OMRON

Machine Automation Controller NJ-series

EtherCAT(R) Connection Guide HMS Industrial Networks

Anybus X-gateway

SYSMAC always in control

P561-E1-02

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1. Related Manuals

The table below lists the manuals related to this document.
To ensure system safety, make sure to always read and heed the information provided in all Safety Precautions, Precautions for Safe Use, and Precaution for Correct Use of manuals for each device which is used in the system.

Cat. No.	Model	Manual name
W500	NJ501-□□□□ NJ301-□□□□	NJ-series CPU Unit Hardware User's Manual
W501	NJ501-□□□□ NJ301-□□□□	NJ-series CPU Unit Software User's Manual
W505	NJ501-□□□□ NJ301-□□□□	NJ-series CPU Unit Built-in EtherCAT Port User's Manual
W504	SYSMAC-SE2□□□	Sysmac Studio Version 1 Operation Manual
HMSI-168-101	ABX-□□□□-ECTS	User Manual Anybus X-gateway
SP0736	ABX-□□□□-ECTS	Gateway Installation Sheet Anybus X-gateway
HMSI-168-94	ABX-□□□□-ECTS	X-gateway Interface Addendum EtherCAT Slave
SP0993	ABX-□□□□-ECTS	Network Installation Sheet EtherCAT Slave Interface

2. Terms and Definitions

Term	Explanation and Definition
PDO communications (Communications using Process Data Objects)	This method is used for cyclic data exchange between the master unit and the slave units. PDO data (i.e., I/O data that is mapped to PDOs) that is allocated in advance is refreshed periodically each EtherCAT process data communications cycle (i.e., the period of primary periodic task). The NJ-series Machine Automation Controller uses the PDO communications for commands to refresh I/O data in a fixed control period, including I/O data for EtherCAT Slave Units, and the position control data for the Servomotors. It is accessed from the NJ-series Machine Automation Controller in the following ways. •With device variables for EtherCAT slave I/O •With Axis Variables for Servo Drive and encoder input slave to which assigned as an axis
SDO Communications (Communications using Service Data Objects)	This method is used to read and write the specified slave unit data from the master unit when required. The NJ-series Machine Automation Controller uses SDO communications for commands to read and write data, such as for parameter transfers, at specified times. The NJ-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 the bit signals. The slave unit receives output data sent from the master, and transmits input data to the master.
Node address	A node address is an address to identify a unit connected to EtherCAT.
ESI file (EtherCAT Slave Information file)	The ESI files contain information unique to the EtherCAT slaves in XML format. Install an ESI file into the Sysmac Studio, to allocate 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 safety circuit in order to ensure safety and minimize risks of abnormal occurrence.

(2) To ensure system safety, always read and heed the information provided in all Safety Precautions, Precautions for Safe Use, and Precaution for Correct Use of 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 document without the permission of OMRON Corporation.

(5) The information contained in this document is current as of March 2014. It is subject to change without notice for improvement.

The following notation is used in this document.

⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, will 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 in property damage.

Precautions for Safe Use

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

Precautions for Correct Use

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

Additional Information

Additional information to read as required.
This information is provided to increase understanding or make operation easier.

Symbol

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 must do.

4. Overview

This document describes the procedure for connecting the Anybus X-gateway (hereinafter referred to as X-gateway) of HMS Industrial Networks (hereinafter referred to as HMS) to NJ-series Machine Automation Controller (hereinafter referred to as Controller) of OMRON Corporation via EtherCAT and provides the procedure for checking their connection.
Refer to *Section 6 EtherCAT Settings* and *Section 7. EtherCAT Connection Procedure* to understand the setting method and key points to operate PDO communications of EtherCAT.

5. Applicable Devices and Device Configuration

5.1. Applicable Devices

The applicable devices are as follows:

Manufacturer	Name	Model
OMRON	NJ-series CPU Unit	NJ501-□□□□ NJ301-□□□□
HMS	Anybus X-gateway	ABX-□□□□-ECTS

Precautions for Correct Use

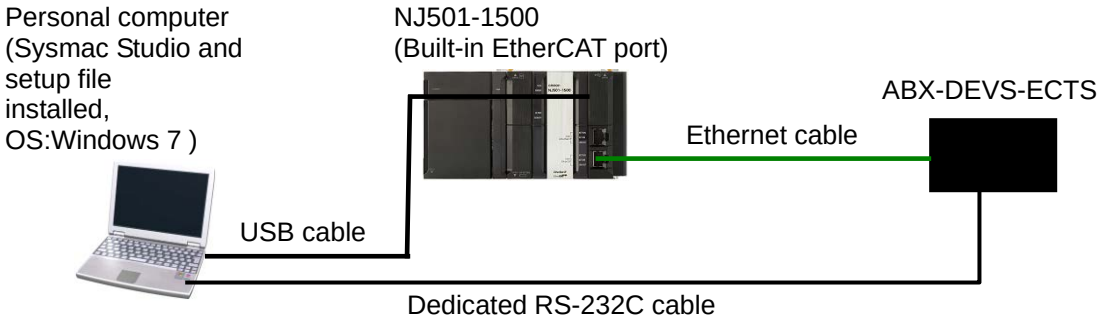
As applicable devices above, the devices with the models and versions listed in *Section 5.2*. are actually used in this document to describe the procedure for connecting devices and checking the connection.
You cannot use devices with versions lower than the versions listed in *Section 5.2*.
To use the above devices with versions not listed in *Section 5.2* or versions higher than those listed in *Section 5.2*, check the differences in the specifications by referring to the manuals before operating the devices.

Additional Information

This document describes the procedure to establish the network connection. Except for the connection procedure, it does not provide information on operation, installation or wiring method. It also does not describe the functionality or operation of the devices. Refer to the manuals or contact the device manufacturer.
(HMS Industrial Networks http://www.hms.se/)
This URL is the latest address at the time of this document creation. Contact each device manufacturer for the latest information.

5.2. Device Configuration

The hardware components to reproduce the connection procedure of this document are as follows:



Manufacturer	Name	Model	Version
OMRON	CPU Unit (Built-in EtherCAT port)	NJ501-1500	Ver.1.06
OMRON	Power Supply Unit	NJ-PA3001	
OMRON	Sysmac Studio	SYSMAC-SE2[][][]	Ver.1.07
-	Personal computer (OS: Windows 7)	-	
-	USB cable (USB 2.0 type B connector)	-	
OMRON	Ethernet cable (with industrial Ethernet connector)	XS5W-T421-[]M[]-K	
HMS	Anybus X-gateway	ABX-DEVS-ECTS	Ver.3.20
HMS	Dedicated RS-232C cable	(Included with Anybus X-gateway.)	
HMS	ESI file	ABXS_ECT_V_3_20_ Fixed_PDO_256bytes_ for_OMRON_1.xml	Ver.1.2
HMS	Setup file •X-gateway and HyperTerminal *The following files are included: •hypertrm.dll •hypertrm.exe	-	 •- •Ver.5.1.2600.2180 •Ver.5.1.2600.0

Precautions for Correct Use

Prepare the applicable ESI file described in this section beforehand. The ESI file can be downloaded from the HMS Industrial Networks website.

http://www.hms.se/

Contact HMS Industrial Networks if the file is not available.

Precautions for Correct Use

The connection line of EtherCAT communication cannot be shared with other Ethernet networks.
Do not use devices for Ethernet such as a switching hub.
Use the cable (double shielding with aluminum tape and braiding) of Category 5 or higher, and use the 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 the Sysmac Studio to the version specified in this section or higher version using the auto update function.
If a version not specified in this section is used, the procedures described in *Section 7* and subsequent sections may not be applicable. In that case, use the equivalent procedures described in the *Sysmac Studio Version 1 Operation Manual* (Cat. No. W504).

Additional Information

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

Additional Information

The system configuration in this document uses USB for the connection between the personal computer and NJ-series CPU. For how to install a USB driver, refer to *A-1 Driver Installation for Direct USB Cable Connection* of the *Sysmac Studio Version 1 Operation Manual* (Cat.No. W504).

6. EtherCAT Settings

This section describes the specifications such as communication parameters and variables that are defined in this document.
Hereinafter, X-gateway is referred to as the "Destination Device" or the "Slave Unit" in some descriptions.

Precautions for Correct Use

This document checks if communications between the Controller and X-gateway are performed normally. Note that the communications data that are exchanged on EtherCAT are not checked. The data that are converted between EtherCAT and DeviceNet in the X-gateway are not checked, either.

6.1. EtherCAT Communications Parameter Settings

The communications parameters required to connect the Controller and the Destination Device via EtherCAT are given below.

	X-gateway
Node address	1
Output PDO Size	256 bytes
Input PDO Size	256 bytes

Additional Information

For details on EtherCAT-related parameters for the X-gateway, refer to *CANopen Object Dictionary Implementation* of *X-gateway Interface Addendum EtherCAT Slave* (HMSI-168-94).

6.2. Allocation for PDO communications

The EtherCAT PDO communications data of the Destination Device are allocated to the Controller's device variables. The Destination Device data, device variable names and the data types are shown below.

