CKD	Power cable (2 m)	AXP-CBLM1-R02	
CKD	Encoder cable (2 m)	AXP-CBLE1-R02	
CKD	Actuator	AX4R-009N-NNNN	
CKD	Setting Software	AX-Tools	Ver. 3.5.0.0
CKD	ESI file	AXD.xml	
---	USB cable (Mini-B connector)	---	
---	External power supply for TB2 terminal (24 VDC)	---	



**Precautions for Correct Use**

Obtain the ESI file specified above before proceeding. For information on how to obtain the ESI file, contact CKD Corporation.



### Precautions for Correct Use

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The connection line of EtherCAT communications cannot be shared with other Ethernet communications.

Do not use devices for Ethernet such as an Ethernet switch.

Use an Ethernet cable (double shielding with aluminum tape and braiding) of Category 5 or higher, and use a shielded connector of Category 5 or higher.

Connect the cable shield to the connector hood at both ends of the cable.

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### Precautions for Correct Use

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Ensure that Sysmac Studio is updated to the version specified in this section or higher.

If you use a version higher than the one specified, the procedures and related screenshots described in Section 7 and the subsequent sections may not be applicable. In that case, use the equivalent processes described in this guide by referring to the *Sysmac Studio Version 1 Operation Manual* (Cat. No. W504).

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### Additional Information

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For information on the specifications of Ethernet cables and the network wiring, refer to *Section 4. EtherCAT Network Wiring* in the *NJ/NX-series CPU Unit Built-in EtherCAT® Port User's Manual* (Cat. No. W505).

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### Additional Information

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For information on the specifications of power supplies that can be used for the Controller, refer to the *NX-series NX102 CPU Unit Hardware User's Manual* (Cat. No. W593).

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### Additional Information

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For information on the specifications of power supplies that can be used with the ABSODEX Driver, refer to the *AXD SERIES DRIVER FOR DIRECT DRIVE ACTUATOR EtherCAT/EtherNet/IP Specifications INSTRUCTION MANUAL* (SM-A63469-A).

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## 6. EtherCAT Settings

This section describes the parameters and device variables that are all defined in this guide. In subsequent sections, the ABSODEX Driver is referred to as *slave unit* in some descriptions.

### 6.1. Parameters

The following parameters are required to connect the Controller and the ABSODEX Driver via EtherCAT.

#### ■ ABSODEX Driver

Setting item	Setting value	Remarks
Node address	1	The node address is set using Sysmac Studio.

### 6.2. Device Variables

The data for PDO communications with the ABSODEX Driver is assigned to the Controller's device variables.

The device variable names and data types are shown below.



#### Additional Information

For details on the allocation of the output area and input area for the ABSODEX Driver, refer to 4.4. *Input/Output* in the *AXD SERIES DRIVER FOR DIRECT DRIVE ACTUATOR EtherCAT/EtherNet/IP Specifications INSTRUCTION MANUAL (SM-A63469-A)*.

#### ■ Output Area (Controller → ABSODEX Driver)

Device variable name	Data type	Meaning
E001_RxPdo_Input_signal_1_3000_01	UDINT	Refer to <i>Details of Input Signal 1</i> .
E001_RxPdo_Input_signal_2_3000_02	UDINT	Refer to <i>Details of Input Signal 2</i> .
E001_RxPdo_Input_data_1_3001_01	UDINT	Monitor code 1
E001_RxPdo_Input_data_2_3001_02	UDINT	Monitor code 2
E001_RxPdo_Input_data_3_3001_03	UDINT	Monitor code 3
E001_RxPdo_Input_data_4_3001_04	UDINT	Monitor code 4
E001_RxPdo_Input_data_5_3001_05	UDINT	Monitor code 5
E001_RxPdo_Input_command_1_3002_01	UDINT	Instruction code
E001_RxPdo_Input_command_2_3002_02	UDINT	Write data <sup>*1</sup> /A code or P code <sup>*2</sup>
E001_RxPdo_Input_command_3_3002_03	UDINT	Data specification <sup>*1</sup> /F code <sup>*2</sup>

\*1 Selected during table operation (Input Signal 1 - bit 19 = OFF).

\*2 Selected during data input operation (Input Signal 1 - bit 19 = ON).

\*Details of *Input Signal 1*

The table below shows the bit-by-bit allocation for the above

*E001\_RxPdo\_Input\_signal\_1\_3000\_01.*

Device variable name	Bit	Meaning
E001_RxPdo_Input_signal_1_3000_01	0	Program No. selection input (bit 0)
	1	Program No. selection input (bit 1)
	2	Program No. selection input (bit 2)
	3	Program No. selection input (bit 3)
	4	Program No. setting input, 2nd digit /Program No. selection input (bit 4)
	5	Program No. setting input, 1st digit /Program No. selection input (bit 5)
	6	Reset input
	7	Home positioning instruction input
	8	Start of input
	9	Servo-on input /Program stop input
	10	Ready return input /Continuous rotation stop input
	11	Answer input /Position deviation counter reset input
	12	Forced stop input
	13	Brake release input
	14	Jog operation input (CW direction) <sup>*1</sup>
	15	Jog operation input (CCW direction) <sup>*1</sup>
	16	Unavailable <sup>*2</sup> /Travel unit selection input (bit 0) <sup>*3</sup>
	17	Unavailable <sup>*2</sup> /Travel unit selection input (bit 1) <sup>*3</sup>
	18	Unavailable <sup>*2</sup> /Travel speed unit selection input <sup>*3</sup>
	19	Table operation, data input operation switching input
20 to 31	Unavailable	

\*1 Available only when the Operation mode is Network operation mode.

\*2 Selected during table operation (Input Signal 1 - bit 19 = OFF).

\*3 Selected during data input operation (Input Signal 1 - bit 19 = ON).

\*Details of *Input Signal 2*

The table below shows the bit-by-bit allocation for the above

*E001\_RxPdo\_Input\_signal\_2\_3000\_02.*

Device variable name	Bit	Meaning
E001_RxPdo_Input_signal_2_3000_02	0	Monitor output execution request
	1	Instruction code execution request
	2 to 31	Unavailable

### ■ Input Area (Controller ← ABSODEX Driver)

Device variable name	Data type	Meaning
E001_TxPdo_Output_signal_1_2000_01	UDINT	Refer to <i>Details of Output Signal 1</i> .
E001_TxPdo_Output_signal_2_2000_02	UDINT	Refer to <i>Details of Output Signal 2</i> .
E001_TxPdo_Output_data_1_2001_01	UDINT	Monitor data 1
E001_TxPdo_Output_data_2_2001_02	UDINT	Monitor data 2
E001_TxPdo_Output_data_3_2001_03	UDINT	Monitor data 3
E001_TxPdo_Output_data_4_2001_04	UDINT	Monitor data 4
E001_TxPdo_Output_data_5_2001_05	UDINT	Monitor data 5
E001_TxPdo_Output_command_1_2002_01	UDINT	Response code
E001_TxPdo_Output_command_2_2002_02	UDINT	Read data
E001_TxPdo_Output_command_3_2002_03	UDINT	Unavailable

#### \*Details of *Output Signal 1*.

The table below shows the bit-by-bit allocation for the above

##### *E001\_TxPdo\_Output\_signal\_1\_2000\_01*.

Device variable name	Bit	Meaning
E001_TxPdo_Output_signal_1_2000_01	0	M code output (bit 0)
	1	M code output (bit 1)
	2	M code output (bit 2)
	3	M code output (bit 3)
	4	M code output (bit 4)
	5	M code output (bit 5)
	6	M code output (bit 6)
	7	M code output (bit 7)
	8	In-position output
	9	Positioning completion output
	10	Start input wait output
	11	Alarm output 1
	12	Alarm output 2
	13	Output 1 during indexing /Home position output
	14	Output 2 during indexing /Servo state output
	15	Ready output
	16	Segment position strobe output
	17	M code strobe output
18 to 31	Unavailable	

#### \*Details of *Output Signal 2*.

The table below shows the bit-by-bit allocation for the above

##### *E001\_TxPdo\_Output\_signal\_2\_2000\_02*.

Device variable name	Bit	Meaning
E001_TxPdo_Output_signal_2_2000_02	0	Monitoring
	1	Instruction code execution completion
	2 to 31	Unavailable



### Additional Information

The device variable names are automatically generated by combining the *device name* and the *port name*.

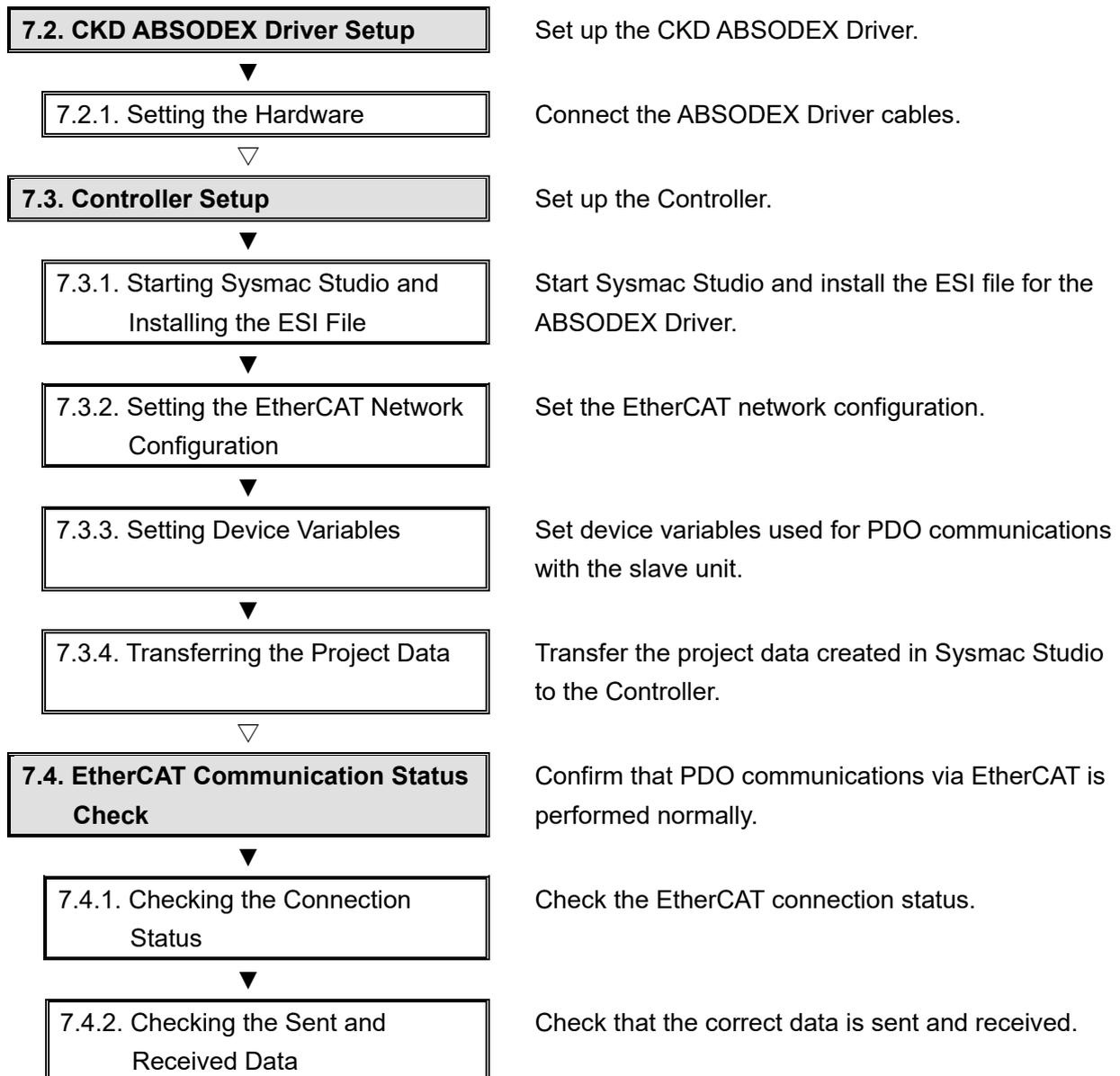
For slave units, the default **Device name** is *E* followed by a *sequential number starting from 001*.

