2026/6/30 Discontinued

OMRON

Machine Automation Controller NJ/NX-series

EtherCAT®
Connection Guide

CKD Corporation

ABSODEX driver
(AX9000TS/TH-U5)

SYSMAC
always in control

P690-E1-01

2026/6/30 Discontinued

About Intellectual Property Rights and Trademarks

2026/6/30 Discontinued

Table of Contents

1. Related Manuals

To ensure system safety, make sure to always read and follow the information provided in all Safety Precautions and Precautions for Safe Use in the manuals for each device which is 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	Cat. No.	Model	Manual name
OMRON	W500	NJ501-□5□□ NJ501-□4□□ NJ501-□3□□ NJ301-12□□ NJ301-11□□ NJ101-10□□ NJ101-90□□	NJ-series CPU Unit Hardware User's Manual
OMRON	W535	NX701-17□□ NX701-16□□	NX-series CPU Unit Hardware User's Manual
OMRON	W578	NX1P2-11□□□□ NX1P2-10□□□□ NX1P2-90□□□□	NX-series NX1P2 CPU Unit Hardware User's Manual
OMRON	W501	NX701-17□□ NX701-16□□ NX1P2-11□□□□ NX1P2-10□□□□ NX1P2-90□□□□ NJ501-□5□□ NJ501-□4□□ NJ501-□3□□ NJ301-12□□ NJ301-11□□ NJ101-10□□ NJ101-90□□	NJ/NX-series CPU Unit Software User's Manual
OMRON	W505		NJ/NX-series CPU Unit Built-in EtherCAT® Port User's Manual
OMRON	W504	SYSMAC-SE2□□□	Sysmac Studio Version 1 Operation Manual
CKD	SMF-2006-A	AX9000TS/TH/XS	INSTRUCTION MANUAL ABSODEX AX SERIES TS TYPE TH TYPE XS TYPE
CKD	SMF-2012-A	AX9000TS/TH-U5	Instruction Manual ABOSODEX AX Series TS type TH type EtherCAT specification
CKD	SMF-2005-A	-	INSTRUCTION MANUAL ABSODEX AX Tools for Windows® Common for TS-Type, TH-Type, MU-Type and XS-Type Drivers

2. Terms and Definitions

Term	Explanation and Definition
PDO communications (Communications using Process Data Objects)	PDO communications is used for constant data exchange between a master and slaves. PDO data (i.e., I/O data that is mapped to PDOs) that is allocated in advance is input and output each EtherCAT process data communications cycle (i.e., the task period of primary periodic task). The NJ/NX-series Machine Automation Controller uses 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. It is accessed from NJ/NX-series Machine Automation Controller in the following ways. ・With device variables for EtherCAT slave I/O ・With axis variables for a servo drive and an encoder input slave to which an axis is assigned
SDO communications (Communications using Service Data Objects)	SDO communications is used to read and write specified slave data from a master when required. The NJ/NX-series Machine Automation Controller uses SDO communications for commands to read and write data, such as for parameter transfers, at specified times. The NJ/NX-series Machine Automation Controller can read/write the specified slave data (parameters and error information, etc.) with the EC_CoESDORead (Read CoE SDO) instruction or the EC_CoESDOWrite (Write CoE SDO) instruction.
Slave unit	There are various types of slaves such as servo drives that handle position data and I/O terminals that handle bit signals. A slave unit receives output data sent from a master, and sends input data to a master.
Node address	A node address is an address to identify a unit connected to EtherCAT.
ESI file (EtherCAT Slave Information file)	An ESI file contains information unique to EtherCAT slave units in XML format. You can load an ESI file into the Sysmac Studio, to allocate EtherCAT slave process data and make other settings.

3. Precautions

(1) Understand the specifications of devices which are used in the system. Allow some margin for ratings and performance. Provide safety measures, such as installing a safety circuit, in order to ensure safety and minimize the risk of abnormal occurrence.

(2) To ensure system safety, make sure to always read and follow the information provided in all Safety Precautions and Precautions for Safe Use in the manuals for each device which is 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 May 2017. It is subject to change for improvement without notice.

The following notations are used in this guide.

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

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.

Symbol

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

4. Overview

This guide describes procedures for connecting a CKD ABSODEX Driver AX9000TS/TH-U5 (hereinafter referred to as the "ABSODEX Driver") to an OMRON NJ/NX-series Machine Automation Controller (hereinafter referred to as the "Controller") via EtherCAT and for checking their communication status.
The explanations given in this guide assume the use of NJ-series Controllers.
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	NX701-17[][] NX701-16[][] NX1P2-11[][][][] NX1P2-10[][][][] NX1P2-90[][][][] NJ501-[]5[][] NJ501-[]4[][] NJ501-[]3[][] NJ301-12[][] NJ301-11[][] NJ101-10[][] NJ101-90[][]
CKD	ABSODEX Driver	AX9000TS/TH-U5
CKD	Actuator	AX-T Series

Precautions for Correct Use

In this guide, the devices with models and versions listed in *5.2. Device Configuration* are used as examples of applicable devices to describe the procedures for connecting the devices and checking their connections.
You cannot use devices with versions lower than the versions listed in *5.2*.
To use the above devices with models not listed in *5.2.* or versions higher than those listed in *5.2.*, check the differences in the specifications by referring to the manuals before operating the devices.

Additional Information

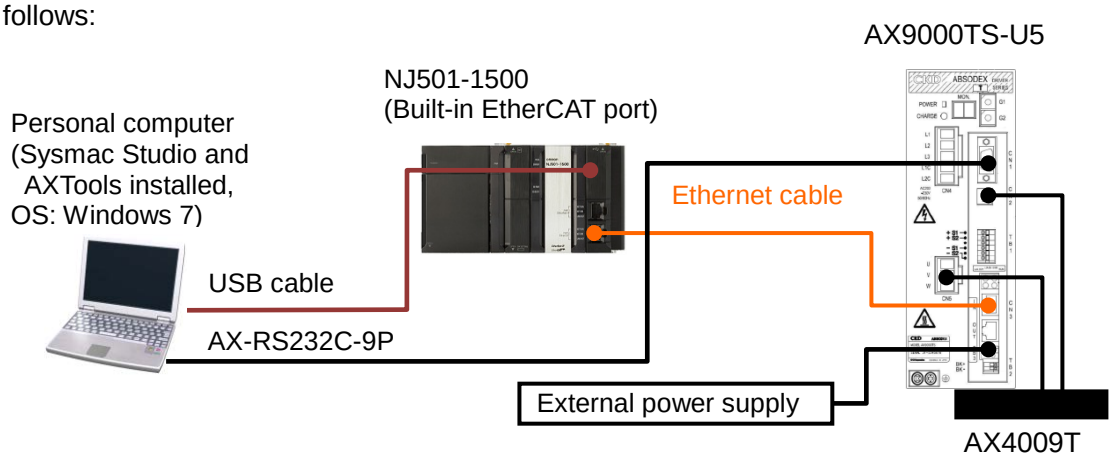
This guide describes the procedures for establishing the network connections.
It does not provide information on operation, installation, wiring method, device functionality, or device operation, which is not related to the connection procedures.
Refer to the manuals or contact the device manufacturer.

Additional Information

Contact CKD Corporation for Actuators connectable to the ABSODEX Driver.

5.2. Device Configuration

This guide describes the connection procedures using an NJ-series Controller.
The hardware components to reproduce the connection procedures in this guide are as follows:



Manufacturer	Name	Model	Version
OMRON	NJ-series CPU Unit (Built-in EtherCAT port)	NJ501-1500	Ver.1.13
OMRON	Power Supply Unit	NJ-PA3001	
OMRON	Sysmac Studio	SYSMAC-SE2[][][]	Ver.1.17
-	Personal computer (OS: Windows 7)	-	
-	USB cable (USB 2.0 type B connector)	-	
OMRON	Ethernet cable (with industrial Ethernet connector)	XS5W-T421-[]M[]-K	
CKD	RS-232C cable	AX-RS232C-9P	
CKD	ABSODEX Driver	AX9000TS-U5	Rev.0x0000 0001
CKD	Actuator	AX4009T	
CKD	AXTools	-	V2.13
CKD	ESI file	CKD_ABSODEX_ECAT_161206.xml	
-	External power supply (24 VDC)	-	

Precautions for Correct Use

Prepare the ESI file listed above beforehand.
To obtain the ESI file, contact CKD Corporation.

Precautions for Correct Use

The connection line of EtherCAT communications cannot be shared with other Ethernet networks.
Do not use devices for Ethernet such as a switching hub.
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.

Precautions for Correct Use

Update Sysmac Studio to the version specified in this *Clause 5.2.* or to a higher version.
If you use a version higher than the one specified, the procedures and related screenshots described in *Section 7.* and subsequent sections may not be applicable.
In that case, use the equivalent procedures described in this guide by referring to the *Sysmac Studio Version 1 Operation Manual* (Cat. No. W504).

Additional Information

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

Additional Information

For external power supply specifications, refer to the *Instruction Manual ABSODEX AX Series TS type TH type EtherCAT specification* (SMF-2012-A).

Additional Information

The system configuration in this guide uses USB for the connection between the personal computer and the Controller. For information on how to install the USB driver, refer to *A-1 Driver Installation for Direct USB Cable Connection* of the *Sysmac Studio Version 1 Operation Manual* (Cat. No. W504).
For NX1P2 Controllers, there is no need to install the USB driver because they do not have a USB port.

Additional Information

The NX1P2 Controller, if used, should be connected to your personal computer with an Ethernet cable. For information on how to connect the cable, refer to *6-2 Going Online with a Controller* of the *Sysmac Studio Version 1 Operation Manual* (Cat. No. W504).

6. EtherCAT Settings

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

6.1. Parameters

The parameters required for connecting the Controller and the ABSODEX Driver via EtherCAT are shown below.

Name	Item	Set value
ABSODEX Driver	Node address (set in AXTools)	1
	Setting of Device ID to Station Alias register	Set (Default)
Controller	Priority-4 Primary Periodic Task	1ms (Default)

Precautions for Correct Use

Set Period/Execution Conditions to 1ms or more for the Controller's primary periodic task because the minimum task period of the ABSODEX Driver is 1ms.

6.2. Device Variables

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

The device variable names and data types are shown below.