■Output area (from Controller to Destination Device)

Destination Device data	Global variable	Data type
Receive PDO1 Mapping_ Output Byte 1_2100_01	E001_Recieve_PDO_1_Mapping_ Output_Byte_1_2100_01	USINT
• • •	• • •	• • •
Receive PDO1 Mapping_ Output Byte 128_2100_80	E001_Recieve_PDO_1_Mapping_ Output_Byte_128_2100_80	USINT
Receive PDO 2 Mapping_ Output Byte 1_2101_01	E001_Recieve_PDO_2_Mapping_ Output_Byte_1_2101_01	USINT
• • •	• • •	• • •
Receive PDO 2 Mapping_ Output Byte 128_2101_80	E001_Recieve_PDO_2_Mapping_ Output_Byte_128_2101_80	USINT

■Input area (from Destination Device to Controller)

Destination Device data	Global variable	Data type
Transmit PDO 1 Mapping_ Input Byte 1_2000_01	E001_Transmit_PDO_1_Mapping_ Input_Byte_1_2000_01	USINT
• • •	• • •	• • •
Transmit PDO 1 Mapping_ Input Byte 128_2000_80	E001_Transmit_PDO_1_Mapping_ Input_Byte_128_2000_80	USINT
Transmit PDO 2 Mapping_ Input Byte 1_2001_01	E001_Transmit_PDO_2_Mapping_ Input_Byte_1_2001_01	USINT
• • •	• • •	• • •
Transmit PDO 2 Mapping_ Input Byte 128_2001_80	E001_Transmit_PDO_2_Mapping_ Input_Byte_128_2001_80	USINT

Additional Information

For details on the I/O format, refer to *Data Exchange* of *X-gateway Interface Addendum EtherCAT Slave* (HMSI-168-94).

7. EtherCAT Connection Procedure

This section describes the procedure for connecting the Controller to the X-gateway via EtherCAT.

This document explains the procedures for setting up the Controller and the X-gateway from the factory default setting. For the initialization, refer to *Section 8 Initialization Method*.

7.1. Work Flow

Take the following steps to perform PDO communications of EtherCAT.

7.2. Setting Up the X-gateway	Set up the X-gateway.
↓	
7.2.1. Parameter Settings	Set the parameters for the X-gateway.
↓	
7.3. Setting Up the Controller	Set up the Controller.
↓	
7.3.1. Starting the Sysmac Studio and Installing the ESI File	Install the ESI file for the X-gateway in the Sysmac Studio.
↓	
7.3.2. Setting Up EtherCAT Network Configuration	Set up EtherCAT network configuration.
↓	
7.3.3. Setting the Device Variables	Set the device variables used for the EtherCAT Slave Unit.
↓	
7.3.4. Transferring the Project Data	Transfer the project data from the Sysmac Studio to the Controller.
↓	
7.4. Checking the EtherCAT Communications	Confirm that the PDO communications of EtherCAT are performed normally.
↓	
7.4.1 Checking the Connection Status	Check the connection status of the EtherCAT network.

7.2. Setting Up the X-gateway

Set up the X-gateway.

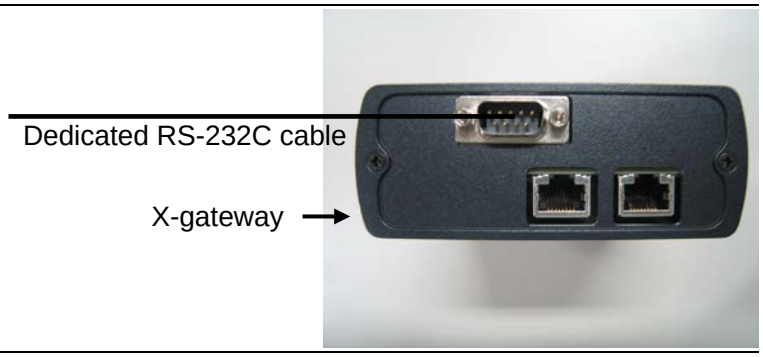
7.2.1. Parameter Settings

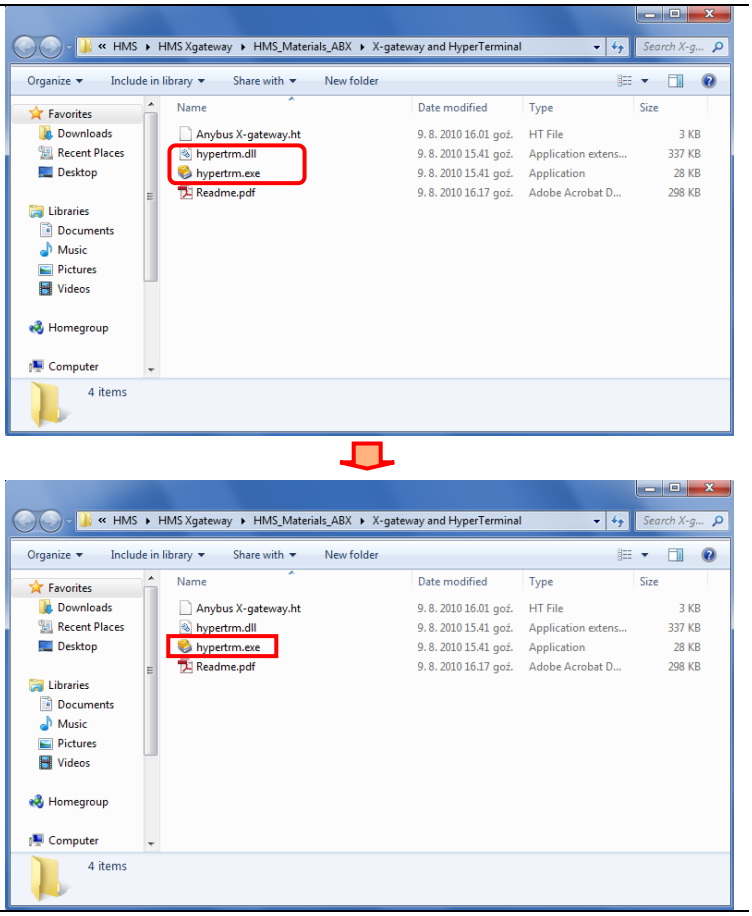
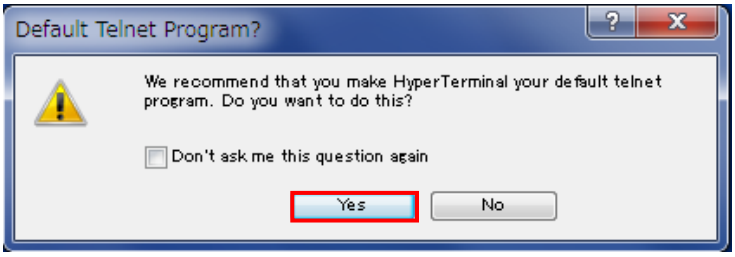
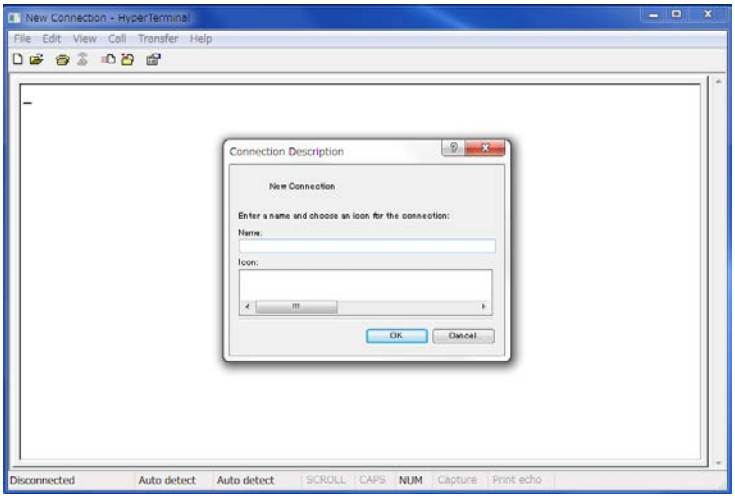
Set the parameters for the X-gateway.

You set the parameters with "hypertrm.exe" HyperTerminal. Store and unzip the "X-gateway and HyperTerminal.zip" setup file beforehand that contains files necessary for parameter settings.

Additional Information

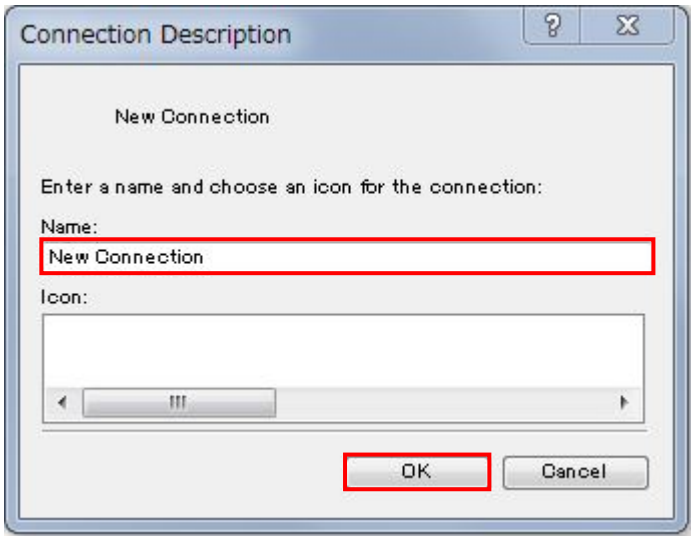
For details on how to operate "hypertrm.exe" HyperTerminal, refer to *Installation and Configuration* of *X-gateway Interface Addendum EtherCAT Slave* and refer to Readme.pdf in the "X-gateway and HyperTerminal.zip" setup file.