## 7. EtherCAT Connection Procedure

This section describes the procedures for connecting the Controller and the ABSODEX Driver via EtherCAT. In this guide, it is assumed that the Controller and the ABSODEX Driver use the factory default settings. For how to initialize the devices, refer to *Section 8. Initialization Method*.

### 7.1. Work Flow

Follow the steps below to connect the Controller and the ABSODEX Driver via EtherCAT and perform PDO communications.



## 7.2. CKD ABSODEX Driver Setup

Set up the CKD ABSODEX Driver.

### 7.2.1. Setting the Hardware

Connect the ABSODEX Driver cables.



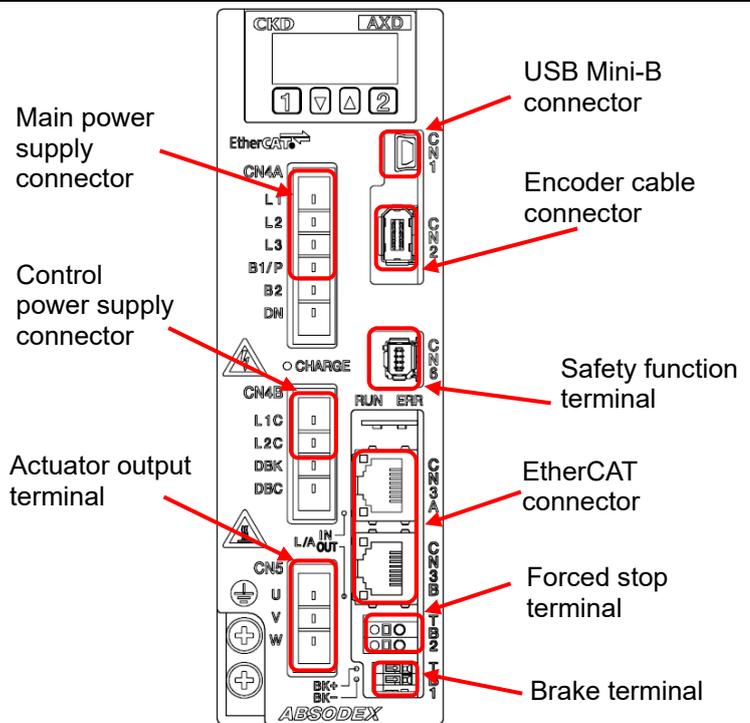
#### Precautions for Correct Use

Turn OFF the power supply before setting the hardware.

If it is ON, the settings described in the following steps and subsequent procedures may not be applicable.

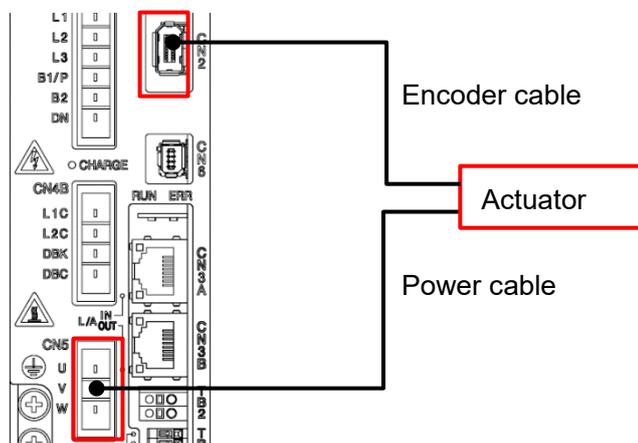
- 1 Check that the main power supply, control power supply, and external power supply for the ABSODEX Driver are OFF.

- 2 Check the positions of the ABSODEX Driver connectors by referring to the figure on the right.

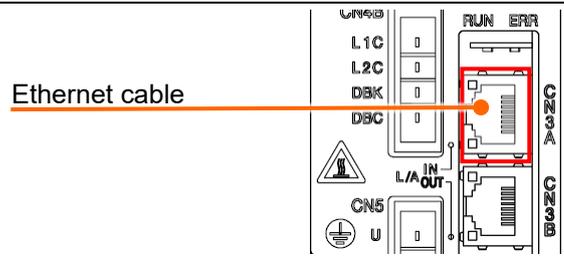


- 3 Connect the actuator's encoder cable to the "encoder cable connector."

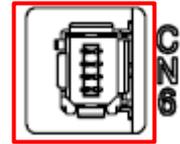
Connect the actuator's power cable to the "actuator output terminal."



- 4** Connect the Ethernet cable to the **EtherCAT connector**.



- 5** Check that the safety function is disabled.  
Check that the STO short-circuit plug is connected to the “safety function terminal.”

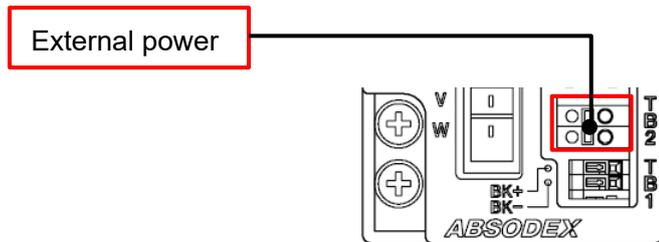


\*The safety function is disabled by factory default, with the STO short-circuit plug connected to the “safety function terminal.”

\*In this guide, the safety function is disabled for the purpose of connection check.

\*For the wiring of the safety function terminal, refer to 3.4.3. *Wiring for Safety Function in the AXD SERIES DRIVER FOR DIRECT DRIVE ACTUATOR EtherCAT/EtherNet/IP Specifications INSTRUCTION MANUAL (SM-A63469-A).*

- 6** Connect the external power supply to the “forced stop terminal” to disable the forced stop function of the ABSODEX Driver.



\*For the wiring of the forced stop terminal, refer to 3.4.5. *Wiring of Forced Stop Input (TB2) in the AXD SERIES DRIVER FOR DIRECT DRIVE ACTUATOR EtherCAT/EtherNet/IP Specifications INSTRUCTION MANUAL (SM-A63469-A).*

### 7.3. Controller Setup

Set up the Controller.

#### 7.3.1. Starting Sysmac Studio and Installing the ESI File

Start Sysmac Studio and install the ESI file for the ABSODEX Driver.

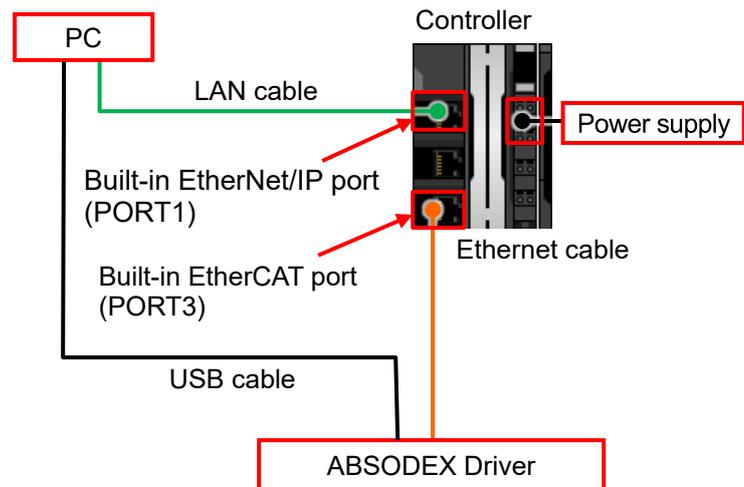
- 1 Check that the power supply for the Controller and the power supply for the ABSODEX Driver are OFF.

- 2 Connect PC and **Built-in EtherNet/IP port (PORT1)** on Controller with a LAN cable. Connect the other end of the Ethernet cable (of which one end has been connected to the ABSODEX Driver) to **Built-in EtherCAT port (PORT3)** on the Controller.

Connect the ABSODEX Driver's **USB Mini-B connector** and the PC with a USB cable.

Connect the power supply to the Controller.

\*For information on the power supply connection to Controller, refer to *5-4-1 Wiring the Unit Power Supply* in the *NX-series NX102 CPU Unit Hardware User's Manual* (Cat. No. W593).



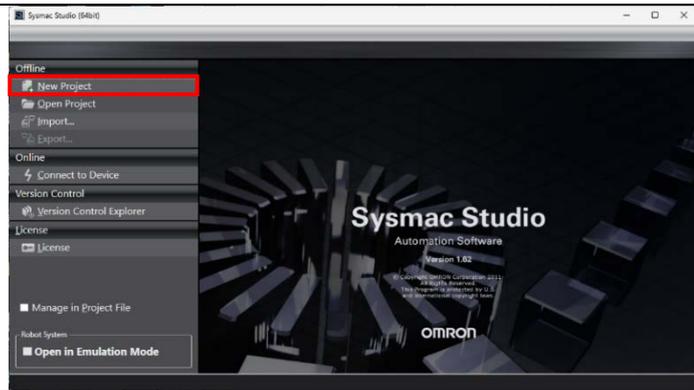
\*In this guide, connect the PC and the ABSODEX Driver with a USB cable since you will use AX-Tools in 7.4.2. *Checking the Sent and Received Data.*

- 3 Start Sysmac Studio.



\*If a user account control dialog box appears at startup, select the option to start.