■Output area (Controller to ABSODEX Driver)

Device variable name	Data type	Bit	Description
E001_1st_Receive_PDO_Mapping _Input_signal_1_2001_01	UDINT	0 to 3	Program number selection input (bits 0 to 3)
		4	Program number setting input, second digit/: Program number selection input (bit 4)
		5	Program number setting input, first digit/ Program number selection input (bit 5)
		6	Reset input
		7	Origin return command input
		8	Start input
		9	Servo-on input/ Program stop input
		10	Ready return input/ Continuous rotation stop input
		11	Answer input/ Position deviation counter reset
		12	Emergency stop input
		13	Brake off input
		14	Jog operation input (CW direction)
		15	Jog operation input (CCW direction)
		16, 17	Reserved/ Travel unit selection input (bits 0 and 1)
		18	Reserved/ Travel speed unit selection input
		19	Table operation, data input operation Switching input
		20 to 31	Reserved
E001_1st_Receive_PDO_Mapping _Input_signal_2_2001_02	UDINT	0	Monitor output execution request
		1	Command code execution request
		2 to 31	Reserved
E001_1st_Receive_PDO_Mapping _Input_data_1_2003_01	DINT	-	Monitor code 1
E001_1st_Receive_PDO_Mapping _Input_data_2_2003_02	DINT	-	Monitor code 2
E001_1st_Receive_PDO_Mapping _Input_data_3_2003_03	DINT	-	Monitor code 3
E001_1st_Receive_PDO_Mapping _Input_data_4_2003_04	DINT	-	Monitor code 4
E001_1st_Receive_PDO_Mapping _Input_data_5_2003_05	DINT	-	Monitor code 5
E001_1st_Receive_PDO_Mapping _Input_command_1_2003_06	DINT	-	Command code
E001_1st_Receive_PDO_Mapping _Input_command_2_2003_07	DINT	-	Written data /A code or P code
E001_1st_Receive_PDO_Mapping _Input_command_3_2003_08	DINT	-	Data designation /F code

■Input area (ABSODEX Driver to Controller)

Device variable name	Data type	Bit	Description
E001_1st_Transmit_PDO_Mapping _Output_signal_1_2005_01	UDINT	0 to 7	M code output (bits 0 to 7)
		8	In-position output
		9	Positioning completion output
		10	Start input wait output
		11, 12	Alarm outputs 1 and 2
		13	Indexing-in-progress output 1 /Origin position output
		14	Indexing-in-progress output 2 /Servo state output
		15	Ready state output
		16	Segment position strobe output
		17	M code strobe output
		18 to 31	Reserved
E001_1st_Transmit_PDO_Mapping _Output_signal_2_2005_02	UDINT	0	Monitoring
		1	Command code execution complete
		2 to 31	Reserved
E001_1st_Transmit_PDO_Mapping _Output_data_1_2007_01	DINT	-	Monitor data 1
E001_1st_Transmit_PDO_Mapping _Output_data_2_2007_02	DINT	-	Monitor data 2
E001_1st_Transmit_PDO_Mapping _Output_data_3_2007_03	DINT	-	Monitor data 3
E001_1st_Transmit_PDO_Mapping _Output_data_4_2007_04	DINT	-	Monitor data 4
E001_1st_Transmit_PDO_Mapping _Output_data_5_2007_05	DINT	-	Monitor code 5
E001_1st_Transmit_PDO_Mapping _Output_command_1_2007_06	DINT	-	Response code
E001_1st_Transmit_PDO_Mapping _Output_command_2_2007_07	DINT	-	Loaded data
E001_1st_Transmit_PDO_Mapping _Output_command_3_2007_08	DINT	-	Reserved

Additional Information

For details on the assignment of the input and output areas, refer to *3.2. Input/Output* of the *Instruction Manual ABSODEX AX Series TS type TH type EtherCAT specification* (SMF-2012-A).

Additional Information

The device variables are automatically named from a combination of the device names and the port names.
The default device names are "E" followed by a serial number that starts from 001.

7. EtherCAT Connection Procedure

This section describes the procedures for connecting the Controller and the ABSODEX Driver via EtherCAT. The explanations of the procedures for setting up the Controller and the ABSODEX Driver given in this guide are based on the factory default settings.
For the initialization, refer to *Section 8. Initialization Method*.

7.1. Work Flow

Take the following steps to connect the Controller and the ABSODEX Driver via EtherCAT to perform PDO communications.

7.2. CKD ABSODEX Driver Setup	Set up the CKD ABSODEX Driver.
↓	
7.2.1. Hardware Settings	Connect the cables to the ABSODEX Driver.
↓	
7.2.2. Parameter Settings	Set the parameters for the ABSODEX Driver.
↓	
7.3. Controller Setup	Set up the Controller.
↓	
7.3.1. Starting Sysmac Studio and Installing the ESI File	Install the ESI file for the ABSODEX Driver in Sysmac Studio.
↓	
7.3.2. Setting up the EtherCAT Network Configuration	Set up the EtherCAT network configuration.
↓	
7.3.3. Setting the Device Variables	Set the device variables to use for the slave unit.
↓	
7.3.4. Transferring the Project Data	Transfer the project data created in Sysmac Studio to the Controller.
↓	
7.4. EtherCAT Communication Status Check	Confirm that PDO communications performs normally via EtherCAT.
↓	
7.4.1. Checking the Connection Status	Check the connection status of the EtherCAT network.
↓	
7.4.2. Checking the Sent and Received Data	Check that the correct data are sent and received.

7.2. CKD ABSODEX Driver Setup

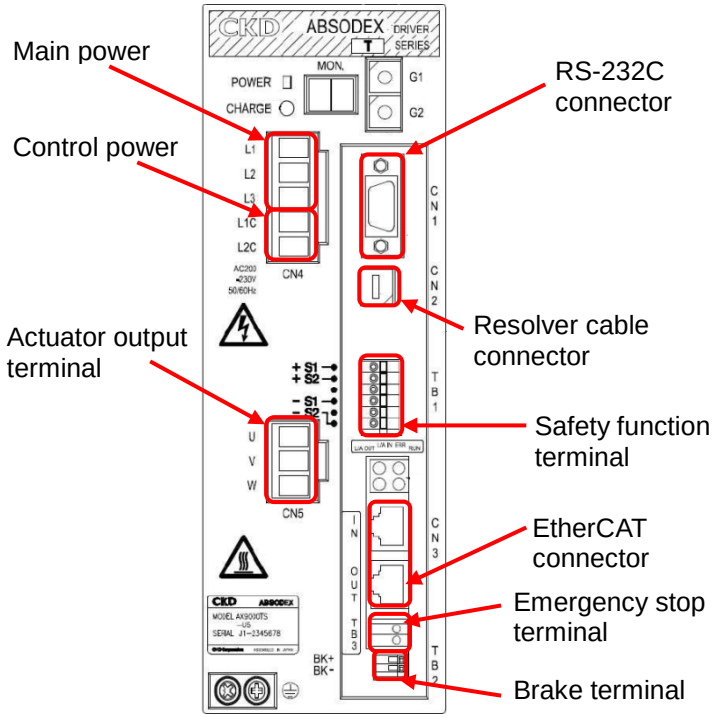
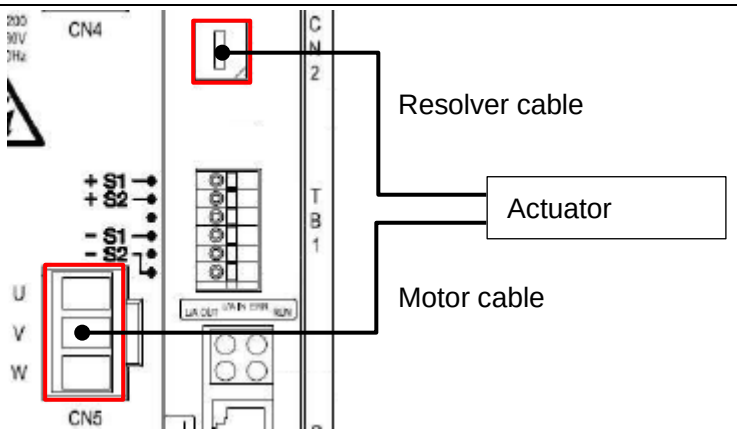
Set up the CKD ABSODEX Driver.

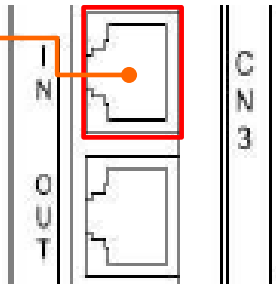
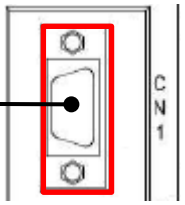
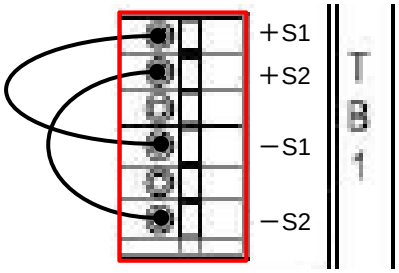
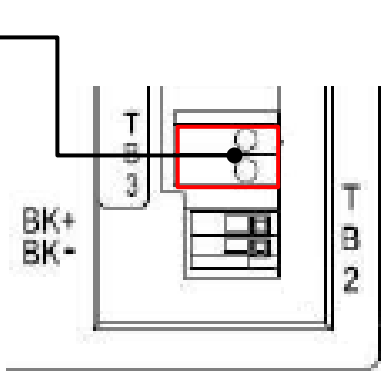
7.2.1. Hardware Settings

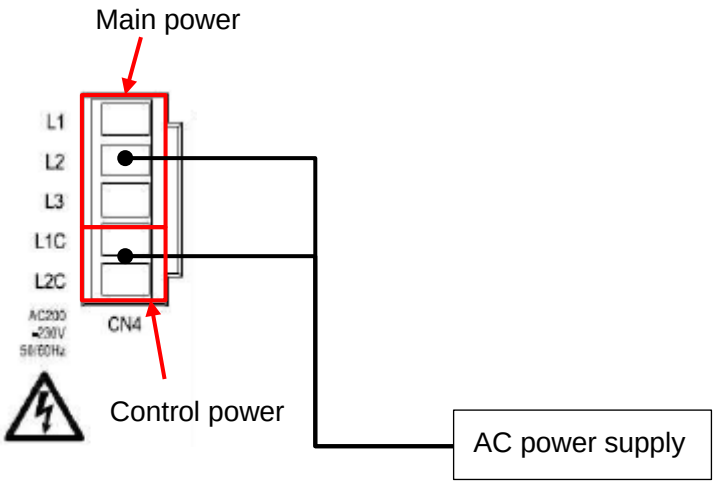
Connect the cables to the ABSODEX Driver.