1	Make sure that the power supply to the X-gateway is OFF. * If the power supply is turned ON, settings may not be applicable as described in the following procedures.	
2	Connect the X-gateway and the personal computer with the dedicated RS-232C cable.	

3	Confirm that the following files are stored in the X-gateway and HyperTerminal setup file that was unzipped in the personal computer. •Hypertrm.dll •Hypertrm.exe *The Anybus X-gateway.ht file that is stored in the X-gateway and HyperTerminal setup file is not used in the procedure described in this document. Double-click *hypertrm.exe* to start up.	
4	Click the **Yes** Button if the dialog box on the right is displayed.	
5	The right dialog box is displayed.	

6 Enter *New Connection* in the *Name* Field on the Connection Description Dialog Box and click the **OK** Button.

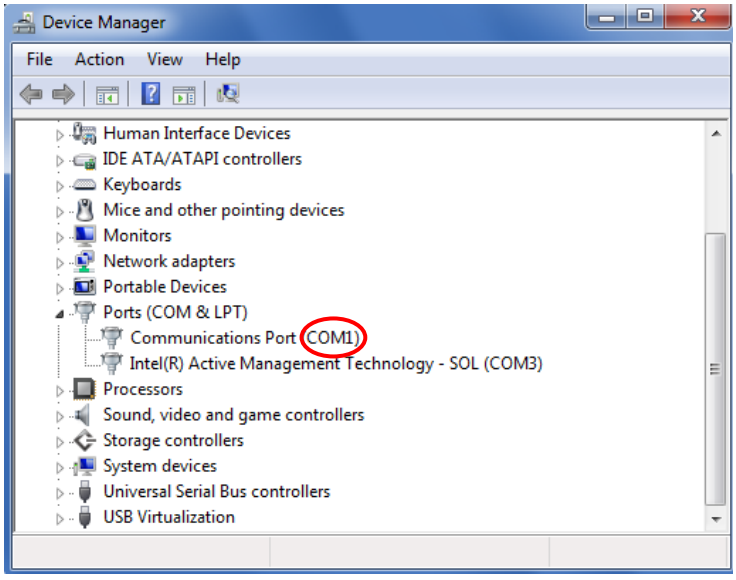
*You can enter any name in the *Name* Field besides New Connection. The name that you entered here is not used in the following procedure.



7 For Connect Using: on the Connect To Dialog Box, select the COM port of the personal computer to which the RS-232C cable is connected.

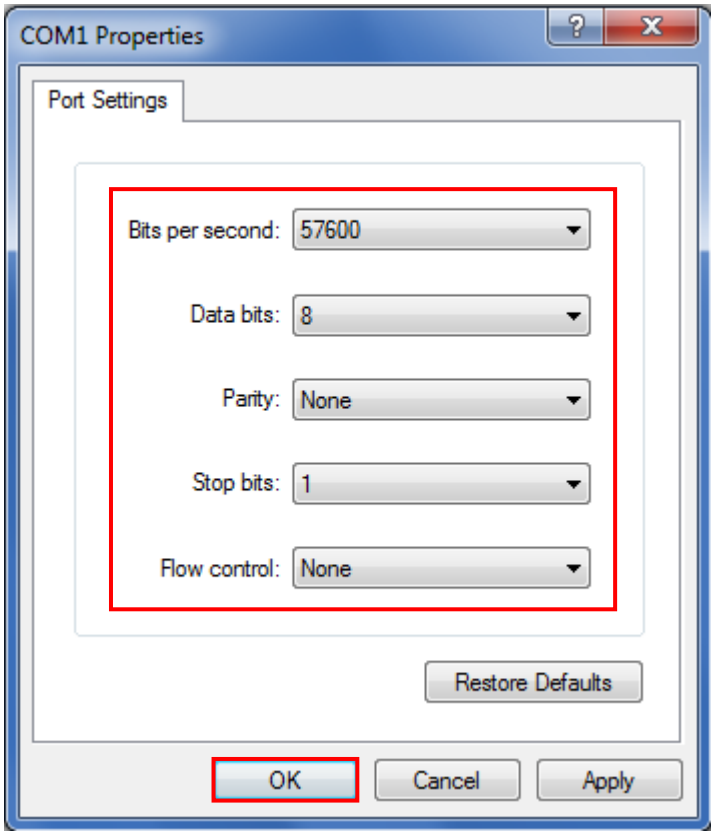
*If the personal computer has multiple serial ports, display the Windows Device Manager and select the COM port number (COM1 in the example on the right) under Ports (COM & LPT).

*To display the Device Manager, right-click **My Computer**, click **Properties**, click the **Hardware** tab, and then click **Device Manager**.



8 Make the Port Settings as follows:
- Bit per second: 57600
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: None

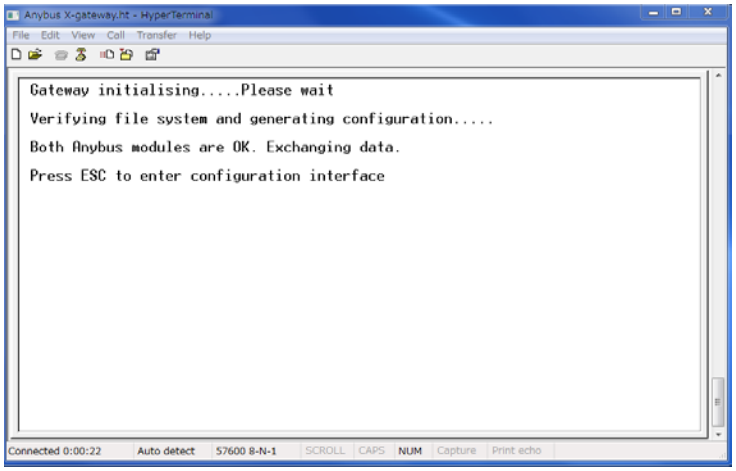
After you make all of the settings, click the **OK** Button.



9 Turn ON the power supply to the X-gateway.

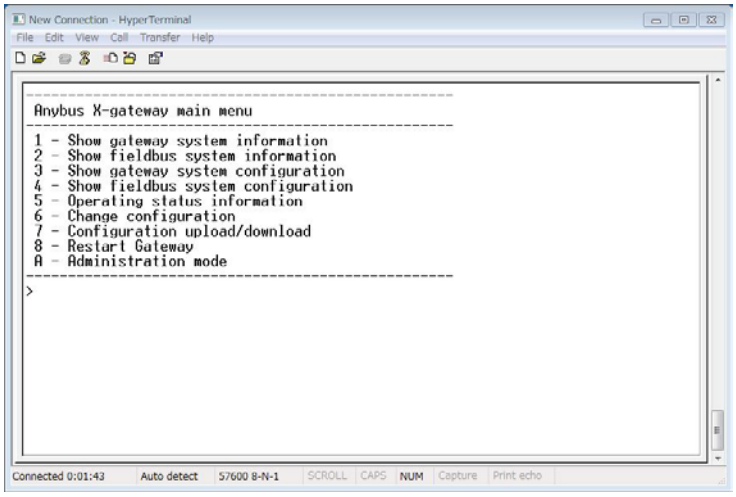
10 A message is displayed as shown in the figure on the right.

Press the **ESC** Key.

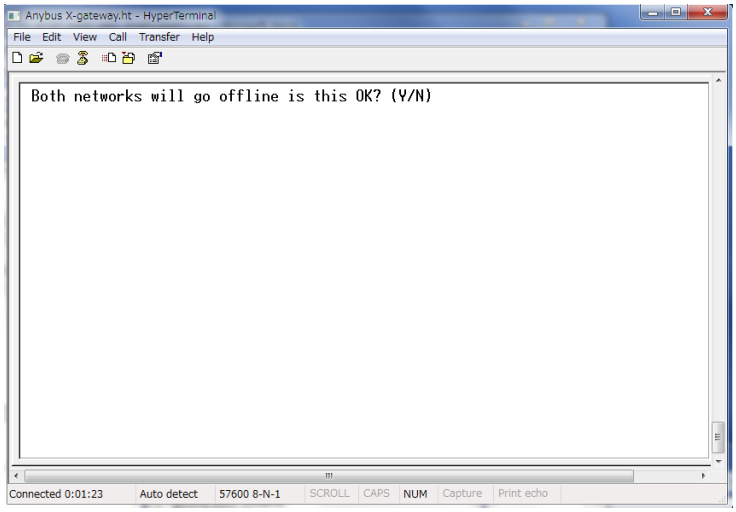


11 The menu shown on the right is displayed.

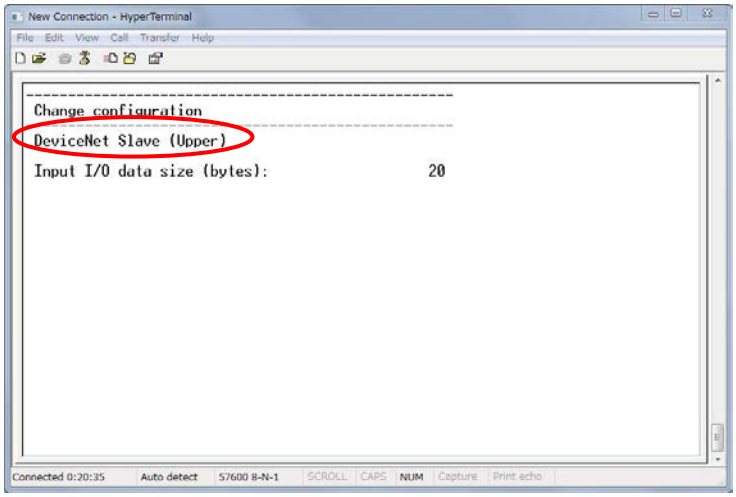
Enter *6*.