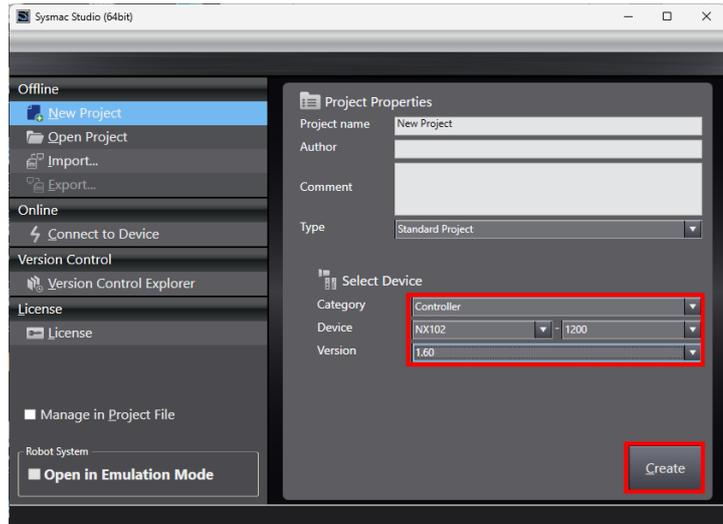
- 4** Sysmac Studio starts up.  
Click **New Project**.



- 5** The **Project Properties** Pane appears. Select items appropriate for your Controller from the pull-down list in each field of **Select Device**. Click **Create**.

In this guide, the following Controller is used.

- Category: Controller
- Device: NX102-1200
- Version: 1.60



\*In this guide, *New Project* is used as the project name.

- 6** The **New Project** Window appears.

The following panes are displayed in the window.

Left: Multiview Explorer

Upper right: Toolbox

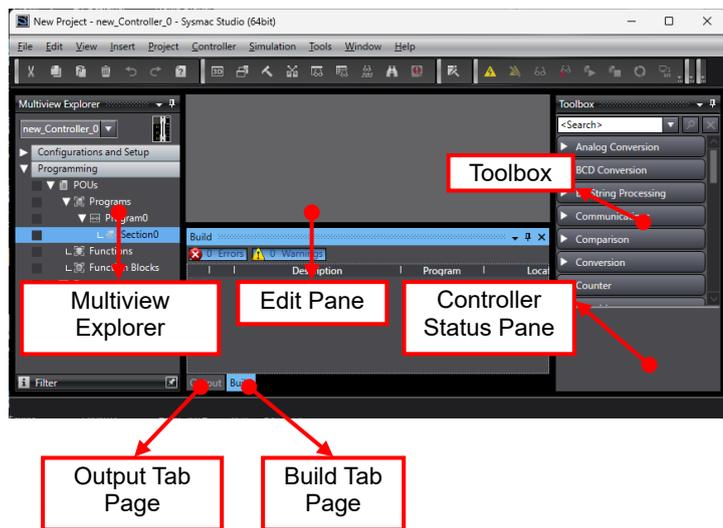
Lower right: Controller Status Pane

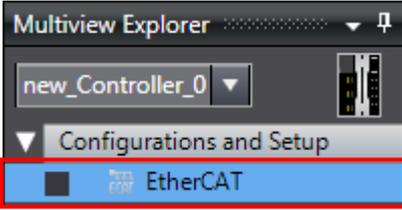
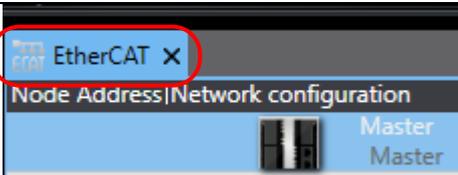
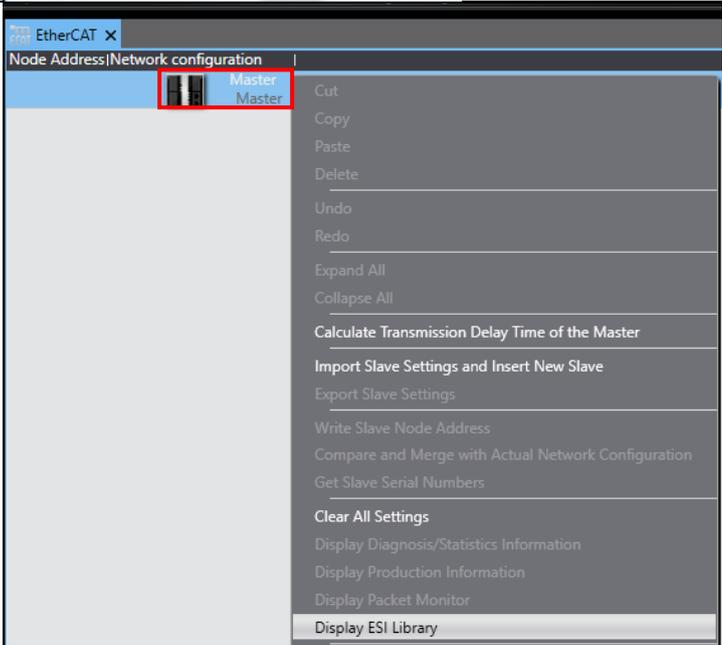
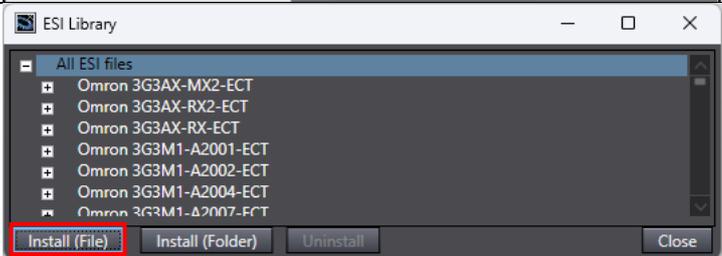
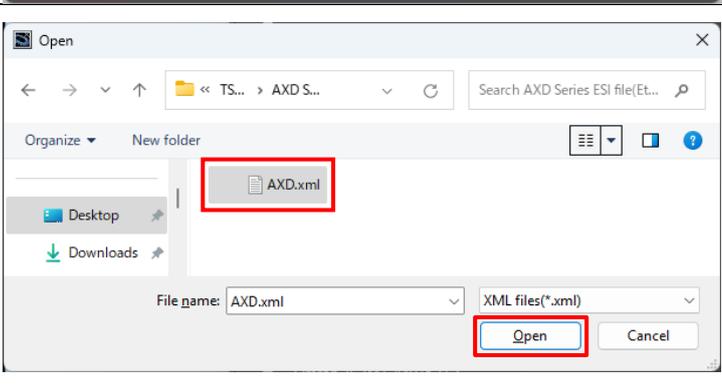
Top middle: Edit Pane

The following tabs are displayed in the lower middle of the window.

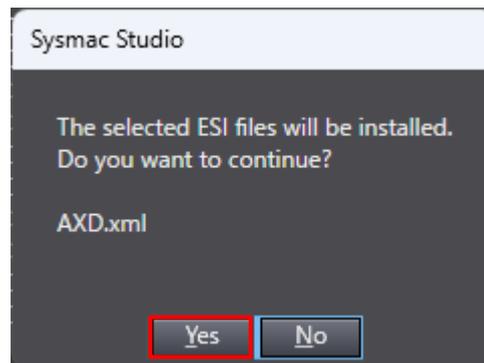
Output Tab Page

Build Tab Page

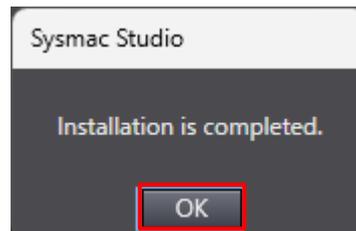


<p><b>7</b> Double-click <b>EtherCAT</b> under <b>Configurations and Setup</b> in the Multiview Explorer.</p>	 <p>The screenshot shows the Multiview Explorer window with a tree view. Under the 'Configurations and Setup' folder, the 'EtherCAT' item is highlighted with a red box.</p>
<p><b>8</b> The <b>EtherCAT</b> Tab Page appears in the <b>Edit Pane</b>.</p>	 <p>The screenshot shows the Edit Pane with the 'EtherCAT' tab selected and highlighted with a red circle. Below the tab, the 'Node Address Network configuration' section is visible.</p>
<p><b>9</b> Right-click <b>Master</b> and select <b>Display ESI Library</b> from the menu.</p>	 <p>The screenshot shows the context menu for the 'Master' node. The 'Display ESI Library' option at the bottom of the menu is highlighted with a red box.</p>
<p><b>10</b> The <b>ESI Library</b> Dialog Box appears. Click <b>Install (File)</b>.</p>	 <p>The screenshot shows the ESI Library dialog box. The 'Install (File)' button at the bottom left is highlighted with a red box.</p>
<p><b>11</b> The <b>Open</b> Dialog Box appears. Select the prepared ESI file <b>AXD.xml</b> and click <b>Open</b>.</p>	 <p>The screenshot shows the Open dialog box. The 'AXD.xml' file is selected in the file list and highlighted with a red box. The 'Open' button at the bottom right is also highlighted with a red box.</p>

- 12** The dialog box on the right appears. Check the message and click **Yes**.

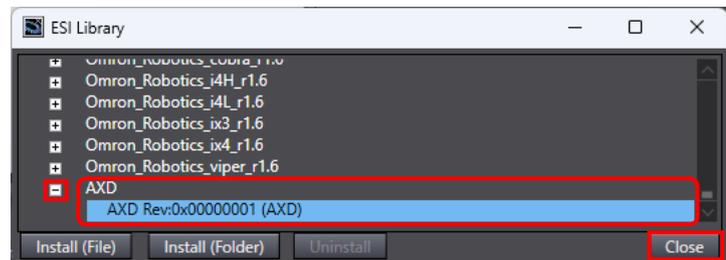


- 13** The dialog box on the right appears when the ESI file installation is completed. Check the message and click **OK**.



- 14** Click the + sign to the left of **AXD** in the **ESI Library** Dialog Box, and check that **AXD Rev:0x00000001 (AXD)** is displayed.

Check that no exclamation mark (warning) is shown.



Click **Close**.



### Precautions for Correct Use

If an exclamation mark (warning) is shown, check the name of the ESI file, and then obtain the ESI file with a correct name. If an exclamation mark (warning) is shown even when the name of the ESI file is correct, the file may be corrupted. In that case, contact CKD Corporation.

7.3.2. Setting the EtherCAT Network Configuration

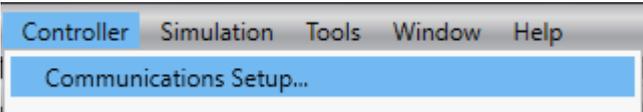
Set the EtherCAT network configuration.

Caution

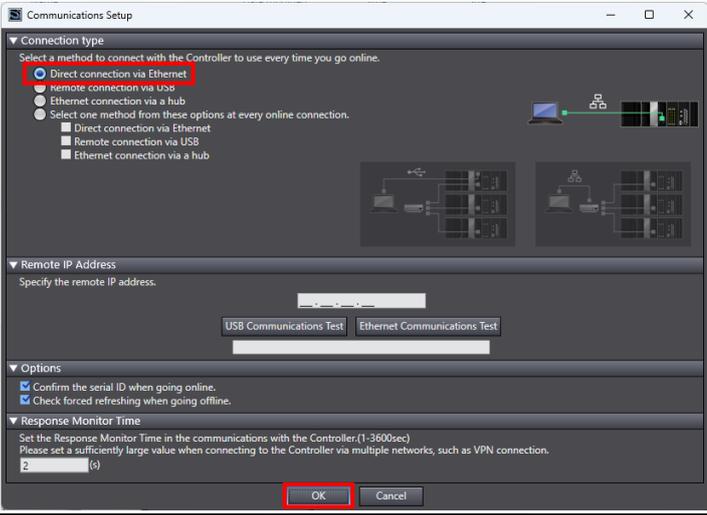
In the following procedure, turning ON the power to the slave unit may result in unexpected operation of the device.