Precautions for Correct Use

Make sure that the power supplies are OFF when you set up.
If either of them is ON, the settings described in the following steps and subsequent procedures may not be applicable.

1	Make sure that ABSODEX Driver and the external power supply are OFF.	
2	Check the position of the connectors on ABSODEX Driver by referring to the figure on the right.	
3	Connect Actuator to Resolver cable connector with a dedicated resolver cable. Connect Actuator to Actuator output terminal with a dedicated motor cable.	

4	Connect an Ethernet cable to EtherCAT connector (IN).	Ethernet cable 
5	Connect an RS-232C cable between RS-232C connector on ABSODEX Driver and the serial connector on Personal computer.	Personal computer — RS-232C cable 
6	Check that the safety function is invalidated. *Since the intention of this guide is to verify the network connection, the safety function is left invalid. *Refer to *3.2.6. Wiring for Safety Function* of the *INSTRUCTION MANUAL ABSODEX AX SERIES TS TYPE TH TYPE XS TYPE* (SMF-2006-A) for wiring to Safety function terminal.	 *A jumper is connected to Safety function terminal to invalidate the safety function when ABSODEX Driver is shipped from the factory.
7	Wire External power supply to Emergency stop terminal. *Refer to *2.3.1. Wiring of Emergency Stop Input (TB3)* of the *Instruction Manual ABSODEX AX Series TS type TH type EtherCAT specification* (SMF-2012-A) for wiring to Emergency stop terminal.	External power supply 

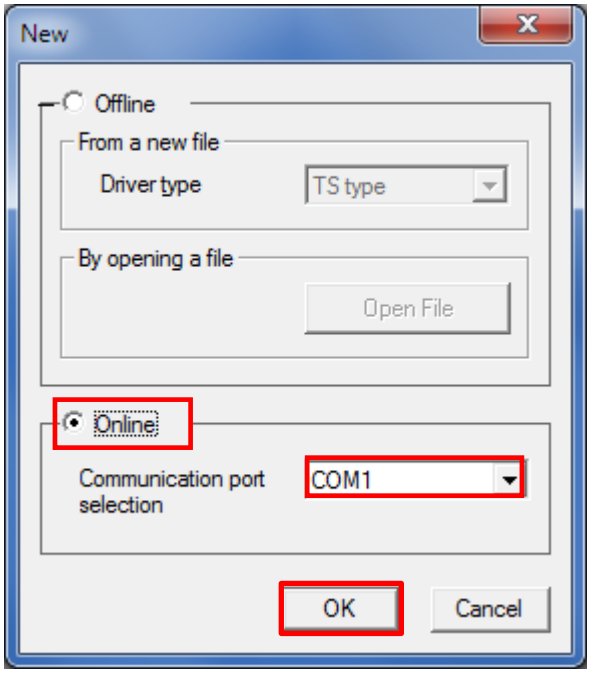
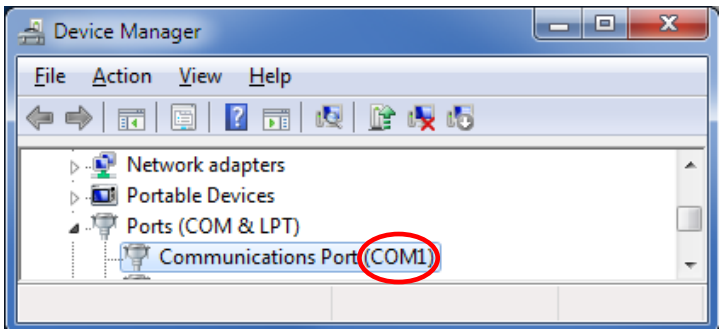
8	Wire AC power supply for ABSODEX Driver to the connectors of Main power and Control power. *For capacities of Main power and Control power, refer to *Table 3.3 Power Supply and Circuit Breaker Capacities* in *3.2.2. Connection to Power and Actuator (CN4, CN5)* or *14. DRIVER SPECIFICATIONS* of the *INSTRUCTION MANUAL ABSODEX AX SERIES TS TYPE TH TYPE XS TYPE* (SMF-2006-A). *For wiring to Main power and Control power, refer to *3.2.2. Connection to Power and Actuator (CN4, CN5)* of the *INSTRUCTION MANUAL ABSODEX AX SERIES TS TYPE TH TYPE XS TYPE* (SMF-2006-A).	

7.2.2. Parameter Settings

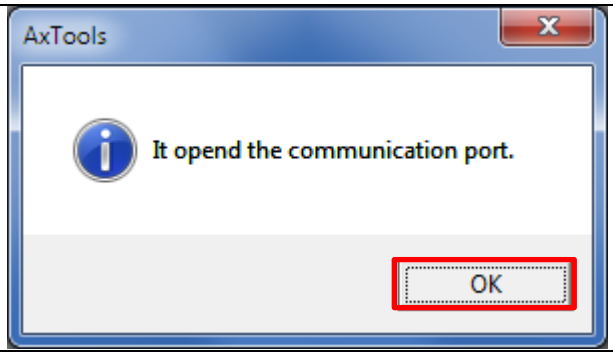
Set the parameters for the ABSODEX Driver.

Precautions for Correct Use

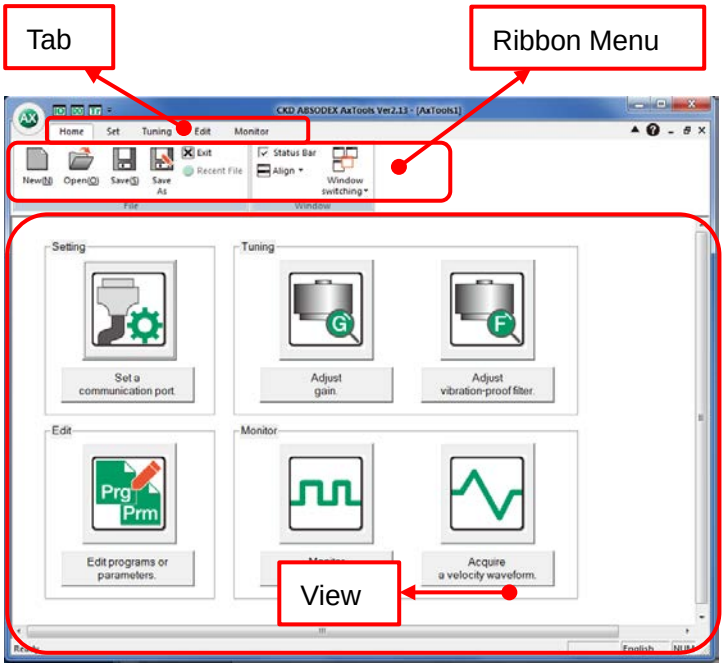
Refer to *5.5.4. Main Power Supply Sequence* of the *INSTRUCTION MANUAL ABSODEX AX SERIES TS TYPE TH TYPE XS TYPE* (SMF-2006-A) for information on the turn-on sequence of the main and control power supplies to the ABSODEX Driver.

1	Turn ON ABSODEX Driver.	
2	Start AXTools.	
3	The New Dialog Box is displayed. Select *online*. Select the COM port number intended for use from the pull-down list of Communication port selection. Click **OK**. *If there is more than one serial port on Personal computer, display Windows Device Manager and select the same port as the communications port number under Ports (COM &LPT) where ABSODEX Driver is connected. (COM1 in this example)	 

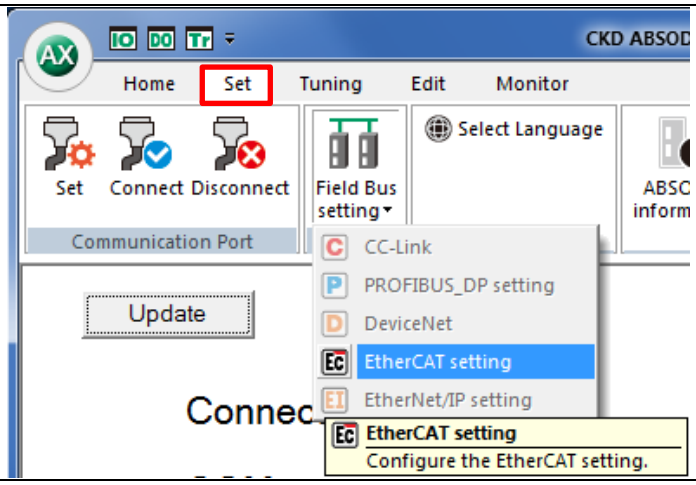
4 A confirmation dialog box is displayed. Check the contents and click **OK**.



5 AXTools starts.

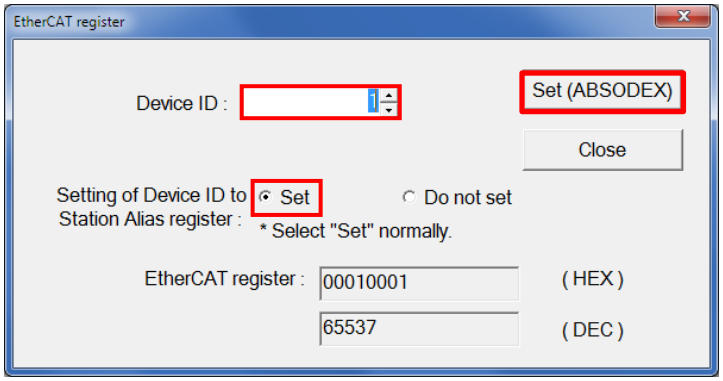


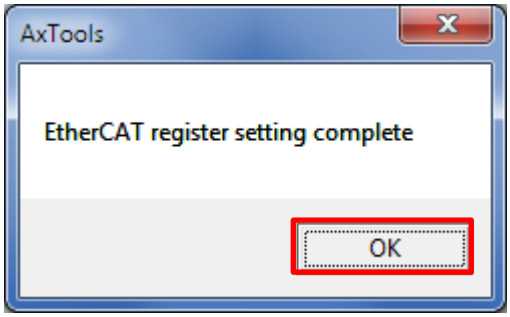
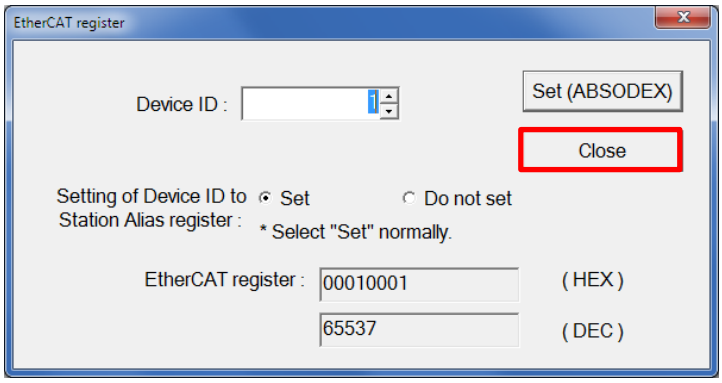
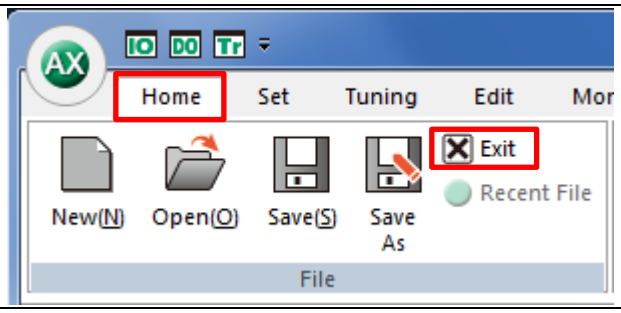
6 Select the **Set** Tab.
The View of the Set Tab is displayed.
Select ***Field Bus setting*** from the Ribbon Menu, then select ***EtherCAT setting***.