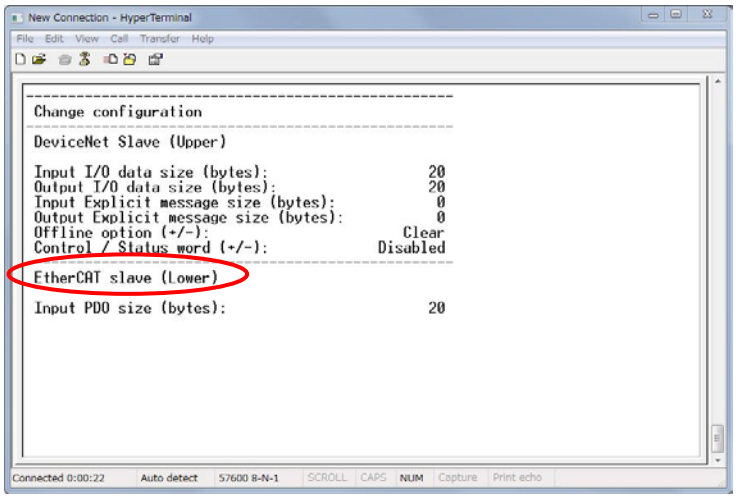
12 Enter *y* to the question shown on the right.



13 A message stating "DeviceNet Slave (Upper)" is displayed as shown in the figure on the right.

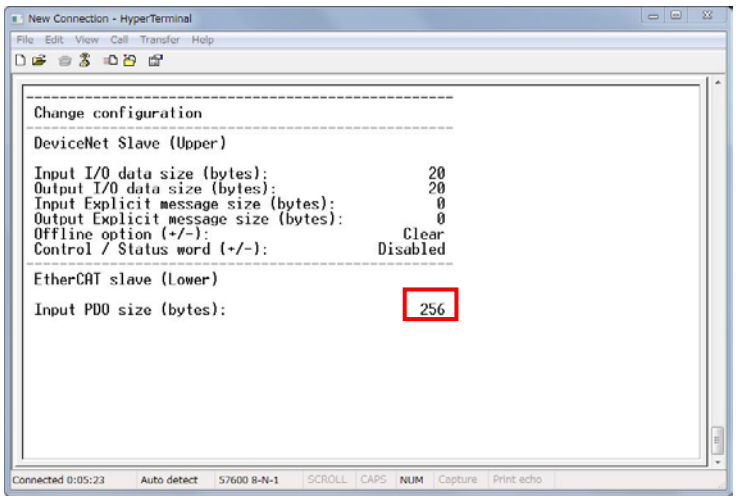


Press the **Enter** Key until a message stating "EtherCAT slave (Lower)" is displayed as shown in the figure on the right.

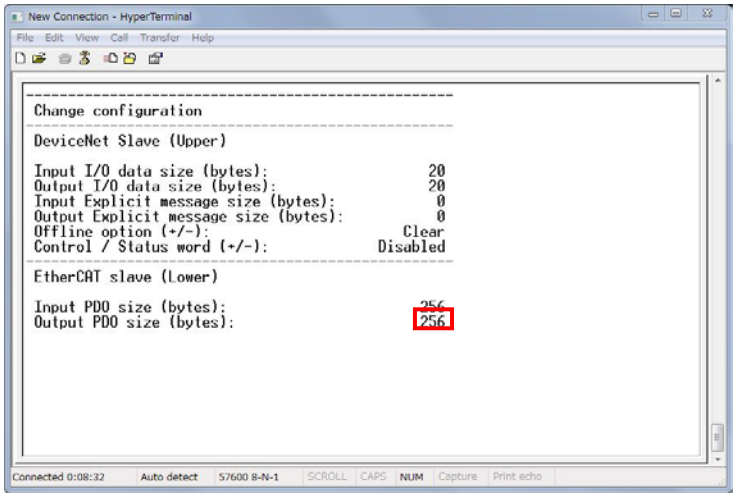


14 Change the default value of Input PDO size (bytes): to *256* bytes as shown in the figure on the right.

Press the **Enter** Key after the value is changed.

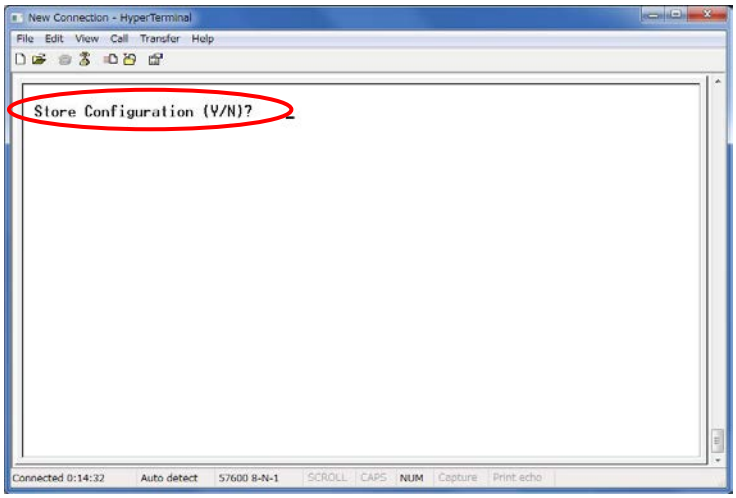


15 Change the default value of Output PDO size (bytes): to *256* bytes as shown in the figure on the right.



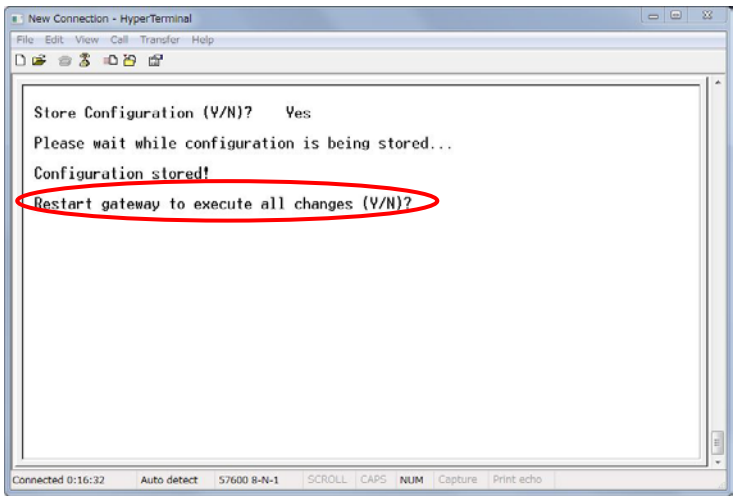
After the value is changed, press the **Enter** Key until a question is displayed as shown in the figure on the right.

Enter *y* to the question.

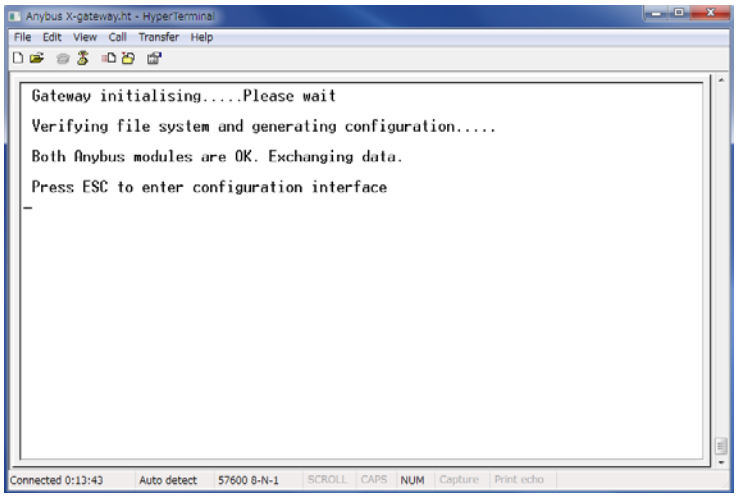


16 A question is displayed as shown in the figure on the right.

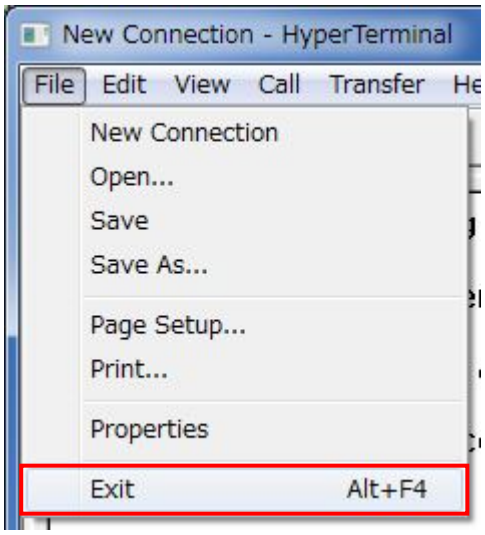
Enter *y* to the question.