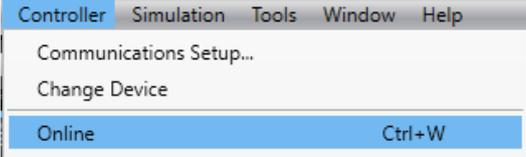
Always ensure safety before you cycle the power supply to the slave unit.

- 1** Turn ON the power supplies for the Controller and the ABSODEX Driver.
- 2** Select **Communications Setup** from the **Controller** Menu.

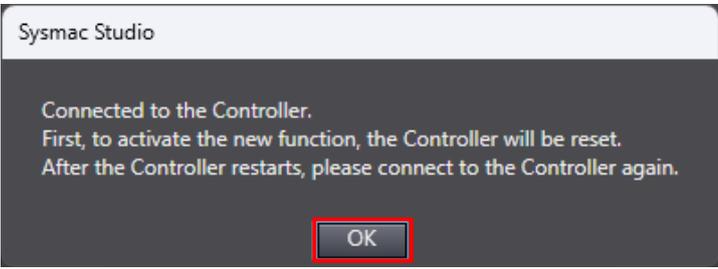

- 3** The **Communications Setup** Dialog Box appears. Check that **Direct connection via Ethernet** is set in the **Connection type** Field.

Click **OK**.


- 4** Select **Online** from the **Controller** Menu.


- 5** When the dialog box on the right appears, check the message and click **OK**. Then select **Online** again.

\*The message of the dialog box varies with the Controller status. Check the message and click **OK** or an appropriate button to proceed with the processing.



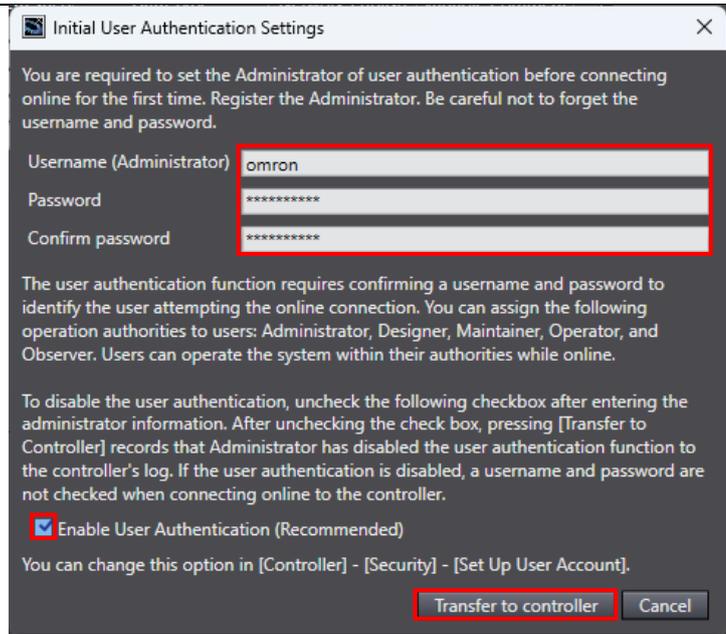
**6** The **Initial User Authentication Settings** Dialog Box appears. Enter the user name and password.

\*The input rules for the user name and password are as follows.

Username: 1 to 16 alphanumeric characters

Password: 8 to 32 alphanumeric characters

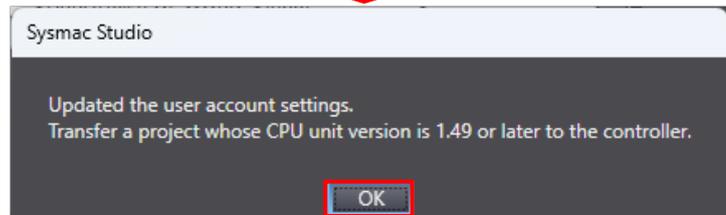
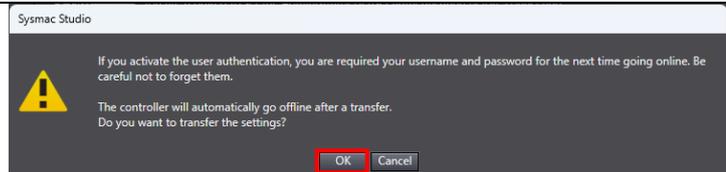
Confirm that the check box for **Enable User Authentication** is selected, and click **Transfer to controller**.



**7** The dialog box on the right appears. Confirm that there is no problem, and click **OK**.

A message appears stating "Processing."

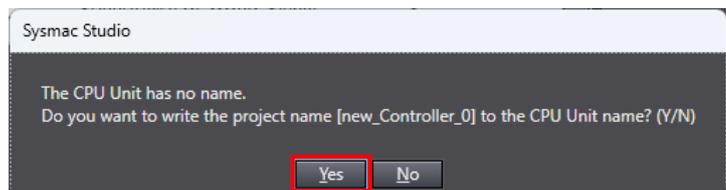
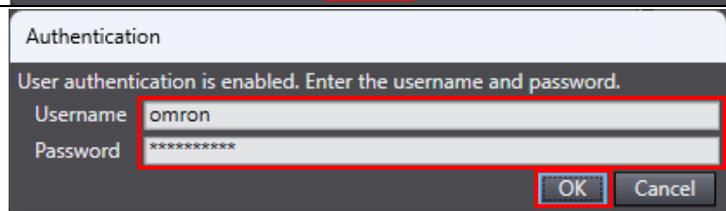
When the dialog box on the right appears, check the message and click **OK**. Then select **Online** again.



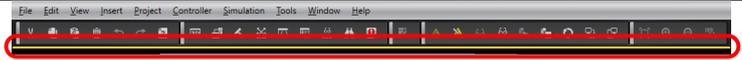
**8** The **Authentication** Dialog Box appears. Enter the user name and password set in step 6, and click **OK**.

\*If user authentication is enabled, the **Authentication** Dialog Box will appear when connecting online.

\*If the dialog box on the right appears, check the message and click **Yes**.



- 9** When an online connection is established, a yellow line appears under the toolbar.

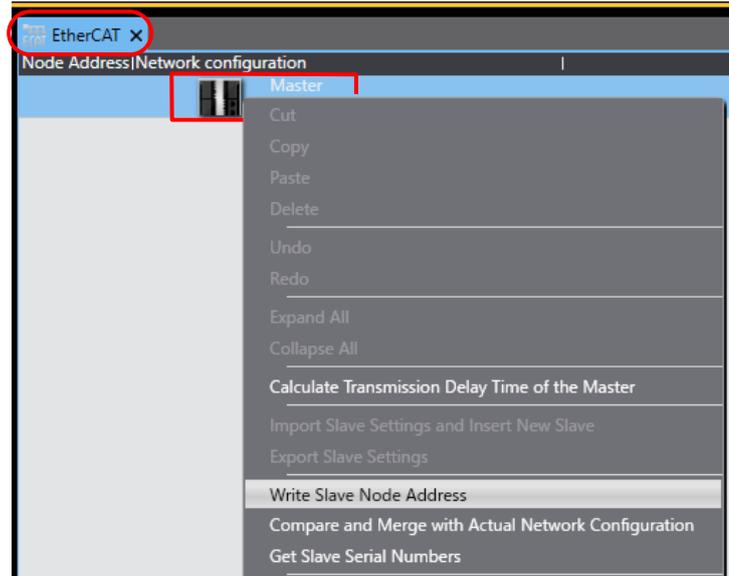


**Additional Information**

For details on the online connection to the Controller, refer to *Section 6. Online Connections to a Controller* and *Section 8. Other Functions – 8-3 Security Settings* in the *Sysmac Studio Version 1 Operation Manual* (Cat. No. W504).

- 10** Right-click **Master** on the **EtherCAT** Tab Page displayed in the **Edit Pane**, and select **Write Slave Node Address** from the menu.

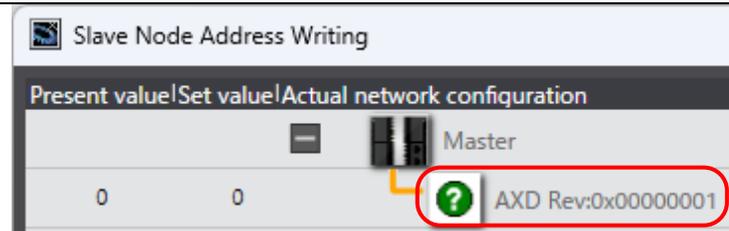
\*If the **EtherCAT** Tab Page is not displayed in the **Edit Pane**, follow step 7 of 7.3.1. *Starting Sysmac Studio and Installing the ESI File* to display the tab page.



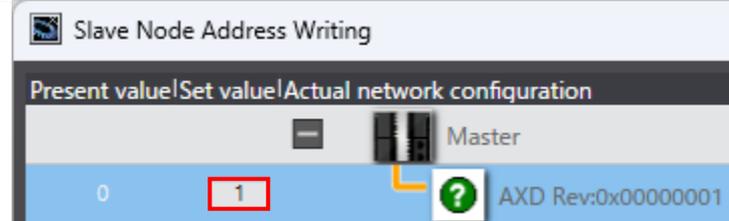
A message appears stating “Get information is being executed.”



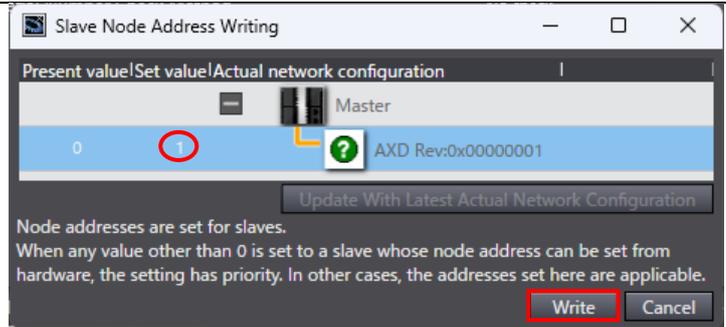
- 11** The **Slave Node Address Writing** Dialog Box appears. **AXD Rev:0x00000001** is displayed in the **Actual network configuration** Column.



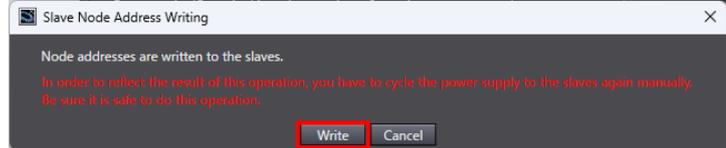
- 12** Enter **1** (node address) in the **Set value** Column



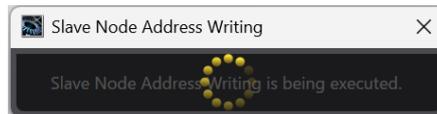
**13** Check that no error messages appear and that the set value is 1.  
Click **Write**.