7 The EtherCAT register Dialog Box is displayed.
Make the following settings.
Device ID: *1*
Setting of Device ID to Station Alias register: *Set*

Click **Set (ABSODEX)**.



8	A confirmation dialog box is displayed. Check the contents and click **OK**.	
9	Click **Close** to close the EtherCAT register Dialog Box.	
10	Select the **Home** Tab. The View of the Home Tab is displayed. Select ***Exit*** from the Ribbon Menu to exit AxTools.	
11	Turn OFF ABSODEX Driver.	

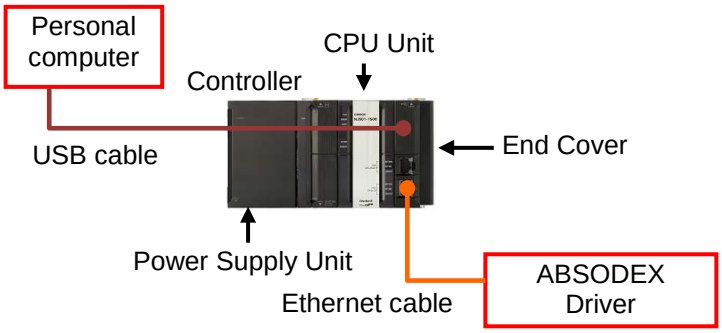
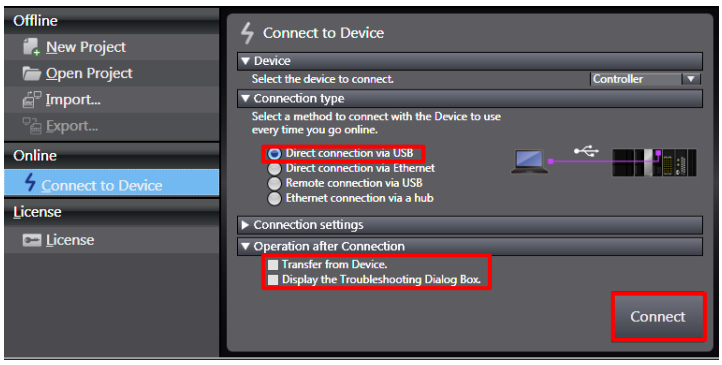
7.3. Controller Setup

Set up the Controller.

7.3.1. Starting Sysmac Studio and Installing the ESI File

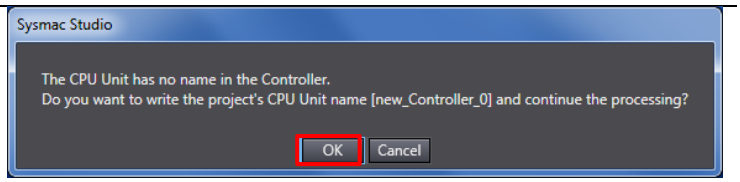
Install the ESI file for the ABSODEX Driver in Sysmac Studio.

Install Sysmac Studio and the USB driver on your personal computer beforehand.

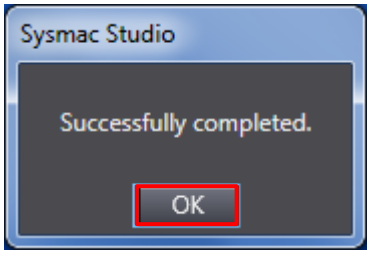
1	Connect the Ethernet cable to the built-in EtherCAT port (PORT2) on Controller, and connect a USB cable to the peripheral (USB) port. As shown in *5.2. Device Configuration*, connect Personal computer and ABSODEX Driver to Controller.	
2	Turn ON the external power supply, Controller and ABSODEX Driver.	
3	Start Sysmac Studio. *If the User Account Control Dialog Box is displayed at start, make a selection to start Sysmac Studio.	
4	Sysmac Studio starts. Click **Connect to Device**.	
5	The Connect to Device Dialog Box is displayed. Select *Direct connection via USB* in the *Connection type* Field. Uncheck both *Transfer from Device* and *Display the Troubleshooting Dialog Box* in the *Operation after Connection* Field. Click **Connect**.	

6 The dialog box on the right is displayed. Check the contents and click **OK**.

*The contents of the dialog box vary depending on the status of Controller. Check the contents and click on an appropriate button to proceed with the processing.



7 The dialog box on the right is displayed. Check the contents and click **OK**.



8 The Auto Connect Project Dialog Box is displayed online. When an online connection is established, a yellow bar is displayed under the toolbar.

The following panes are displayed in this window.

Left: Multiview Explorer

Top right: Toolbox

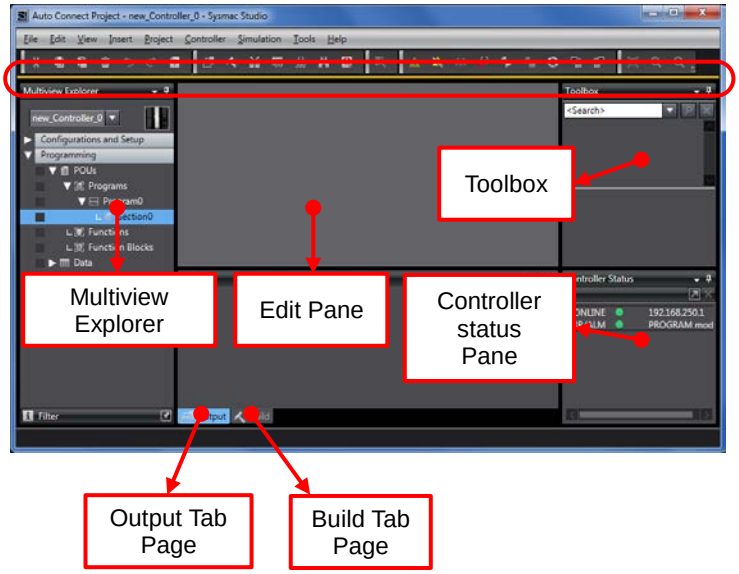
Bottom right: Controller Status Pane

Top middle: Edit Pane

The following tabs are displayed in the bottom middle of this window.

Output Tab Page

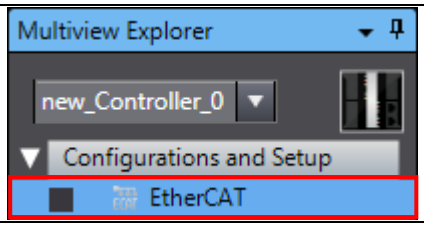
Build Tab Page

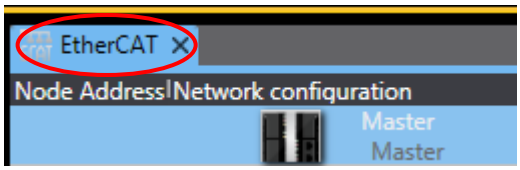
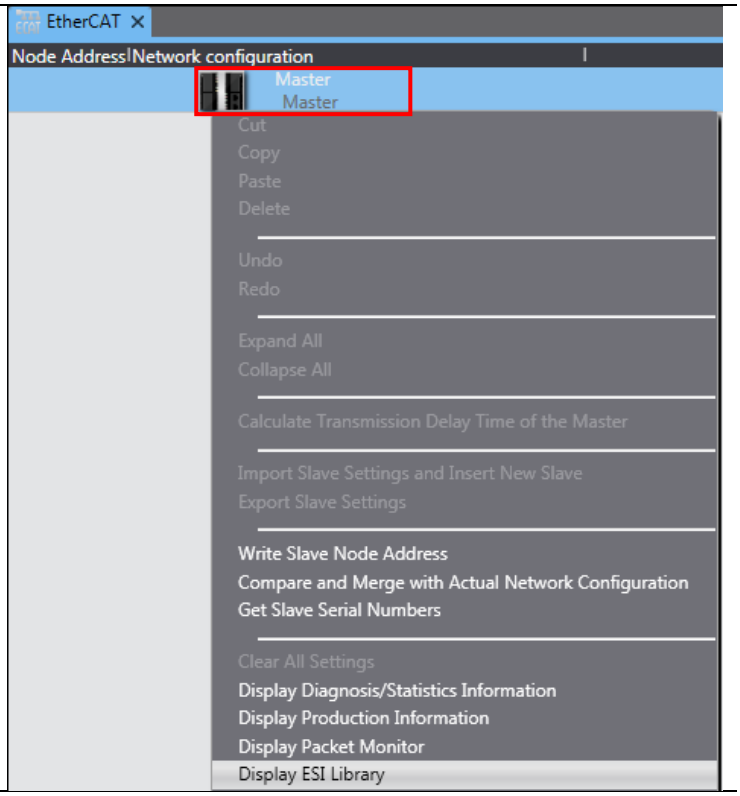
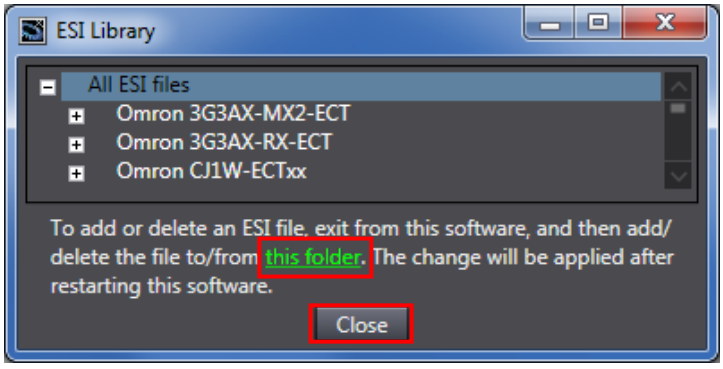
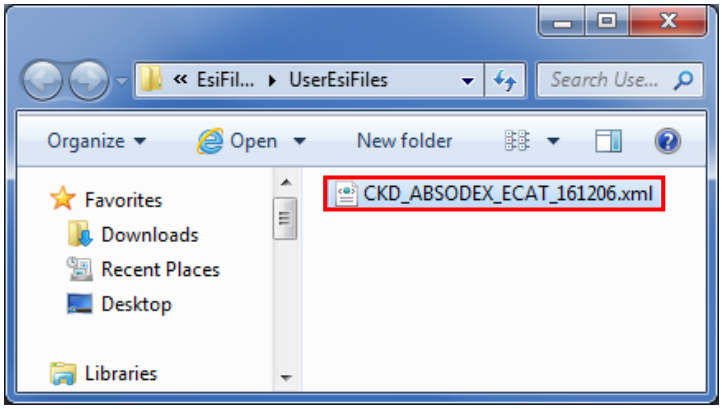


Additional Information

For details on the online connections to the Controller, refer to *Section 6. Online Connections to a Controller* of the *Sysmac Studio Version 1 Operation Manual* (Cat. No. W504).