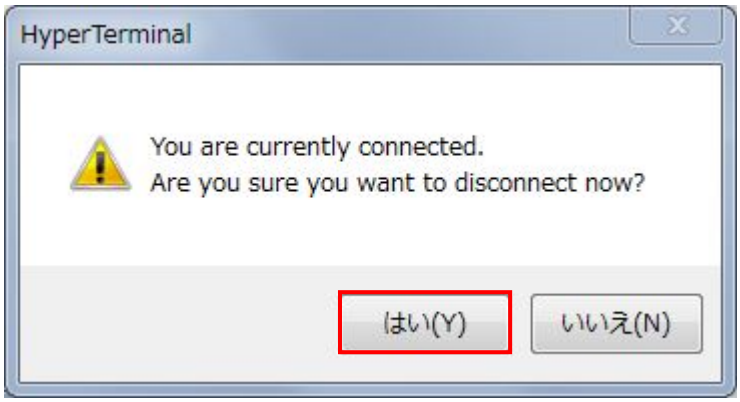
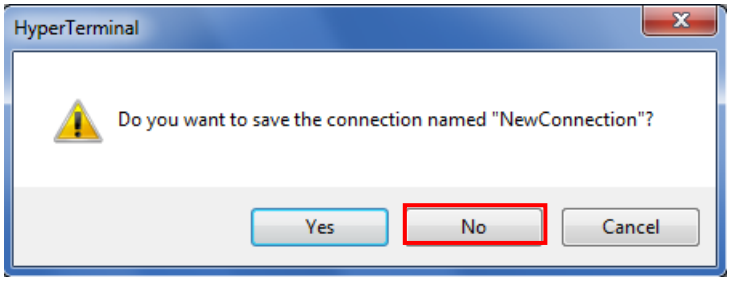


17 After you complete the settings for the X-gateway, the window on the right is displayed.



18 Select ***Exit*** from the File Menu.



19	The message on the right is displayed. Check the contents and click the **Yes** Button.	
20	If the message on the right is displayed, check the contents and click the **No** Button.	

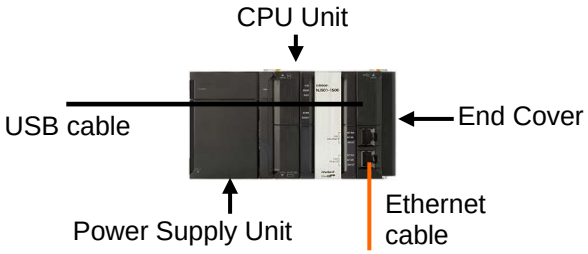
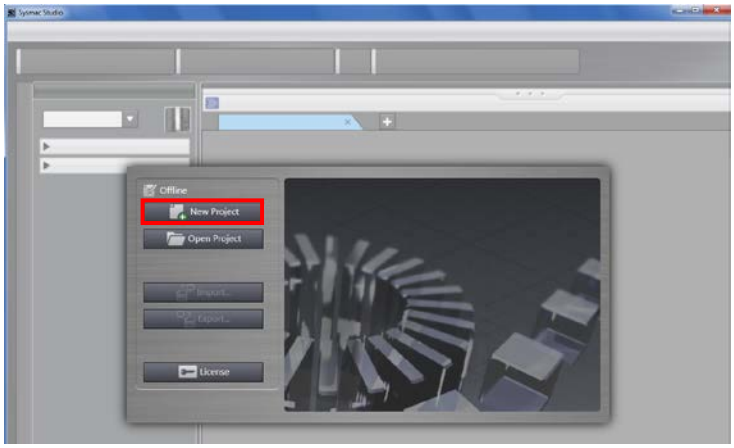
7.3. Setting Up the Controller

Set up the Controller.

7.3.1. Starting the Sysmac Studio and Installing the ESI File

Install the ESI file for the X-gateway in the Sysmac Studio.

Install the Sysmac Studio and USB driver in the personal computer beforehand.

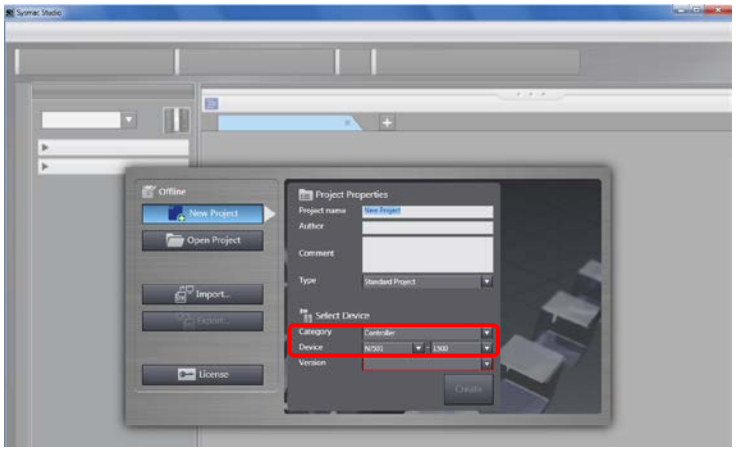
1	Connect the Ethernet cable to the built-in EtherCAT port (PORT2) of the Controller and connect the USB cable to the peripheral (USB) port. As shown in *5.2. Device Configuration*, connect the personal computer, X-gateway and Controller.	
2	Turn ON the power supply to the Controller.	
3	Start the Sysmac Studio.	
4	Click the **New Project** Button. *If a confirmation dialog for an access right is displayed at start, select to start.	

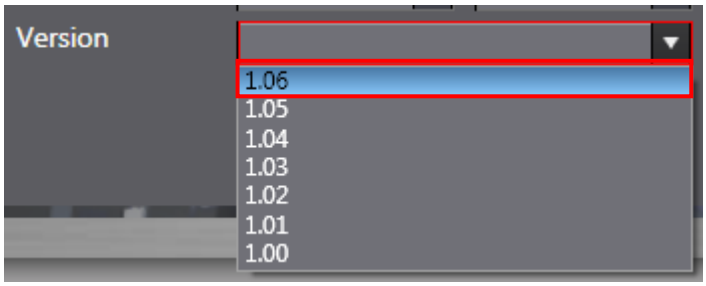
5 The Project Properties Dialog Box is displayed.
*In this document, New Project is set as the project name.

Confirm that *Category* and *Device* that you use are set in the Select Device Field.

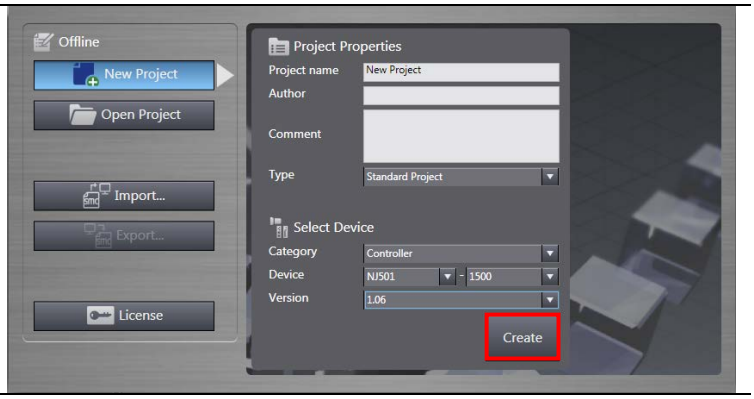
Select version ***1.06*** from the pull-down list of Version.

*Although 1.06 is selected in this document, select the version you actually use.