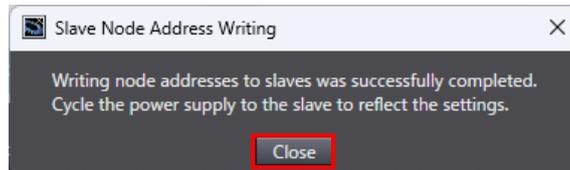
**14** The **Slave Node Address Writing** Dialog Box appears. Check the message and click **Write**.



A message appears stating "Slave Node Address Writing is being executed."

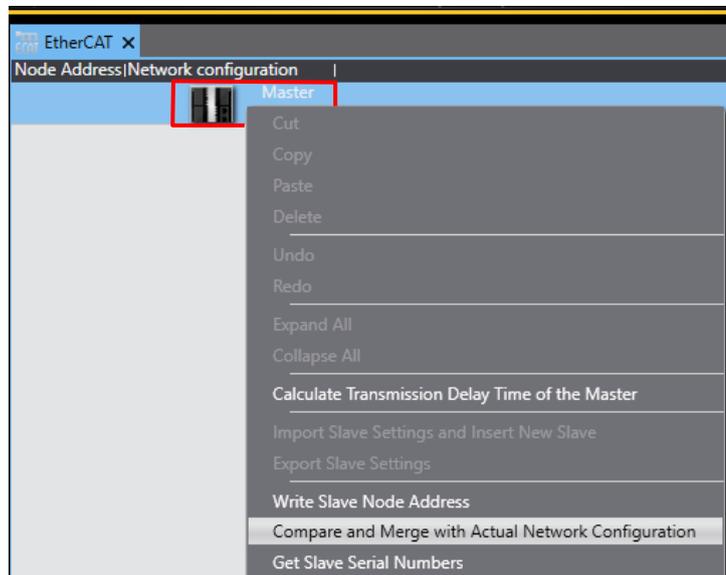


A message appears stating "Writing node address to slave was successfully completed." Check the message and click **Close**.



**15** Power cycle the ABSODEX Driver.

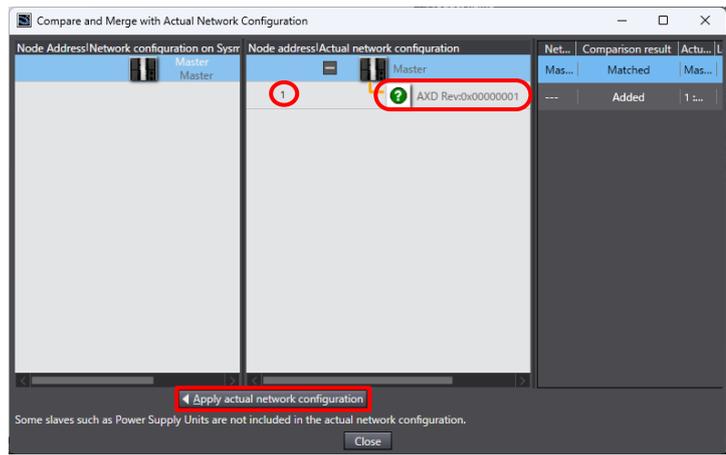
**16** Right-click **Master** on the **EtherCAT** Tab Page displayed in the **Edit Pane**, and select **Compare and Merge with Actual Network Configuration** from the menu.



A message appears stating "Get information is being executed."

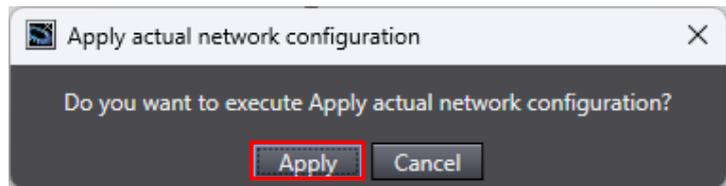


**17** The **Compare and Merge with Actual Network Configuration** Dialog Box appears.  
In the actual network configuration of the comparison result, **AXD Rev:0x00000001** is added as the slave unit with node address **1**.

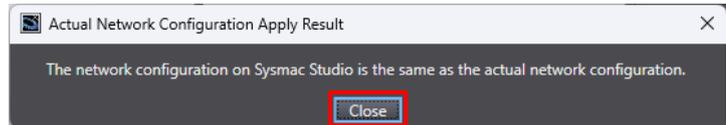


Click **Apply actual network configuration**.

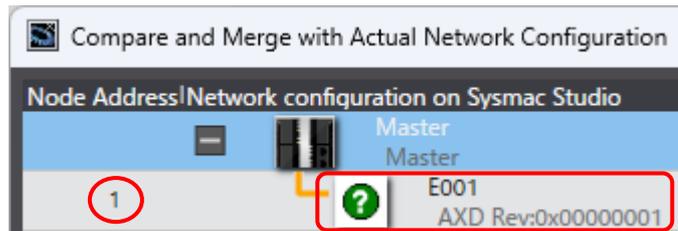
**18** A confirmation dialog box appears. Check the message and click **Apply**.



A result dialog box appears. Check the message and click **Close**.



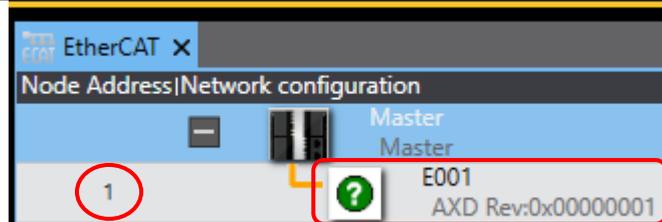
**19** In **Network configuration on Sysmac Studio**, **E001 AXD Rev:0x00000001** is added as the slave unit with node address **1**.



Check that the slave unit is added. Click **Close**.



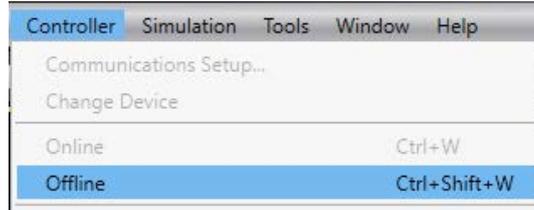
**20** In the **EtherCAT** Tab Page of the **Edit Pane**, **E001 AXD Rev:0x00000001** is added as the slave unit with node address **1**.



### 7.3.3. Setting Device Variables

Set device variables used for PDO communications with the slave unit.

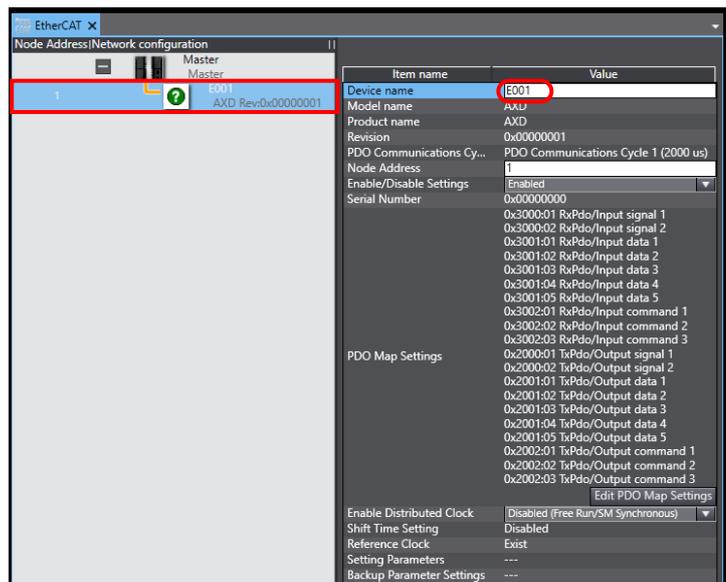
- 1 Select **Offline** from the **Controller** Menu.



The yellow line under the toolbar disappears.

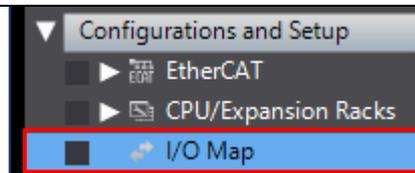


- 2 In the **EtherCAT** Tab Page, select the device with node address 1 added in the previous procedure. Check that **Device name** is **E001**.



\***Device name** can be changed as desired.

- 3 Double-click **I/O Map** under **Configurations and Setup** in the **Multiview Explorer**.



- 4 The **I/O Map** Tab Page appears in the **Edit Pane**.

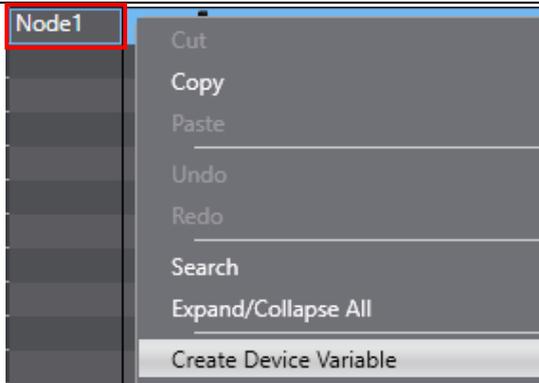
The screenshot shows the 'I/O Map' Edit Pane. The table below shows the ports and variables for Node1.

Position	Port	Description	R/W	Data Type	Variable	Variable Comment	Variable Type
(Node1)	AXD						
	RxPdo_Input signal 1_3000_01		W	UDINT			
	RxPdo_Input signal 2_3000_02		W	UDINT			
	RxPdo_Input data 1_3001_01		W	UDINT			
	RxPdo_Input data 2_3001_02		W	UDINT			
	RxPdo_Input data 3_3001_03		W	UDINT			
	RxPdo_Input data 4_3001_04		W	UDINT			
	RxPdo_Input data 5_3001_05		W	UDINT			
	RxPdo_Input command 1_3002_01		W	UDINT			
	RxPdo_Input command 2_3002_02		W	UDINT			
	RxPdo_Input command 3_3002_03		W	UDINT			
	TxPdo_Output signal 1_2000_01		R	UDINT			
	TxPdo_Output signal 2_2000_02		R	UDINT			
	TxPdo_Output data 1_2001_01		R	UDINT			
	TxPdo_Output data 2_2001_02		R	UDINT			
	TxPdo_Output data 3_2001_03		R	UDINT			
	TxPdo_Output data 4_2001_04		R	UDINT			
	TxPdo_Output data 5_2001_05		R	UDINT			
	TxPdo_Output command 1_2002_01		R	UDINT			
	TxPdo_Output command 2_2002_02		R	UDINT			
	TxPdo_Output command 3_2002_03		R	UDINT			

Check that **Node1** is displayed in the **Position** Column and that the added slave unit is displayed in the **Port** Column.

\*In this guide, the device variable names are generated automatically. However, to manually create variable names for the I/O ports, click on a cell in the **Variable** Column for a target port and enter a variable name.