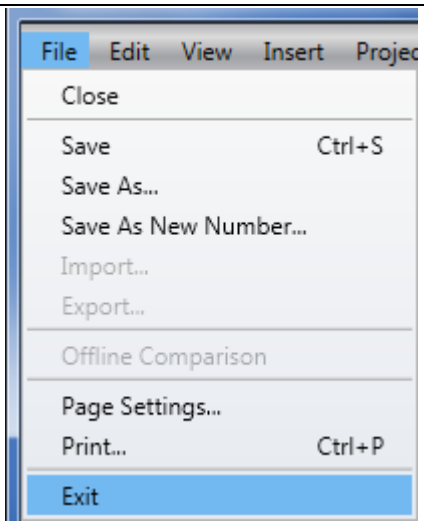
9 Double-click **EtherCAT** under **Configurations and Setup** in the Multiview Explorer.



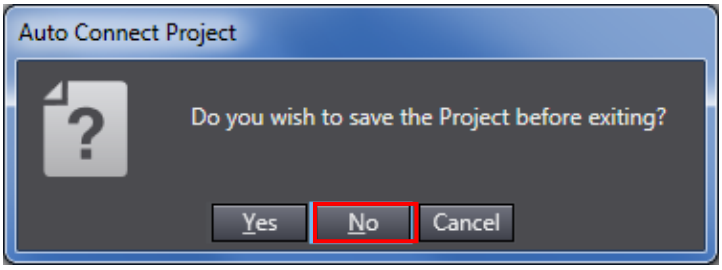
10	The EtherCAT Tab Page is displayed in the Edit Pane.	
11	Right-click **Master** and select ***Display ESI Library***.	
12	The ESI Library Dialog Box is displayed. Click the t**his folder** link. When the Explorer starts, click **Close** to close the dialog box.	
13	The Explorer starts, and a folder is opened, allowing you to install the ESI file. Copy the prepared *CKD_ABSODEX_ECAT_161206.xml* to this folder.	

14 Select ***Exit*** from the File Menu to exit Sysmac Studio.

*You need to restart Sysmac Studio after installing the ESI file.



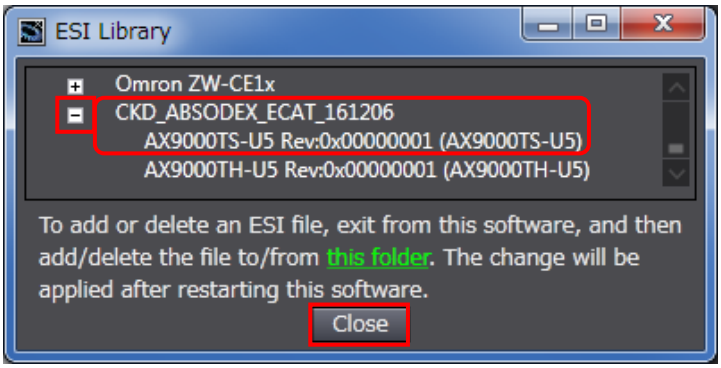
A dialog box is displayed confirming whether to save the project. If you do not need to save it, click **No**.



15 In the same way as steps 3 to 11, restart Sysmac Studio and display the ESI Library Dialog Box.
Click the **+** Button of CKD_ABSODEX_ECAT_161206 to check that AX9000TS-U5 Rev:0x00000001 (AX9000TS-U5) is displayed.

Check that an exclamation mark (warning) is not displayed.

Click **Close**.



Precautions for Correct Use

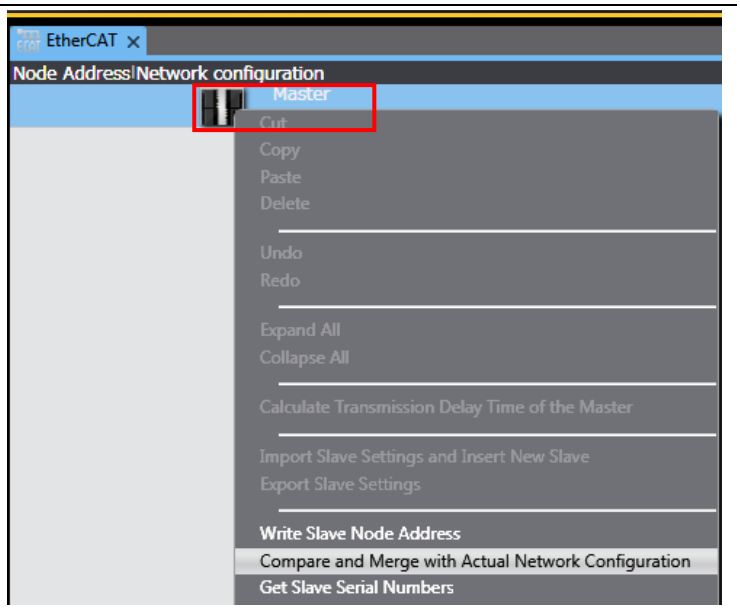
If an exclamation mark (warning) is displayed for the ESI file, check the name of the ESI file and obtain the ESI file with a correct name. If an exclamation mark (warning) is displayed even when the name of the ESI file is correct, the file may be corrupted.
In that case, contact the device manufacturer.

7.3.2. Setting up the EtherCAT Network Configuration

Set up the EtherCAT network configuration.

1 Right-click **Master** on the EtherCAT Tab Page of the Edit Pane, and select ***Compare and Merge with Actual Network Configuration***.

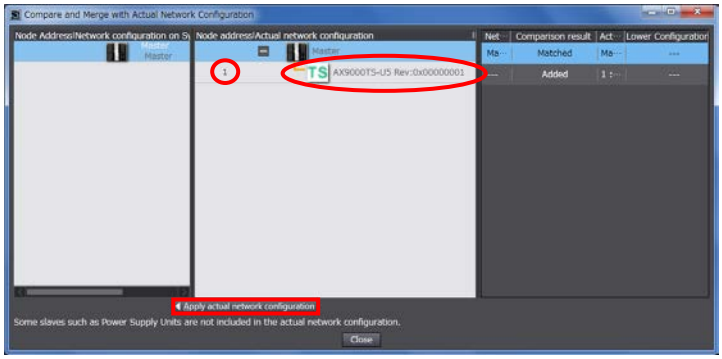
*If the EtherCAT Tab Page is not displayed in the Edit Pane, take step 9 in *7.3.1. Starting Sysmac Studio and Installing the ESI File* to display.



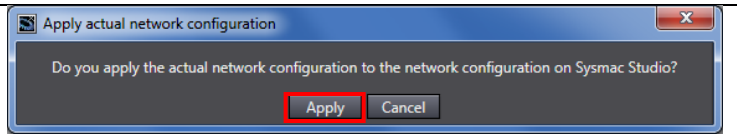
A screen is displayed stating "Get information is being executed".

2 The Compare and Merge with Actual Network Configuration Dialog Box is displayed.
The node address 1 and AX9000TS-U5 Rev:0x00000001 are added to the Actual network configuration after the comparison.

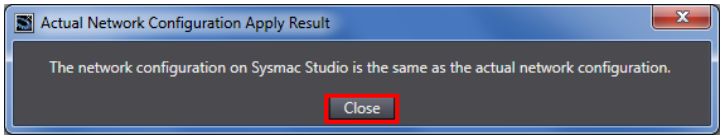
Click **Apply actual network configuration**.

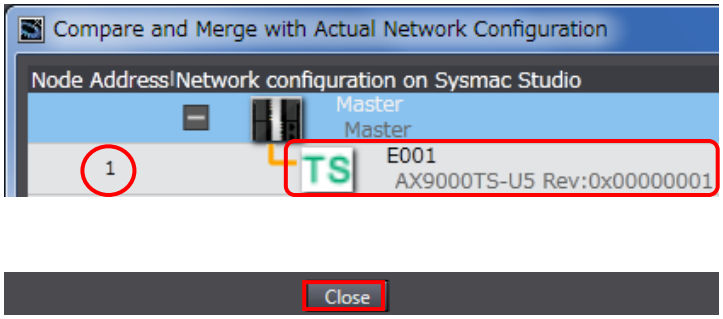
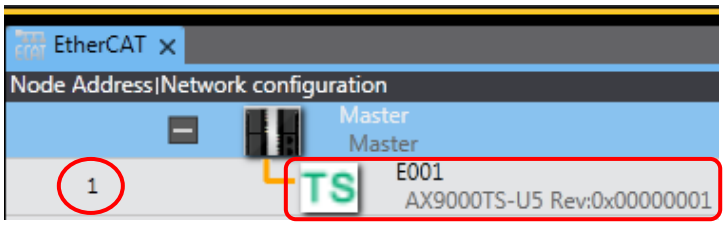