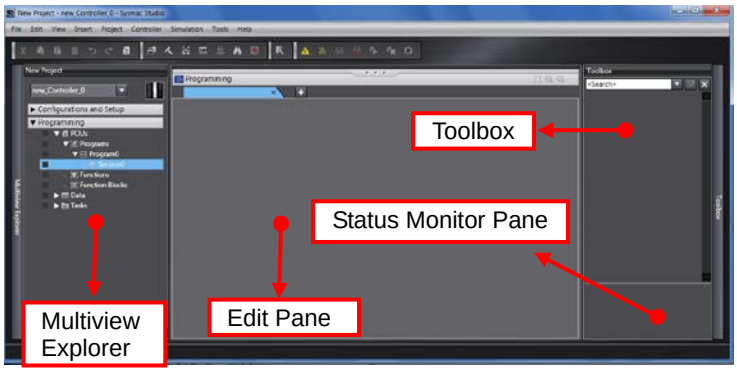


6 Click the **Create** Button.

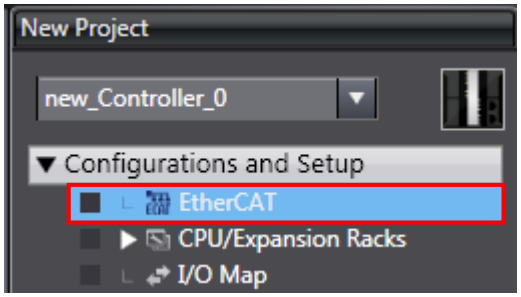


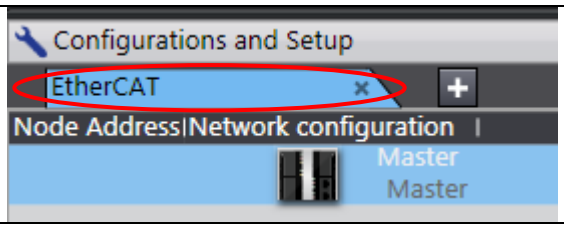
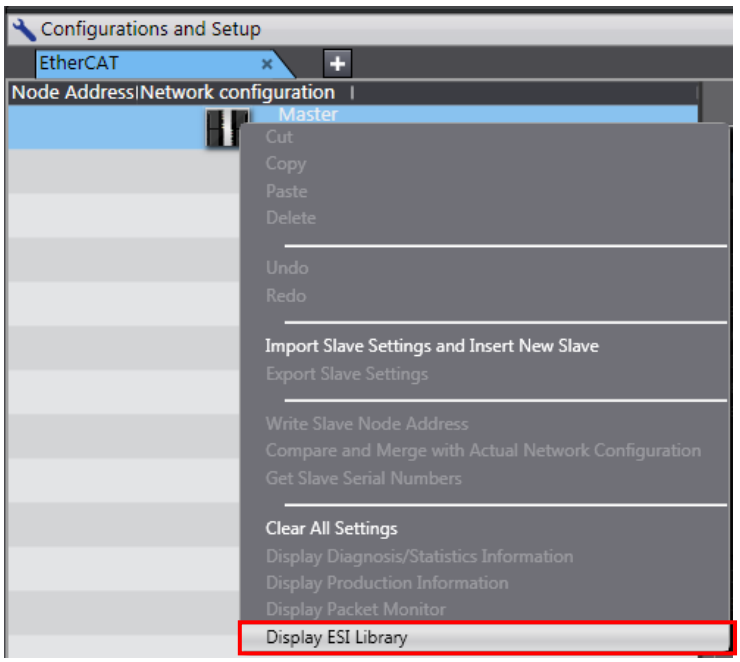
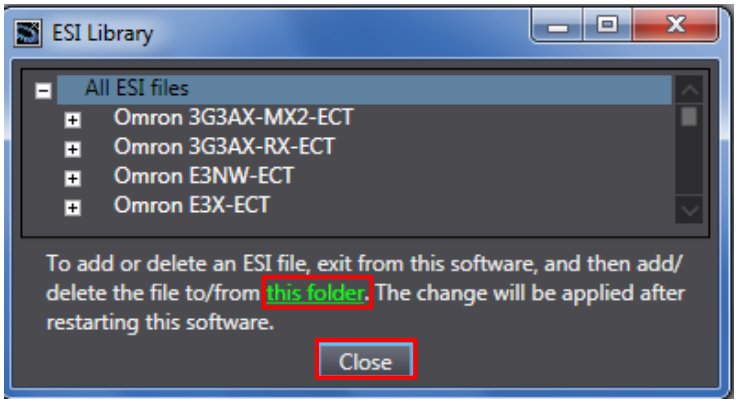
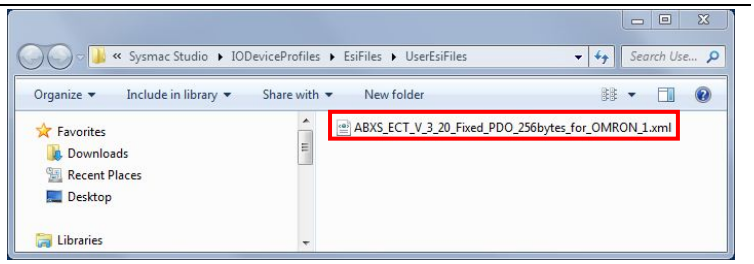
7 The New Project is displayed.

The left pane is called Multiview Explorer, the top right pane is called Toolbox, the bottom right pane is called Edit Pane and the middle pane is called Status Monitor Pane.

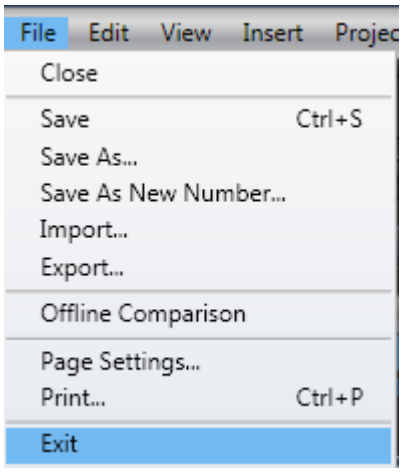


8 Double-click **EtherCAT** under **Configurations and Setup** in the Multiview Explorer.



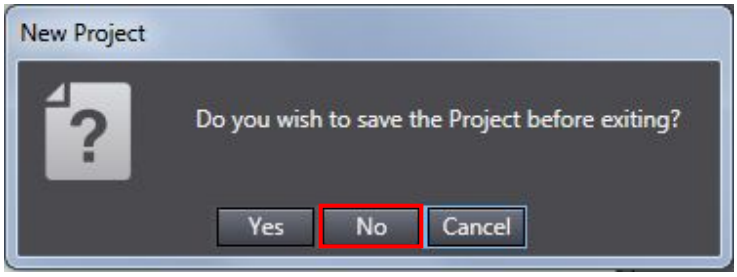
9	The EtherCAT Tab Page is displayed in the Edit Pane.	
10	Right-click **Master** and select ***Display ESI Library***.	
11	The ESI Library Dialog Box is displayed. Click the **this folder** link. When the Explorer starts, close the dialog box by clicking the **Close** Button.	
12	The Explorer starts and a folder is opened allowing you to install the ESI file. Copy the prepared ESI file for HMS (ABXS_ECT_V_3_20_Fixed_PDO_256bytes_for_OMRON_1.xml) to this folder.	

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



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

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

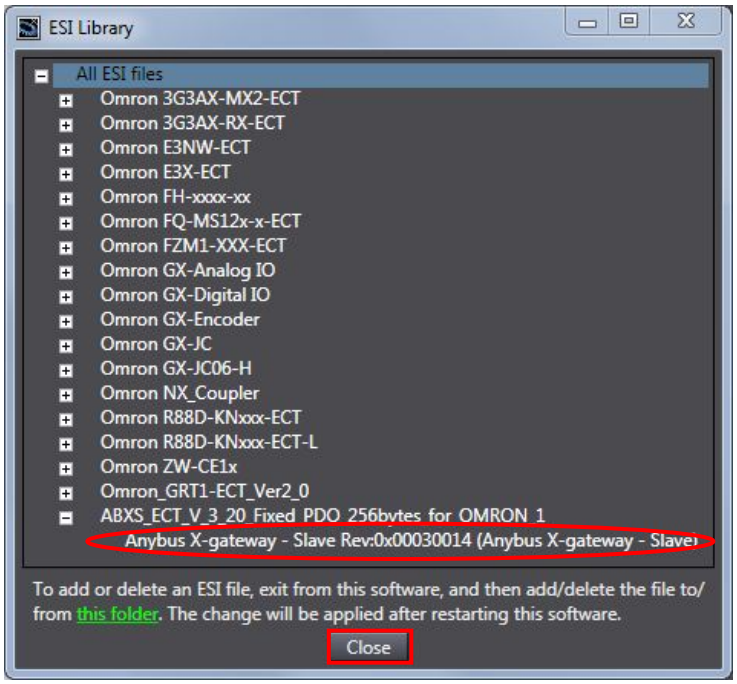


14 Restart the Sysmac Studio by following steps 3 to 10 and display the ESI Library Dialog Box.

Click the **+** Button of *ABXS_ECT_V_3_20_Fixed_PDO_256bytes_for_OMRON_1.xml* to confirm that the Rev:0x00030014 device is displayed.

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

Click the **Close** Button



Precautions for Correct Use

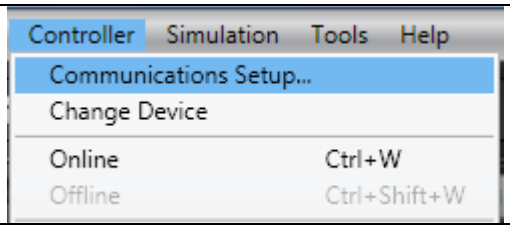
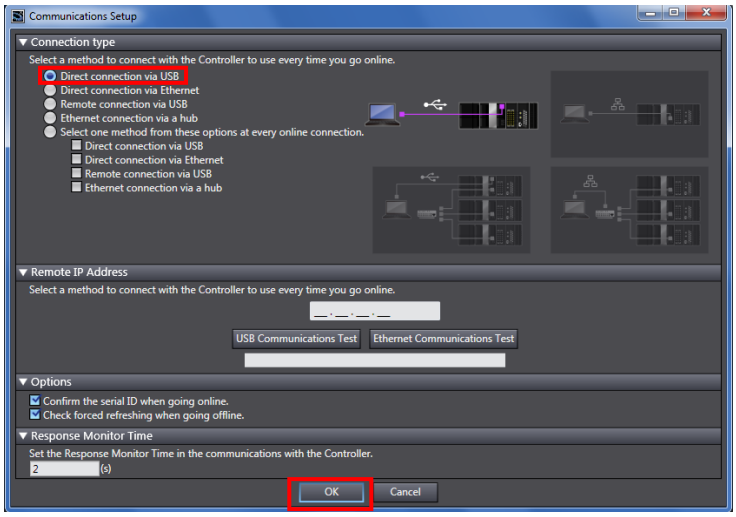
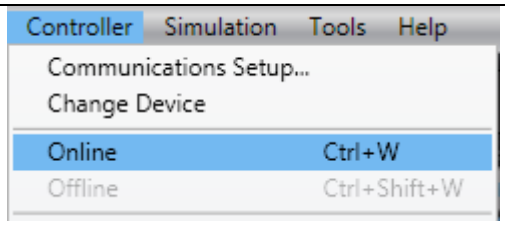
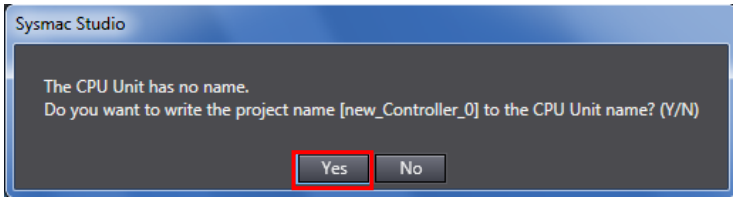
If an exclamation mark (warning) is displayed for the ESI file, check the name of the ESI file and obtain the ESI file with a correct name. If an exclamation mark (warning) is displayed even when the name of the ESI file is correct, the file may be corrupted. Contact the device manufacturer.