**5** Right-click **Node1** and select **Create Device Variable** from the menu.



**6** The **Variable** names and **Variable Type** are set.

Position	Port	Desc/R/W	Data Type	Variable	Varial	Variable Type
Node1	AXD					
	RxPdo_Input signal 1_3000_01	W	UDINT	E001_RxPdo_Input_signal_1_3000_01		Global Variables
	RxPdo_Input signal 2_3000_02	W	UDINT	E001_RxPdo_Input_signal_2_3000_02		Global Variables
	RxPdo_Input data 1_3001_01	W	UDINT	E001_RxPdo_Input_data_1_3001_01		Global Variables
	RxPdo_Input data 2_3001_02	W	UDINT	E001_RxPdo_Input_data_2_3001_02		Global Variables
	RxPdo_Input data 3_3001_03	W	UDINT	E001_RxPdo_Input_data_3_3001_03		Global Variables
	RxPdo_Input data 4_3001_04	W	UDINT	E001_RxPdo_Input_data_4_3001_04		Global Variables
	RxPdo_Input data 5_3001_05	W	UDINT	E001_RxPdo_Input_data_5_3001_05		Global Variables
	RxPdo_Input command 1_3002_01	W	UDINT	E001_RxPdo_Input_command_1_3002_01		Global Variables
	RxPdo_Input command 2_3002_02	W	UDINT	E001_RxPdo_Input_command_2_3002_02		Global Variables
	RxPdo_Input command 3_3002_03	W	UDINT	E001_RxPdo_Input_command_3_3002_03		Global Variables
	TxPdo_Output signal 1_2000_01	R	UDINT	E001_TxPdo_Output_signal_1_2000_01		Global Variables
	TxPdo_Output signal 2_2000_02	R	UDINT	E001_TxPdo_Output_signal_2_2000_02		Global Variables
	TxPdo_Output data 1_2001_01	R	UDINT	E001_TxPdo_Output_data_1_2001_01		Global Variables
	TxPdo_Output data 2_2001_02	R	UDINT	E001_TxPdo_Output_data_2_2001_02		Global Variables
	TxPdo_Output data 3_2001_03	R	UDINT	E001_TxPdo_Output_data_3_2001_03		Global Variables
	TxPdo_Output data 4_2001_04	R	UDINT	E001_TxPdo_Output_data_4_2001_04		Global Variables
	TxPdo_Output data 5_2001_05	R	UDINT	E001_TxPdo_Output_data_5_2001_05		Global Variables
	TxPdo_Output command 1_2002_01	R	UDINT	E001_TxPdo_Output_command_1_2002_01		Global Variables
	TxPdo_Output command 2_2002_02	R	UDINT	E001_TxPdo_Output_command_2_2002_02		Global Variables
	TxPdo_Output command 3_2002_03	R	UDINT	E001_TxPdo_Output_command_3_2002_03		Global Variables



**Additional Information**

The device variable names are automatically generated by combining the *device name* and the *port name*.

For slave units, the default **Device name** is *E* followed by a *sequential number starting from 001*.



**Additional Information**

In this guide, device variable names are automatically generated for each slave unit. The device variable names can be set arbitrarily for each port, not for each unit.

### 7.3.4. Transferring the Project Data

Transfer the project data created in Sysmac Studio to the Controller.

 **WARNING**

When you transfer a user program, *Configurations and Setup* data, or device variables from Sysmac Studio, the devices and machines may operate unexpectedly regardless of the operating mode of the CPU Unit. Before transferring the project data, check the safety of the destination slaves.



 **WARNING**

Before you transfer the parameters, check the specifications of the EtherCAT slave unit in manuals or other documentation and confirm that the system will not be adversely affected.

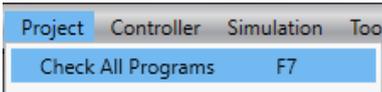


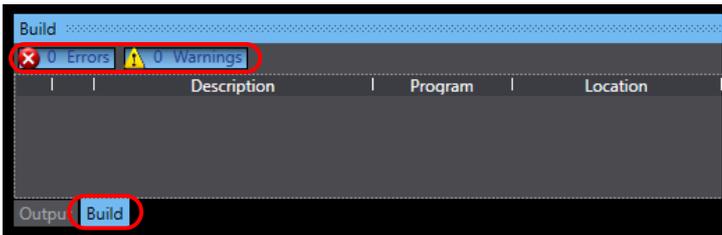
 **Caution**

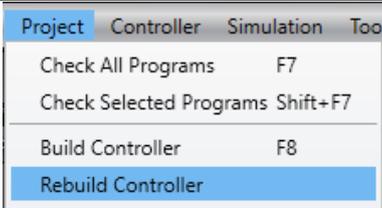
After you transfer the project data, the CPU Unit will restart, and communications with the slave unit will be cut off. During the period, the outputs of the slave unit behave according to the *slave unit settings*. The time that communications is cut off depends on the EtherCAT network configuration. Before you transfer the project data, confirm that the *slave unit settings* will not adversely affect the system.

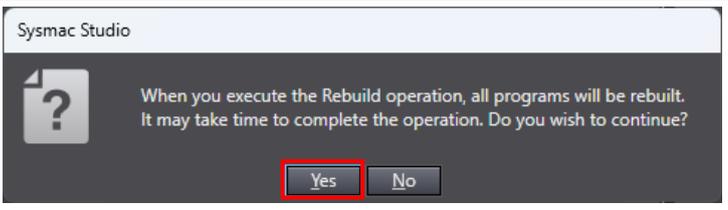
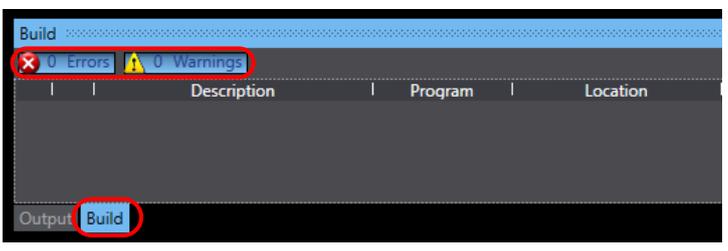
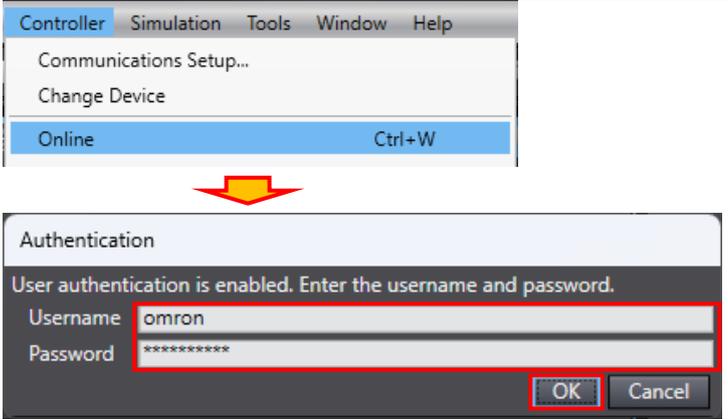
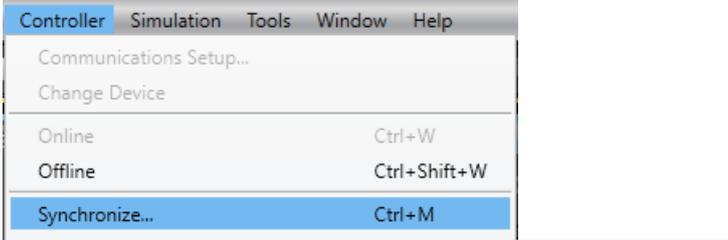
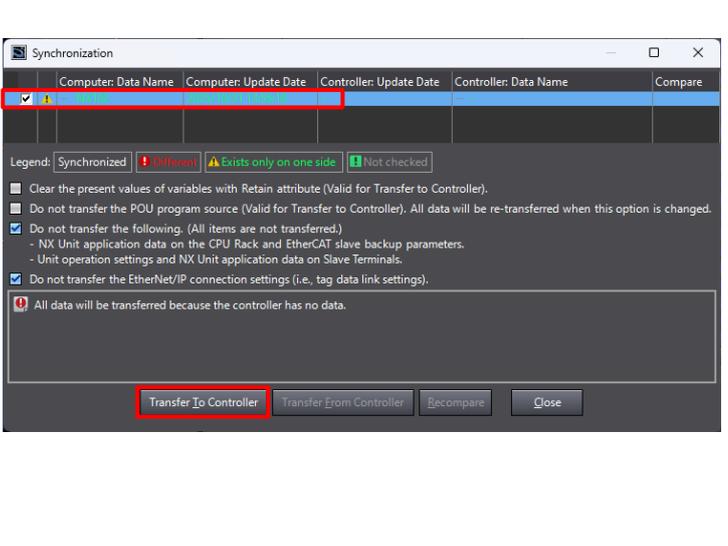


- 1** Select **Check All Programs** from the **Project** Menu.


- 2** The **Build** Tab Page appears. Check that the tab page shows the results *0 Errors* and *0 Warnings*.


- 3** Select **Rebuild Controller** from the **Project** Menu.



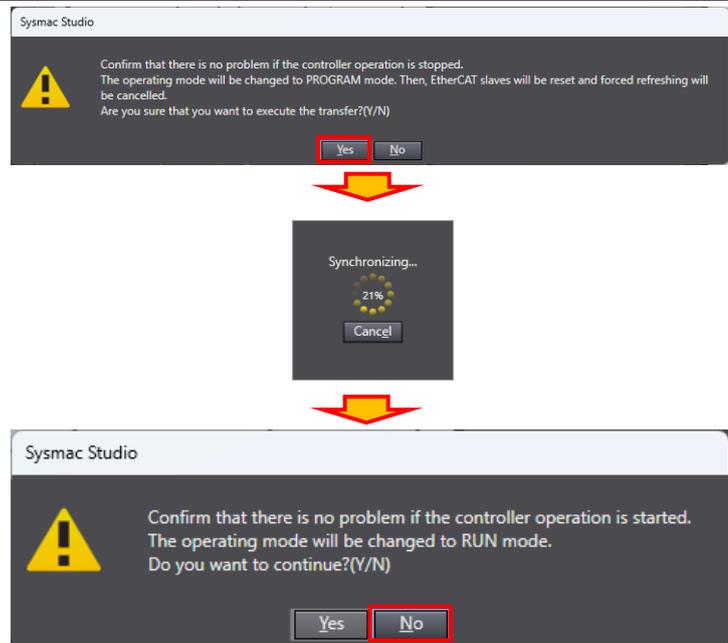
<p><b>4</b> The dialog box on the right appears. Confirm that there is no problem, and click <b>Yes</b>.</p>	
<p><b>5</b> Check that the <b>Build</b> Tab Page shows the results <i>0 Errors</i> and <i>0 Warnings</i>.</p>	
<p><b>6</b> Select <b>Online</b> from the <b>Controller</b> Menu.</p> <p>The <b>Authentication</b> Dialog Box appears. Enter the user name and password set in section 7.3.2., and click <b>OK</b>.</p>	
<p><b>7</b> When an online connection is established, a yellow line appears under the toolbar.</p>	
<p><b>8</b> Select <b>Synchronize</b> from the <b>Controller</b> Menu.</p>	
<p><b>9</b> The <b>Synchronization</b> Dialog Box appears.</p> <p>Confirm that the check box for the data to transfer (i.e. <b>NX102</b> on the figure on the right) is selected, and click <b>Transfer To Controller</b>.</p> <p>*When you execute <b>Transfer To Controller</b>, the data from Sysmac Studio is transferred to the Controller, and the data is synchronized.</p>	

- 10** The dialog box on the right appears. Confirm that there is no problem, and click **Yes**.