3 The dialog box on the right is displayed. Check the contents and click **Apply**.



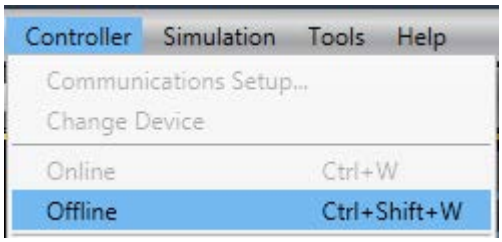
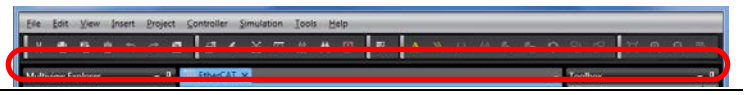
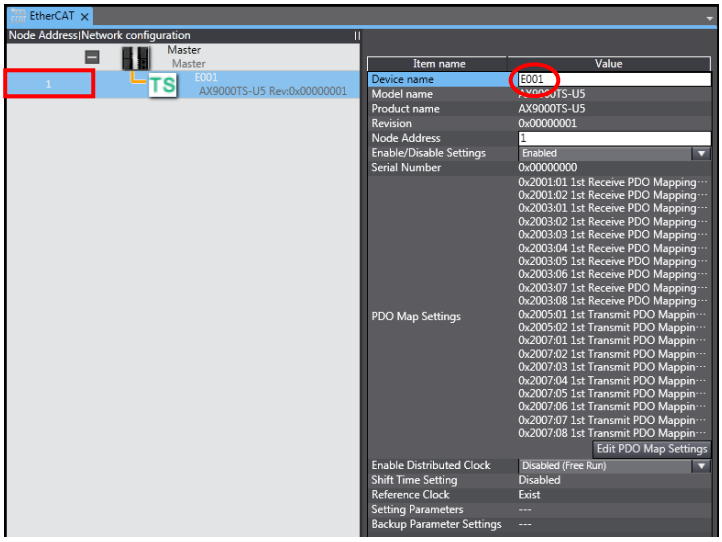
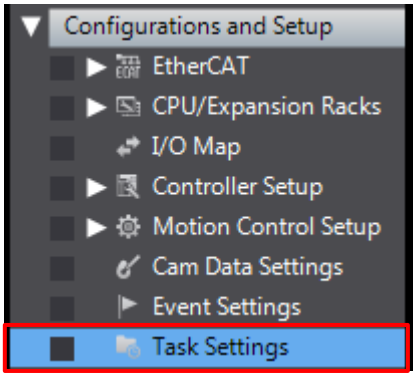
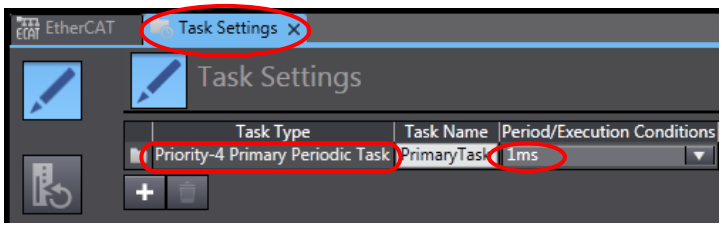
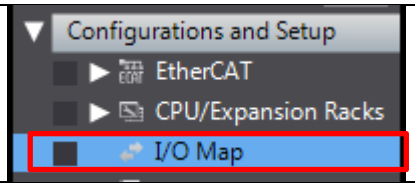
The dialog box on the right is displayed. Check the contents and click **Close**.



4	As a node address 1 slave, E001 AX9000TS-U5 Rev:0x00000001 is added to the Network configuration on Sysmac Studio. Check that the data above is added. Click **Close**.	
5	The node address 1 and E001 AX9000TS-U5 Rev:0x00000001 are added to the EtherCAT Tab Page of the Edit Pane.	

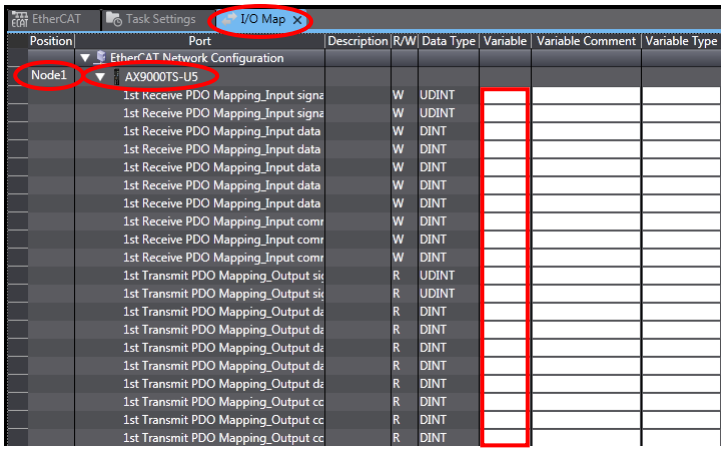
7.3.3. Setting the Device Variables

Set the device variables to use for the slave unit.

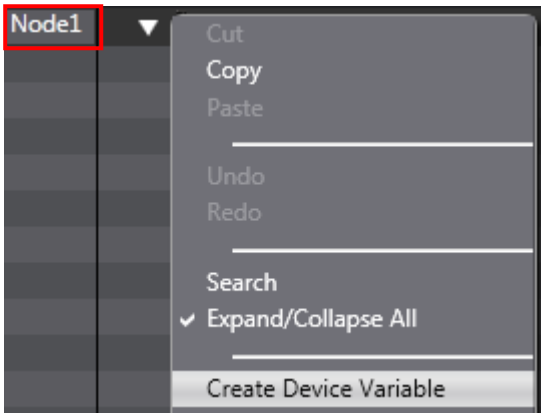
1	Select ***Offline*** from the Controller Menu. The yellow bar under the toolbar disappears.	 
2	Select the device with node address 1 added on the EtherCAT Tab Page in *Sub-Clause 7.3.2*. Check that the device name is E001. *The device name can be changed as desired.	
3	Double-click **Task Settings** under **Configurations and Setup** in the Multiview Explorer.	
4	The Task Settings Tab Page is displayed in the Edit Pane. Check that 1ms is set in the *Period/Execution Conditions* Column for Priority-4 Primary Periodic Task.	
5	Double-click **I/O Map** under **Configurations and Setup** in the Multiview Explorer.	

6 The I/O Map Tab Page is displayed in the Edit Pane. Check that Node1 is displayed in the *Position* Column and that the added slave unit is displayed in the *Port* Column.

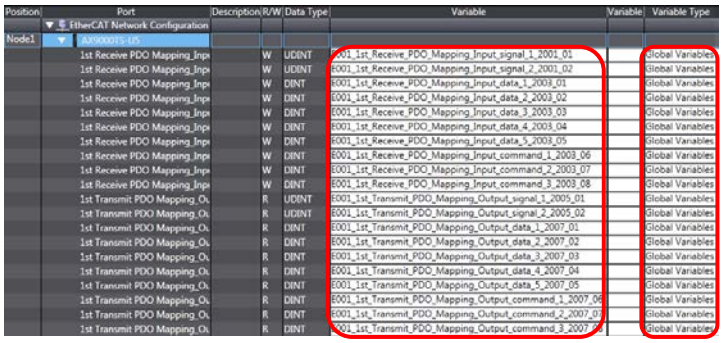
*To manually set a variable name for the slave unit, click an entry cell in the *Variable* Column and enter a name.



7 Right-click **Node1** and select ***Create Device Variable***.



8 The variable names and types are set.



Additional Information

The device variables are automatically named from a combination of the device names and the port names.
The default device names are "E" followed by a serial number that starts from 001.

Additional Information

In this guide, device variables are automatically named for each unit (each slave).
They can also be manually named for each port.

7.3.4. Transferring the Project Data

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

⚠ WARNING

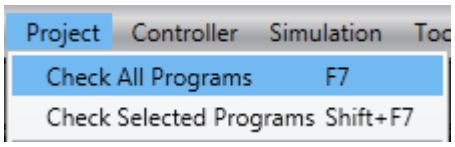
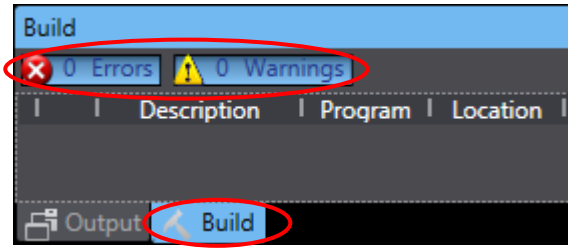
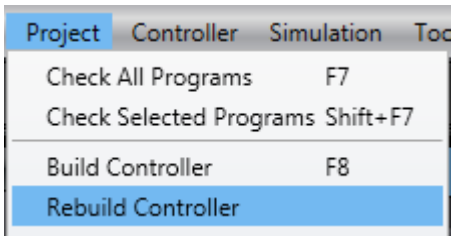
Regardless of the operating mode of the CPU Unit, devices or machines may perform unexpected operation when you transfer any of the following data from Sysmac Studio: a user program, configuration data, setup data, device variables, or values in memory used for CJ-series Units.
Always confirm safety at the destination node before you transfer the project data.

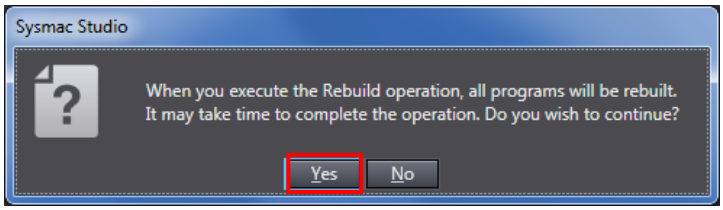
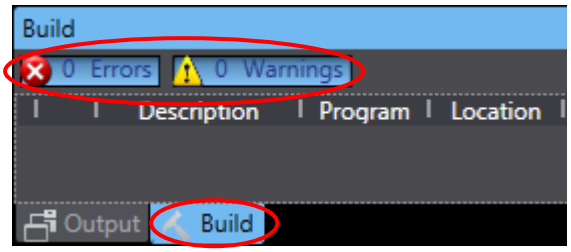
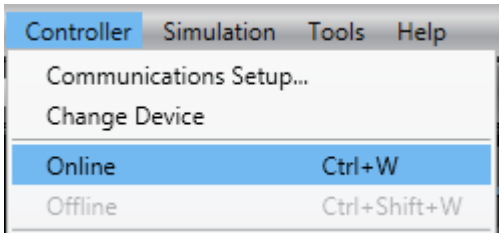
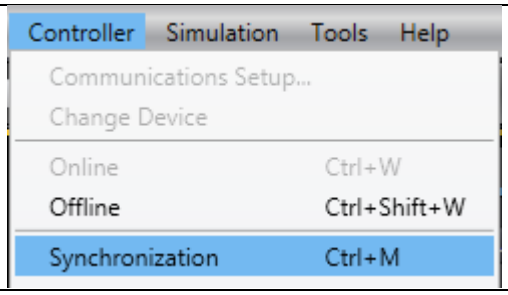
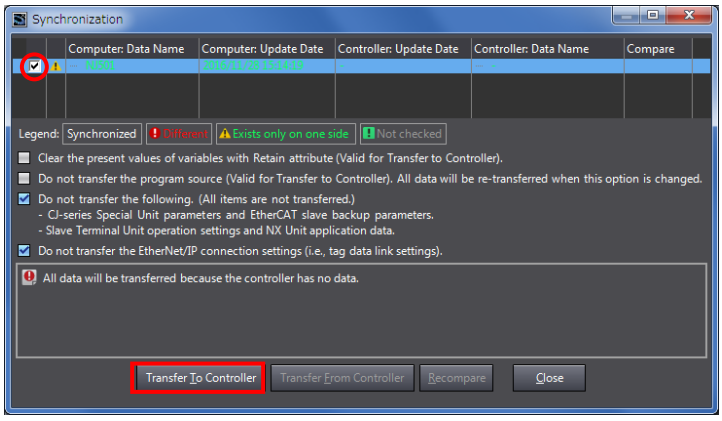
⚠ WARNING