7.3.2. Setting Up EtherCAT Network Configuration

Set up EtherCAT network configuration.

⚠ Caution

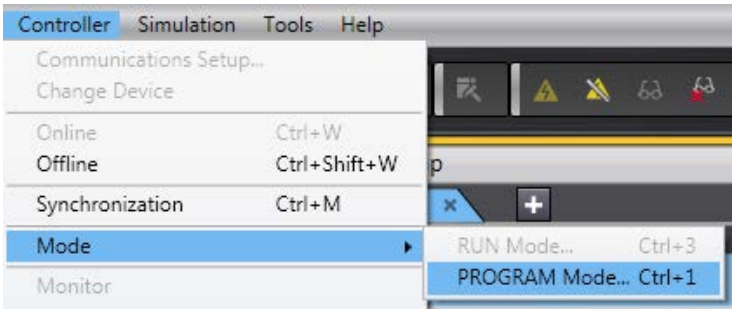
Always confirm safety before you reset the Controller or any components.

1	Select ***Communications Setup*** from the Controller Menu.	
2	The Communications Setup Dialog Box is displayed. Select the *Direct connection via USB* Option for Connection Type. Click the **OK** Button.	
3	Select ***Online*** from the Controller Menu. A confirmation dialog box is displayed. Check the contents and click the **Yes** Button. *The displayed dialog depends on the status of the Controller used. Click the **Yes** Button to proceed with the processing.	 
4	When an online connection is established, a yellow bar is displayed on the top of the Edit Pane.	

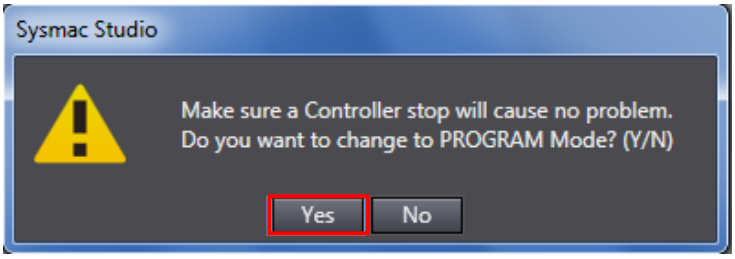
Additional Information

For details on online connections to a Controller, refer to *Section 5 Online Connections to a Controller* of the *Sysmac Studio Version 1 Operation Manual* (Cat. No. W504).

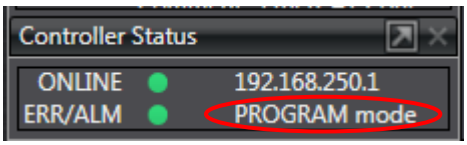
5 Select ***Mode*** - ***PROGRAM Mode*** from the Controller Menu.



6 A confirmation dialog is displayed.
Check if there is no problem and click the **Yes** Button.

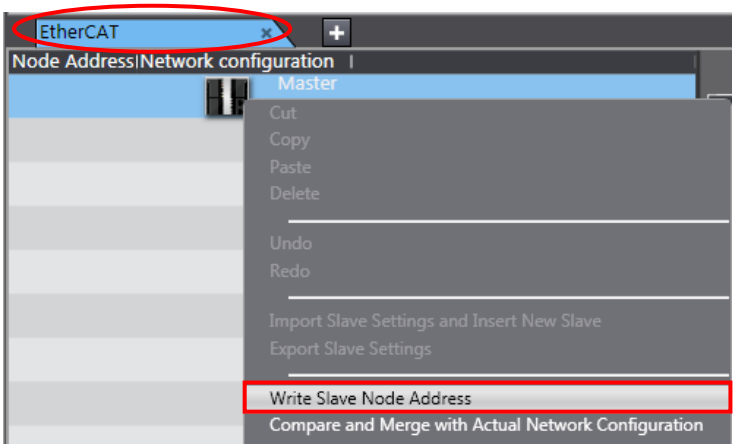


Confirm that the Controller Status in the Status Monitor Pane changed to PROGRAM mode.

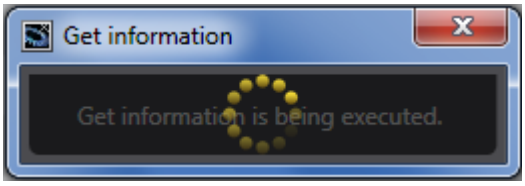


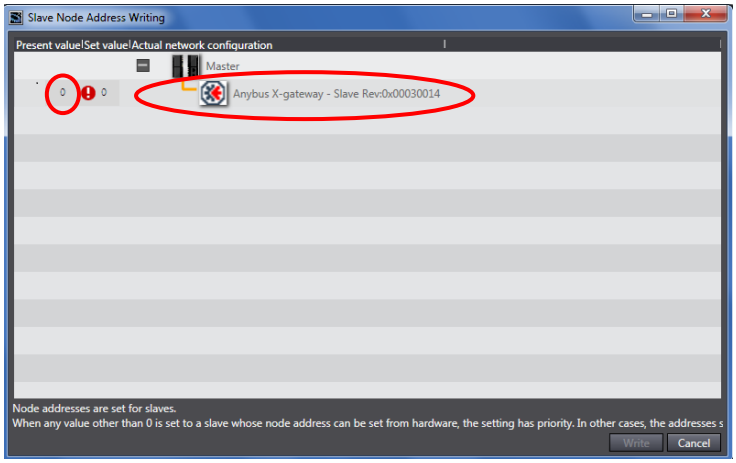
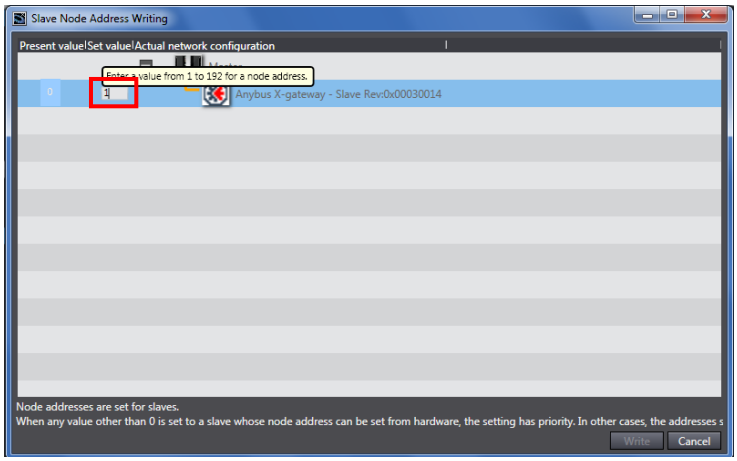
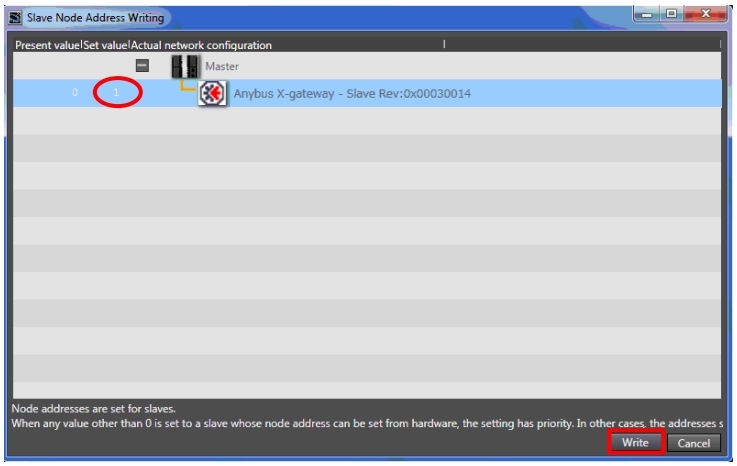
7 Right-click **Master** on the EtherCAT Tab Page of the Edit Pane, and select ***Write Slave Node Address***.

*If the EtherCAT Tab is not displayed on the Edit Pane, display it by following step 8 of *7.3.1. Starting the Sysmac Studio and Installing the ESI File*.

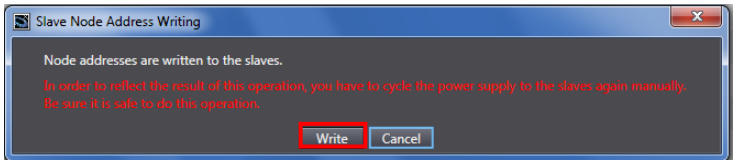


A screen is displayed stating "Get information is being executed".