A message appears stating “Synchronizing.”

The dialog box on the right appears. Confirm that there is no problem, and click **No**.

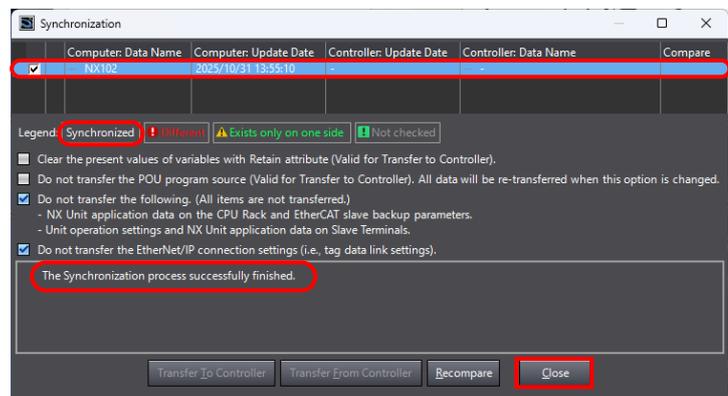
\*Do not return to *Run Mode*.



- 11** As shown in the figure on the right, the font color used to display the synchronized data changes to white which is the color used to specify **Synchronized**. Check that a message appears stating *The Synchronization process successfully finished*. Confirm that there is no problem, and click **Close**.

\*When the project data created in Sysmac Studio matches the Controller data, a message appears stating *The Synchronization process successfully finished*.

\*If the synchronization fails, check the wiring and repeat from step 1.



### 7.4. EtherCAT Communication Status Check

Confirm that PDO communications via EtherCAT is performed normally.

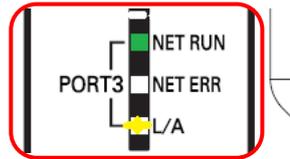
#### 7.4.1. Checking the Connection Status

Check the EtherCAT connection status.

- 1 Check with the LED indicators on Controller that PDO communications via EtherCAT is performed normally.

Below is the LED status in normal operation.

- NET RUN: Lit Green
- NET ERR: OFF
- LINK/ACT: Yellow flashing



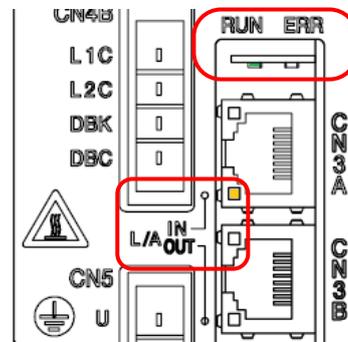
Built-in EtherCAT (Port 3) status Indicators

\*The NJ-series Controllers also have the same LED indicator status.

- 2 Check the LED indicators on the ABSODEX Driver.

Below is the LED status in normal operation.

- RUN: Lit Green
- ERR: OFF
- L/A IN: Flashing Orange



### 7.4.2. Checking the Sent and Received Data

Check that the correct data is sent and received.

In this guide, the sent and received data check is done by using the monitor code function of the ABSODEX Driver to read the monitor data for the current position (pulse) within a full revolution (hereafter referred to as “Current position (pulse)”).

In this guide, you use *AX-Tools* to check the sent and received data. Install *AX-Tools* on the PC beforehand.

For how to install *AX-Tools*, refer to 2.2. *Installing AX-Tools* in the *ABSODEX PC Setting Software AX-Tools INSTRUCTION MANUAL (SM-A63470-A)*.

#### Caution

If you change the variable values on a **Watch Tab Page** when Sysmac Studio is online with the CPU Unit, the devices connected to the Controller may operate regardless of the operating mode of the CPU Unit.

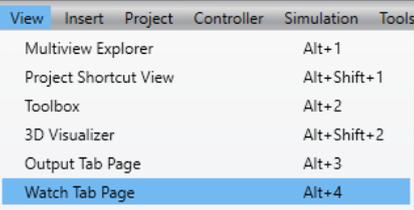
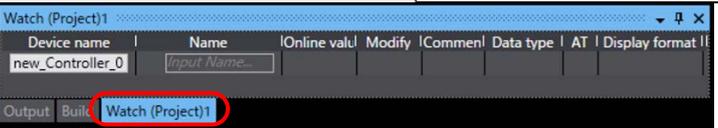
Sufficiently confirm safety before you change the values of variables on a **Watch Tab Page** when Sysmac Studio is online with the CPU Unit.



#### Additional Information

For details on how to output monitor data using the monitor code function, refer to 4.6.

*Monitor Code / Instruction Code* in the *AXD SERIES DRIVER FOR DIRECT DRIVE ACTUATOR EtherCAT/EtherNet/IP Specifications INSTRUCTION MANUAL (SM-A63469-A)*.

<p><b>1</b> Select <b>Watch Tab Page</b> from the <b>View</b> Menu.</p>	
<p><b>2</b> The <b>Watch (Project)1</b> Tab Page appears.</p>	

- 3** Click **Input Name** in the **Name** Column and enter the following variable names for monitoring. Select the **Display format** for each of the variables. When entering a new name, click

**Input Name.**

Name:E001\_RxPdo\_Input\_data\_1\_3001\_01

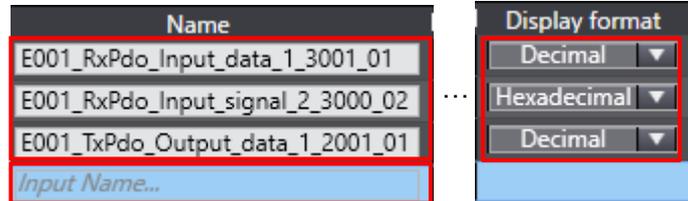
Display format: Decimal

Name:E001\_RxPdo\_Input\_signal\_2\_3000\_02

Display format: Hexadecimal

Name:E001\_TxPdo\_Output\_data\_1\_2001\_01

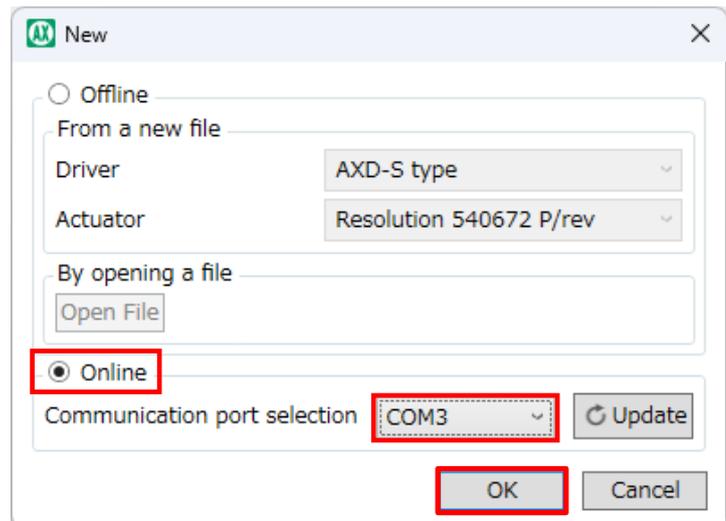
Display format: Decimal



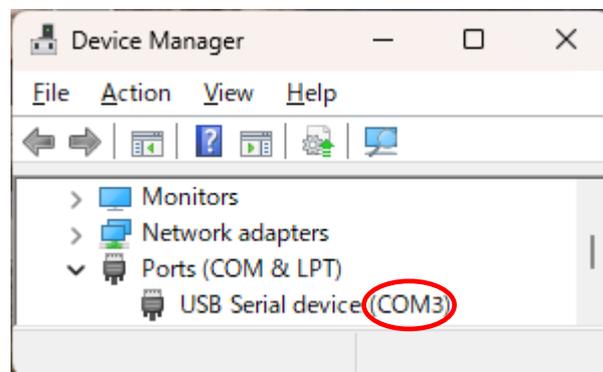
- 4** Start AX-Tools.



- 5** The **New** Dialog Box appears. Select the **Online** Option. Select the COM port number to use from the **Communication port selection** pull-down list and click **OK**.



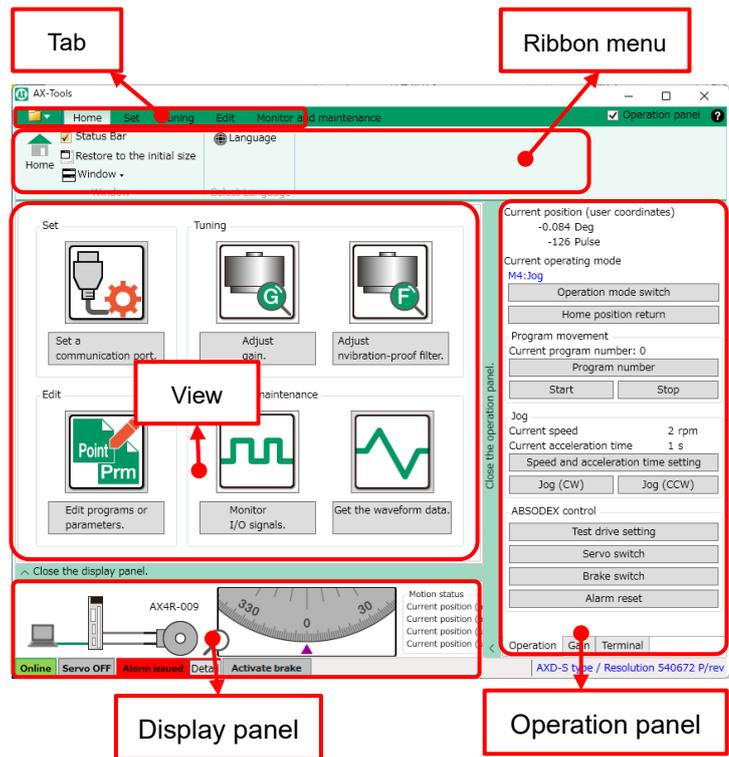
\*If there are two or more serial ports on the PC, display Windows Device Manager and, under *Ports (COM & LPT)*, select the same port number as *the COM port number to which the driver is connected (COM3 in the example figure on the right)*.