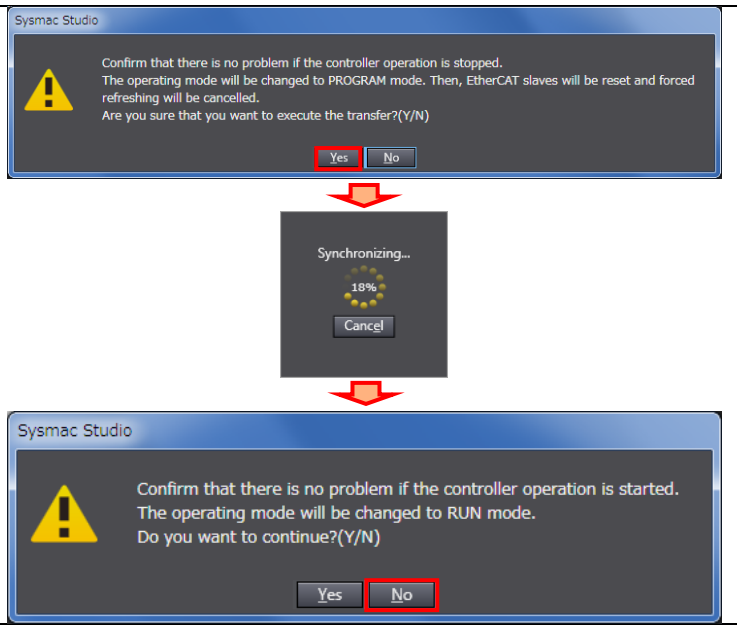
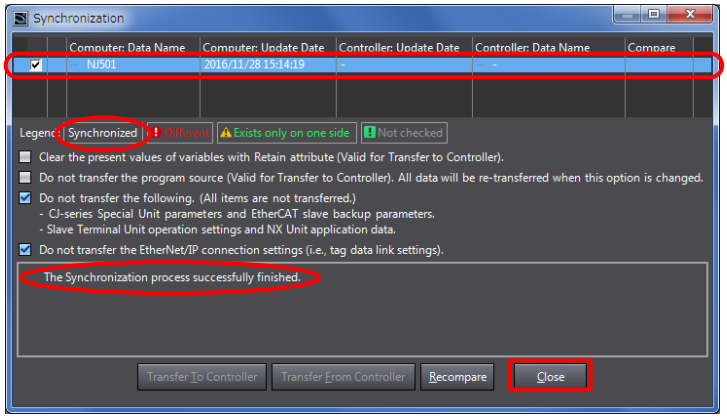
If you use EtherCAT slaves, check the specifications of those slaves in manuals or other documentation and confirm that the system will not be adversely affected before you transfer parameters.

⚠ Caution

After you transfer the project data, the CPU Unit restarts, and communications with the slave unit is 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 device.

1	Select ***Check All Programs*** from the Project Menu.	
2	The Build Tab Page is displayed. Check that "0 Errors" and "0 Warnings" are displayed.	
3	Select ***Rebuild Controller*** from the Project Menu.	

4	The dialog box on the right is displayed. Confirm that there is no problem, and click **Yes**.	
5	Check that "0 Errors" and "0 Warnings" are displayed on the Build Tab Page.	
6	Select ***Online*** from the Controller Menu. When an online connection is established, a yellow bar is displayed under the toolbar.	 
7	Select ***Synchronization*** from the Controller Menu.	
8	The Synchronization Dialog Box is displayed. Check that the data to transfer (NJ501 shown on the right) is selected. Click **Transfer To Controller**. *After executing "Transfer To Controller", the Sysmac Studio data is transferred to Controller, and the data is synchronized.	

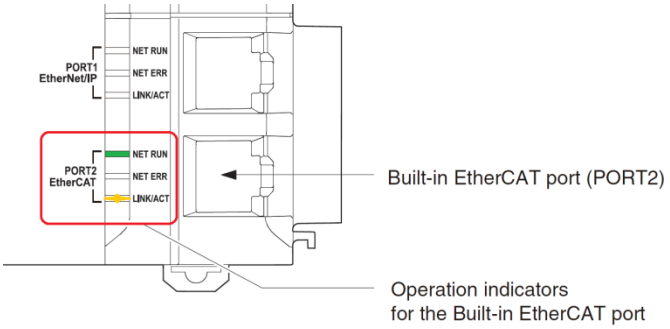
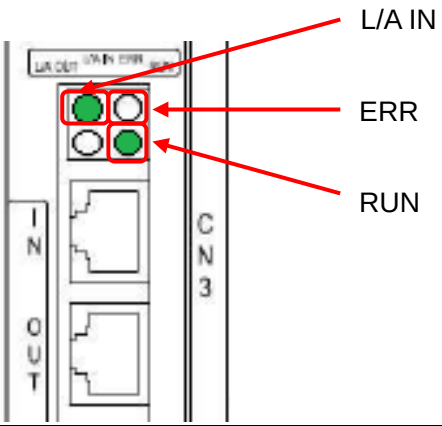
9	The dialog box on the right is displayed. Confirm that there is no problem, and click **Yes**. A screen is displayed stating "Synchronizing". The dialog box on the right is displayed. Confirm that there is no problem, and click **No**. *Do not return to RUN mode.	
10	Check that the synchronized data is displayed with the color specified by "Synchronized" and that a message is displayed stating "The synchronization process successfully finished". Confirm that there is no problem, and click **Close**. *A message is displayed stating "The synchronization process successfully finished" if the Sysmac Studio project data coincides with the Controller data. *If the synchronization fails, check the wiring and repeat from step 1.	

7.4. EtherCAT Communication Status Check

Confirm that PDO communications performs normally via EtherCAT.

7.4.1. Checking the Connection Status

Check the connection status of the EtherCAT network.

1	Check with LED indicators on Controller that PDO communications via EtherCAT performs normally. The LED indicators in normal status are as follows: NET RUN: Green lit NET ERR: Not lit LINK/ACT: Yellow flashing *The NX-series Controllers also have the same LED indicator status.	
2	Check the LED indicators on ABSODEX Driver. The LED indicators in normal status are as follows: RUN: Green lit ERR: Not lit L/A IN: Green blinking	

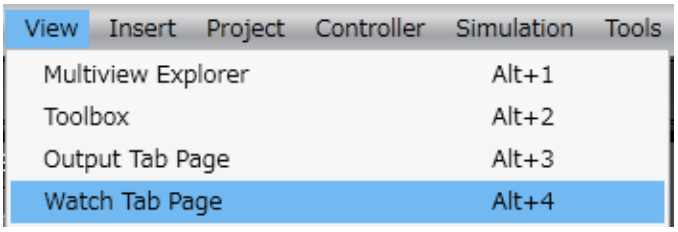
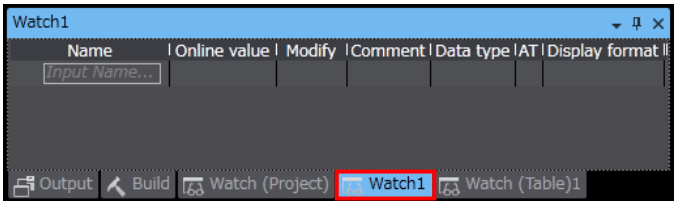
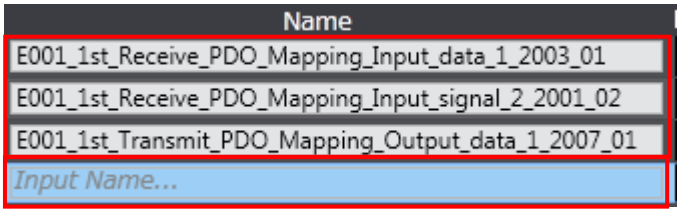
7.4.2. Checking the Sent and Received Data

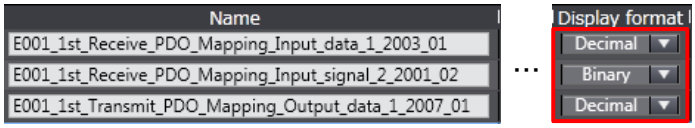
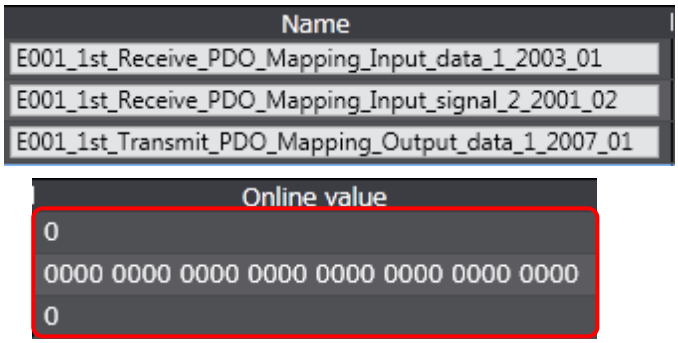
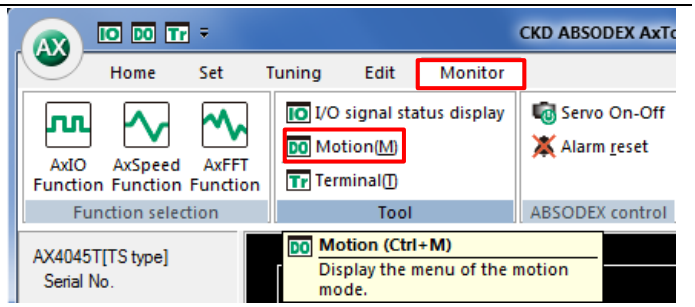
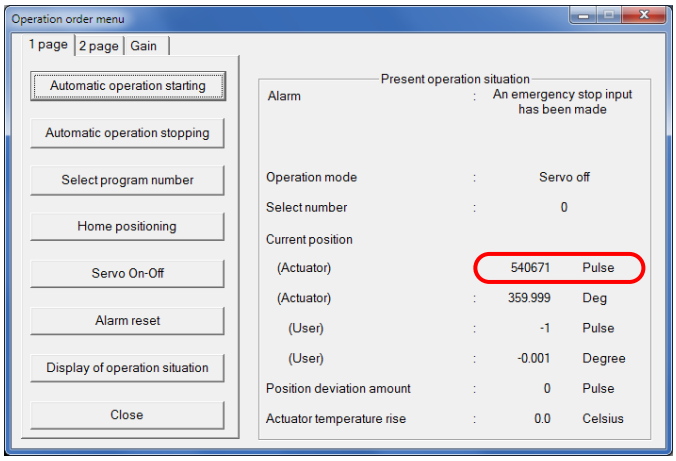
Check that the correct data are sent and received.

In this procedure, the ABSODEX Driver receives a request from the Controller to output "Current position" (unit: pulse) (hereinafter referred to as "the Current position (pulse)"), and the value of the Current position (pulse) that is outputted by the ABSODEX Driver is confirmed by the Controller.

⚠ 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 Output Units may operate regardless of the operating mode of the CPU Unit.
Always ensure safety before you change the variable values on a Watch Tab Page when Sysmac Studio is online with the CPU Unit.

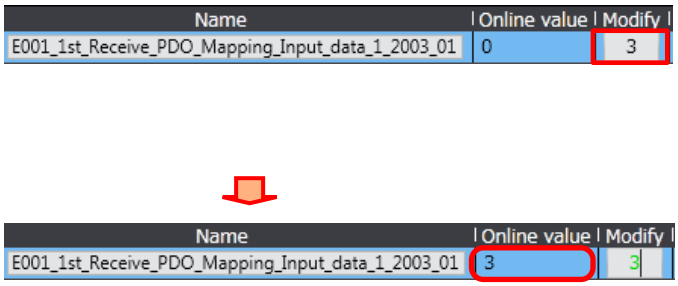
1	Select ***Watch Tab Page*** from the View Menu.	
2	Select the **Watch1** Tab.	
3	Click *Input Name* and enter the following variable names for monitoring. *E001_1st_Receive_PDO_Mapping_Input_data_1_2003_01* (Monitor code 1) *E001_1st_Receive_PDO_Mapping_Input_signal_2_2001_02* (Bit 0: Monitor output execution request) *E001_1st_Transmit_PDO_Mapping_Output_data_1_2007_01* (Monitor data 1)	

4	Select the display format for each variable as follows: *E001_1st_Receive_PDO_Mapping_Input_data_1_2003_01*: ***Decimal*** *E001_1st_Receive_PDO_Mapping_Input_signal_2_2001_02*: ***Binary*** *E001_1st_Transmit_PDO_Mapping_Output_data_1_2007_01*: ***Decimal***	
5	Check that the following online values of the variables are displayed. *E001_1st_Receive_PDO_Mapping_Input_data_1_2003_01*: 0 *E001_1st_Receive_PDO_Mapping_Input_signal_2_2001_02*: 0000 0000 0000 0000 0000 0000 0000 0000 *E001_1st_Transmit_PDO_Mapping_Output_data_1_2007_01*: 0	
6	In AXTools, select ***Motion*** from the Ribbon Menu in the View of the Monitor Tab. *If AXTools is not started, refer to *7.2.2. Parameter Settings* to start AXTools, then connect to ABSODEX Driver again.	
7	The Operation order menu Window is displayed. Check the value of Current position (Actuator) in the Present operation situation. (540671 pulses in this example)	

8 On the Watch Tab Page of Sysmac Studio, enter *3* in the *Modify* Column for *E001_1st_Receive_PDO_Mapping_Input_data_1_2003_01*.

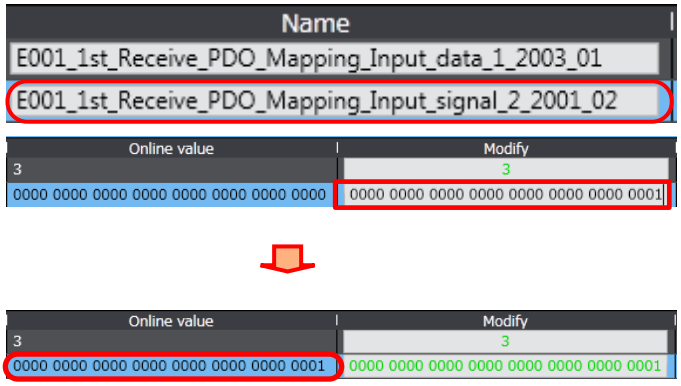
The online value of *E001_1st_Receive_PDO_Mapping_Input_data_1_2003_01* changes to 3.

*For the above mentioned variable (Monitor code 1), set the code No. of the monitored item that you want to fetch into Monitor data 1. The code No. 3 is set in this guide, which indicates the Current position (pulse) as the monitored item.



9 Enter *0000 0000 0000 0000 0000 0000 0000 0000 0001* in the *Modify* Column for *E001_1st_Receive_PDO_Mapping_Input_signal_2_2001_02*.

*The value of the code No. 3 (Current position (pulse)) that is set in step 8 is stored by changing the bit 0 value (Monitor output execution request) of the above mentioned variable to 1 (ON).

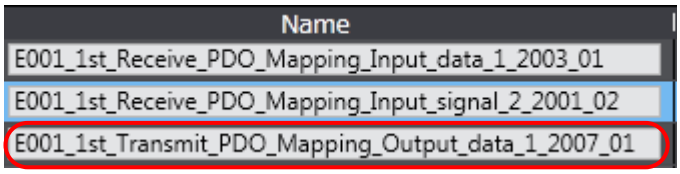


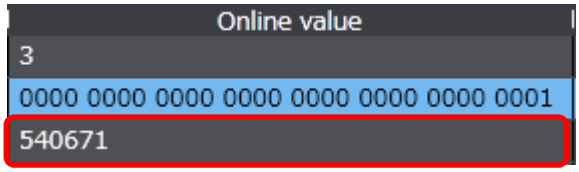
10 Check that the following online value is displayed.

E001_1st_Transmit_PDO_Mapping_Output_data_1_2007_01 (Monitor data 1): 540671

This indicates that Controller has received 540671 as the Current position (pulse) of ABSODEX Driver and that the value is same as in step 7.

*The value of the Current position (Pulse) varies depending on the ABSODEX Driver used.





Additional Information

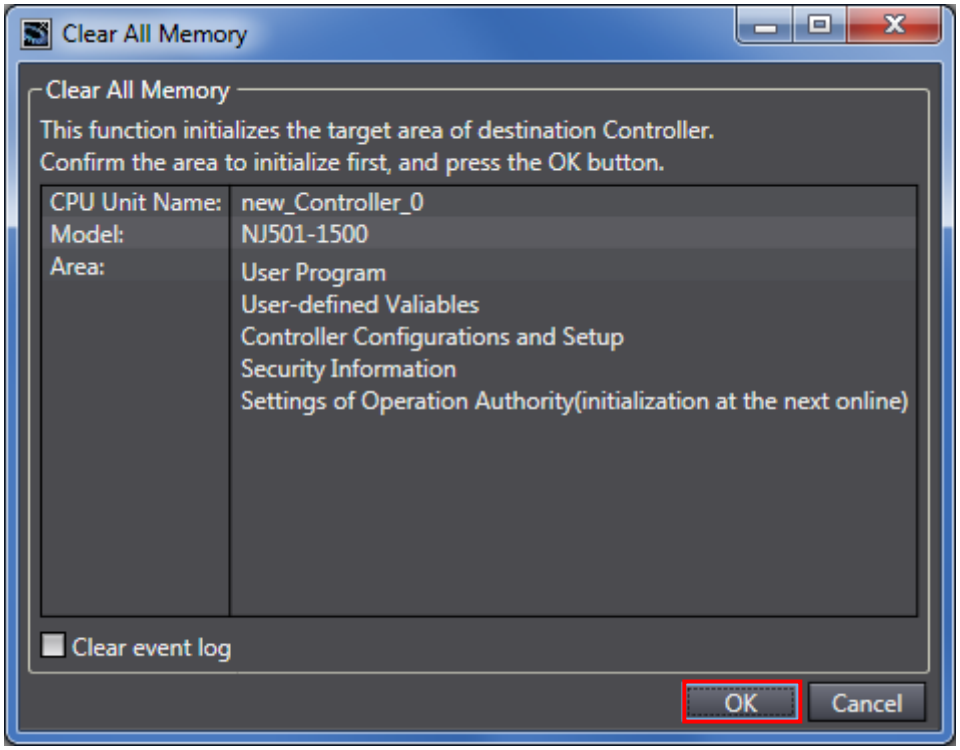
For information on the monitor data output by setting the monitor codes, refer to *3.3.1. Monitor Code* of the *Instruction Manual ABSODEX AX Series TS type TH type EtherCAT specification* (SMF-2012-A).

8. Initialization Method

The setting procedures in this guide are based on the factory default settings.
Some settings may not be applicable unless you use the devices with the factory default settings.

8.1. Initializing a Controller

To initialize a Controller, it is necessary to initialize a CPU Unit.
Change the operating mode of Controller to PROGRAM mode and select ***Clear All Memory*** from the Controller Menu in Sysmac Studio. The Clear All Memory Dialog Box is displayed.
Check the contents and click **OK**.



8.2. Initializing a CKD ABSODEX Driver

For information on how to initialize a CKD ABSODEX Driver, refer to *3-2-1-4 ABSDEX initialization* of the *INSTRUCTION MANUAL ABSODEX AX Tools for Windows® Common for TS-Type, TH-Type, MU-Type and XS-Type Drivers* (SMF-2005-A).

9. Revision History

Revision code	Date of revision	Description of revision
01	September 5, 2017	First edition

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