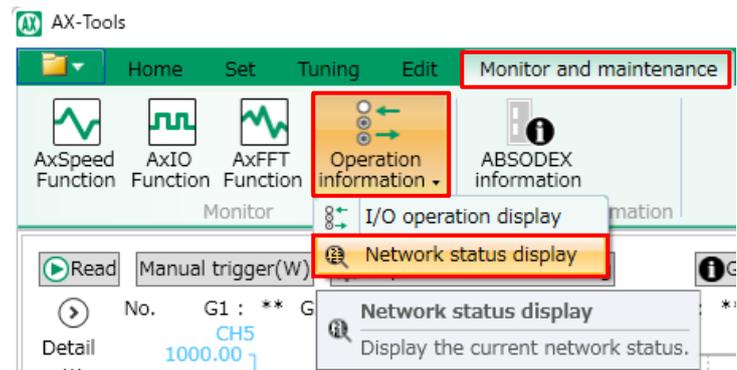
**6** AX-Tools starts.

As shown in the figure on the right, each area of the AX-Tools screen is called as follows:

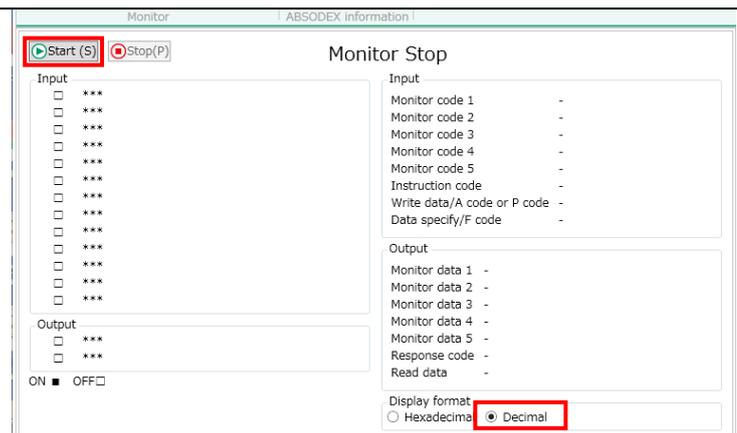
- Tab
- Ribbon menu
- View
- Operation panel
- Display panel



**7** In AX-Tools, select the **Monitor and maintenance** Tab, click **Operation information** on the ribbon menu, and select **Network status display** from the menu.



**8** The **Network status display** View is displayed on the Monitor display. Select **Decimal** in **Display format** and click **Start**.



**9** On the Watch Tab Page of Sysmac Studio, check that the following values are displayed in the **Online value** Column.

E001\_RxPdo\_Input\_data\_1\_3001\_01:  
0  
E001\_RxPdo\_Input\_signal\_2\_3000\_02:  
0000 0000  
E001\_TxPdo\_Output\_data\_1\_2001\_01:  
0

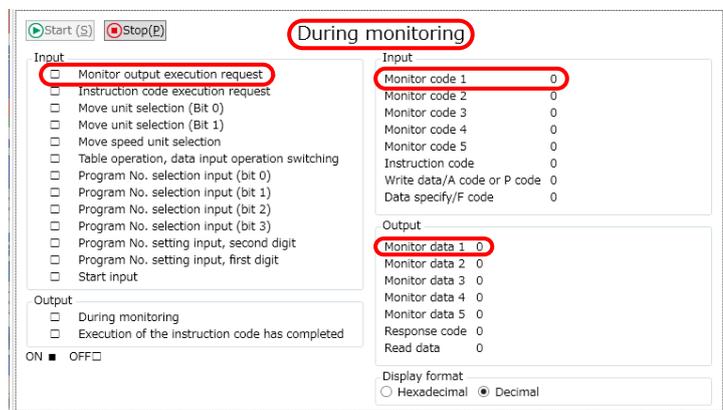
Name	Online value
E001_RxPdo_Input_data_1_3001_01	0
E001_RxPdo_Input_signal_2_3000_02	0000 0000
E001_TxPdo_Output_data_1_2001_01	0

E001\_RxPdo\_Input\_data\_1\_3001\_01: Monitor code 1  
E001\_RxPdo\_Input\_signal\_2\_3000\_02-Bit 0: Monitor output execution request  
E001\_TxPdo\_Output\_data\_1\_2001\_01: Monitor data 1

\*Refer to 6.2. *Device Variables* for details on each of the variables.

**10** The **Network status display** View shows “During monitoring.” Check that the monitor values are displayed as follows.

- Input  
Monitor output execution request:  
OFF (Disabled)  
Monitor code 1: 0
- Output  
Monitor data 1: 0



\*This shows that the monitor values of the ABSODEX Driver match the online values in step 9.

**11** In the Watch Pane of Sysmac Studio, enter 3 in the **Modify** Column for *E001\_RxPdo\_Input\_data\_1\_3001\_01*.

Name	Online value	Modify
E001_RxPdo_Input_data_1_3001_01	0	3



The value in the **Online value** Column for *E001\_RxPdo\_Input\_data\_1\_3001\_01* changes to 3.

Name	Online value	Modify
E001_RxPdo_Input_data_1_3001_01	3	3

\*For *Monitor code 1* above, set the monitor item number to import into *Monitor data 1*. In this guide, it is set to 3, which is the monitor item number for *Current position (pulse)*.

**12** Set 0000 0001 for *E001\_RxPdo\_Input\_signal\_2\_3000\_02* by performing the same operation as in step 11.

Name	Online value	Modify
E001_RxPdo_Input_data_1_3001_01	3	3
E001_RxPdo_Input_signal_2_3000_02	0000 0001	0000 0001

\*Setting *bit 0* (Monitor output execution request) of the above variable to 1 (Enabled) stores the value of the *monitor item number 3* (Current position (pulse)) set in step 11.

**13** Check that the **Online value** Column displays the following value.

E001\_TxPdo\_Output\_data1\_2001\_01:  
(337124 in the example on the right)

Name	Online value	Modify
E001_RxPdo_Input_data_1_3001_01	3	3
E001_RxPdo_Input_signal_2_3000_02	0000 0001	0000 0001
E001_TxPdo_Output_data_1_2001_01	337124	

\*The value of *Current position (pulse)* is 337124 pulses depending on the ABSODEX Driver used.  
The value of *Current position (pulse)* may vary depending on the ABSODEX Driver used.

**14** In the **Network status display** View of AX-Tools, check that the monitor values are displayed as follows.

- **Input**

Monitor output execution request:

ON (Enabled)

Monitor code 1: 3

- **Output**

Monitor data 1: 337124

- **Motion status** on the display panel

Check the value of **Current position (actuator coordinates)** (*337124 Pulse* in the example on the right).

\*This indicates that the *Current position (pulse)* of the ABSODEX Driver is *337124*, which matches the value in step 13.

\*The value of *Current position (pulse)* may vary depending on the ABSODEX Driver used.

The screenshot displays the AX-Tools interface during monitoring. At the top, there are 'Start (S)' and 'Stop (P)' buttons. The main area is divided into 'Input' and 'Output' sections. In the 'Input' section, 'Monitor output execution request' is checked. In the 'Output' section, 'During monitoring' is checked. Below these sections, there are 'Monitor code 1' through 'Monitor code 5' and 'Monitor data 1' through 'Monitor data 5'. The 'Motion status' section shows a gauge and a table of current positions. The table includes 'Current position (actuator coordinates)' with a value of 337124 Pulse, which is circled in red. Other values in the table are 224.470 Deg, -203548 Pulse, and -135.53 Deg. At the bottom, there is a status bar with 'Online', 'Servo OFF', 'Alarm issued', 'Detail', and 'Activate brake' buttons.

Motion status	
Current position (actuator coordinates)	337124 Pulse
Current position (actuator coordinates)	224.470 Deg
Current position (user coordinates)	-203548 Pulse
Current position (user coordinates)	-135.53 Deg

## 8. Initialization Method

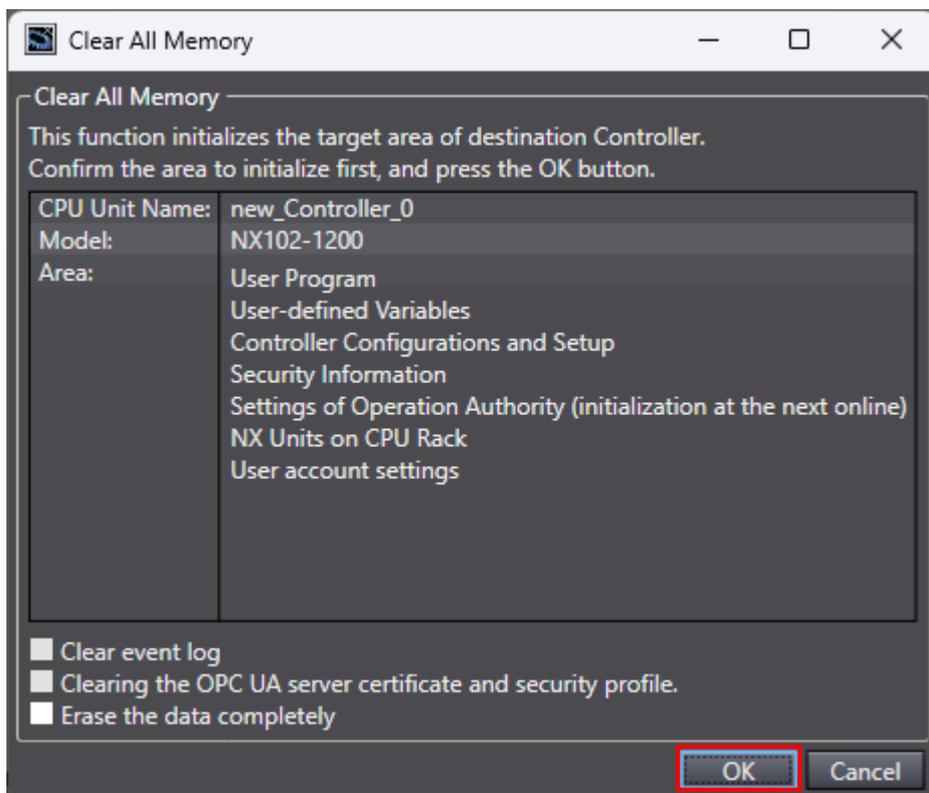
The setting procedures in this guide are based on the factory default settings.

Some procedures may not be applicable unless you use the devices with the factory default settings.

### 8.1. Initializing the Controller

To initialize the Controller, initialize the CPU Unit.

With Sysmac Studio, change the operating mode of Controller to PROGRAM mode and select **Clear All Memory** from the **Controller** Menu. When the **Clear All Memory** Dialog Box is displayed, confirm the contents and click **OK**.



### 8.2. Initializing the CKD ABSODEX Driver

For how to initialize the CKD ABSODEX Driver, refer to 3.5.11. *ABSODEX initialization* in the *ABSODEX PC Setting Software AX-Tools INSTRUCTION MANUAL (SM-A63470-A)*.

## 9. Revision History

Revision code	Revision date	Description of revision
01	February 2026	First edition

**Note: Do not use this document to operate the Unit.**

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