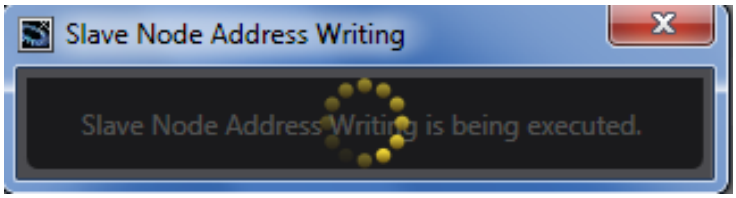


8	The Slave Node Address Writing Dialog Box is displayed. The present value (setting node address) and Anybus X-gateway-Slave Rev:0x00030014 are displayed in the Actual network configuration. *If the present value of the node address is 0, and an error is displayed.	
9	Click the *Set value* field and enter *1* as the node address.	
10	Confirm that there is no error in the setting value and 1 is set. Click the **Write** Button.	

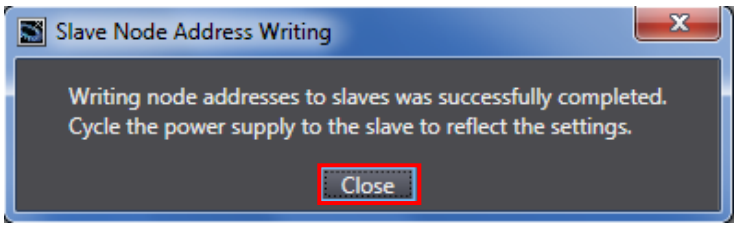
11 The Slave Node Address Writing Dialog Box is displayed. Click the **Write** Button.



A screen is displayed stating "Slave Node Address Writing is being executed".

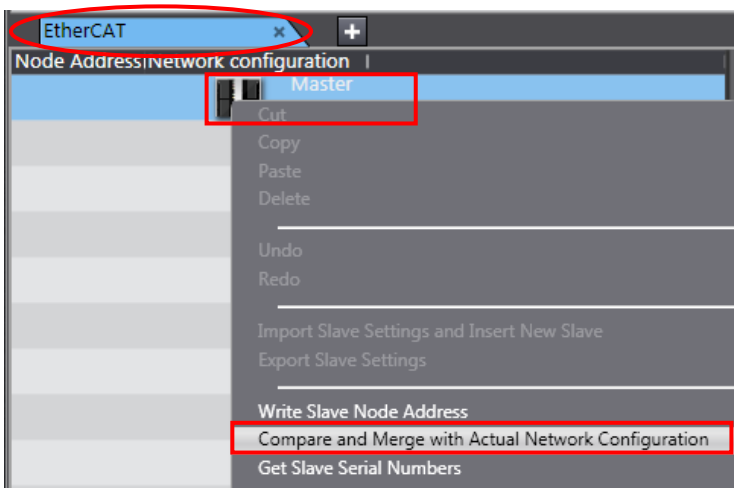


Then, a screen is displayed stating "Writing node addresses to slaves was successfully completed".
Check the contents and click the **Close** Button.

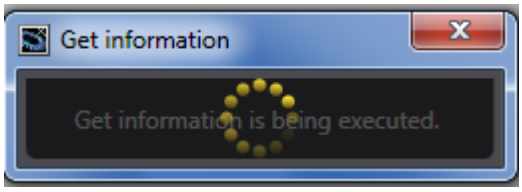


12 Cycle the power supply to the X-gateway.

13 The EtherCAT Tab Page is displayed again. Right-click **Master** and select ***Compare and Merge with Actual Network Configuration***.

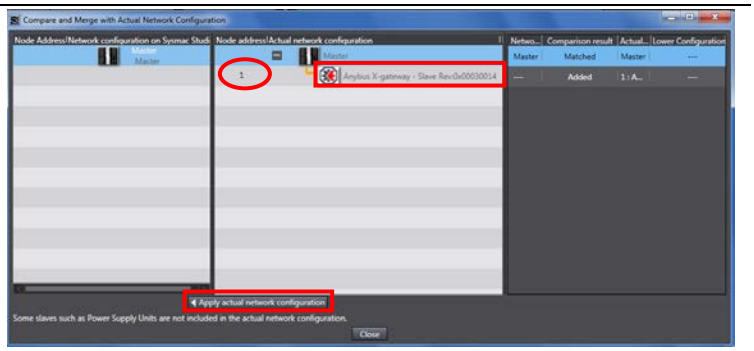


A screen is displayed stating "Get information is being executed".

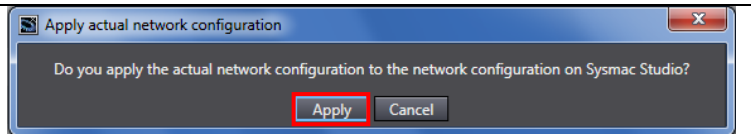


14 The Compare and Merge with Actual Network Configuration Pane is displayed.
Node address 1 and Anybus X-gateway-Slave Rev:0x00030014 are added to the Actual network configuration after the comparison.

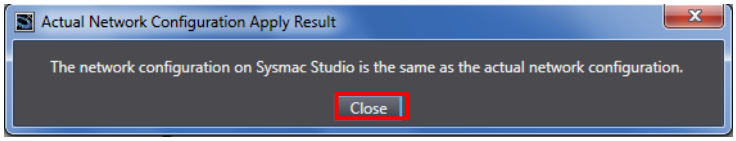
Click the **Apply actual network configuration** Button.



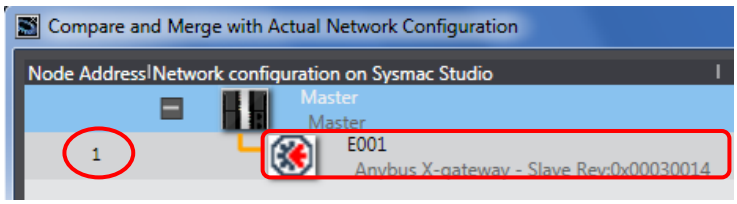
15 A confirmation dialog box is displayed. Check the contents and click the **Apply** Button.



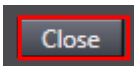
A confirmation dialog box is displayed. Check the contents and click the **Close** Button.



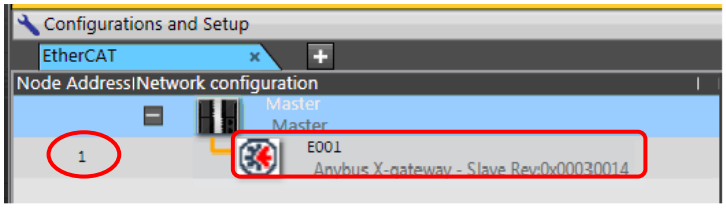
Confirm that node address 1, E001 and Anybus X-gateway-Slave Rev:0x00030014 were added to the Network configuration on Sysmac Studio.



Click the **Close** Button.

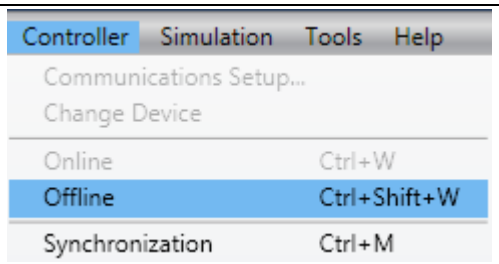
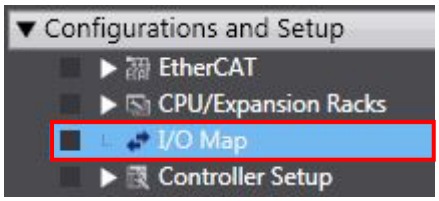
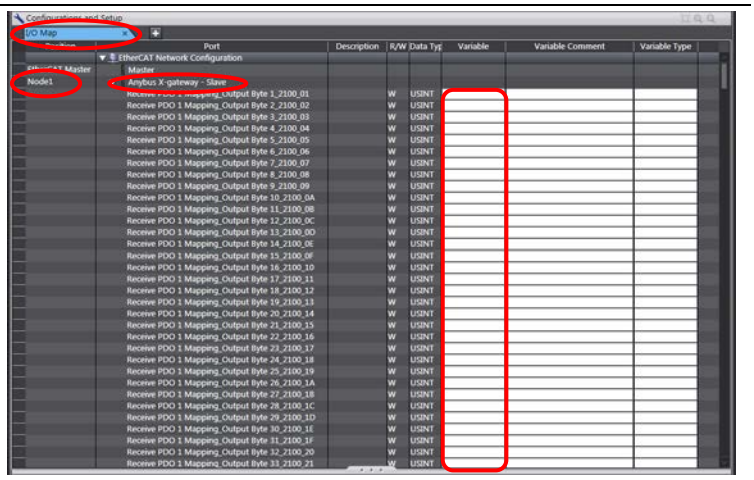
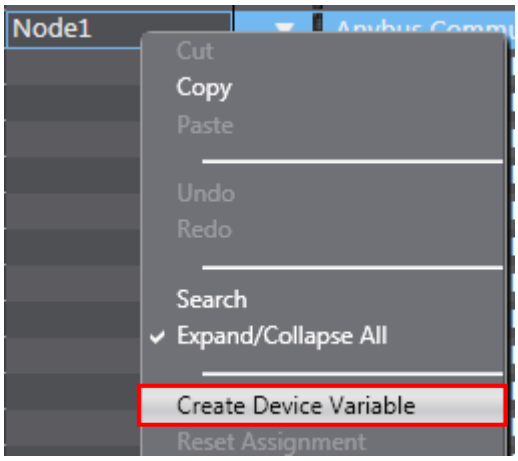


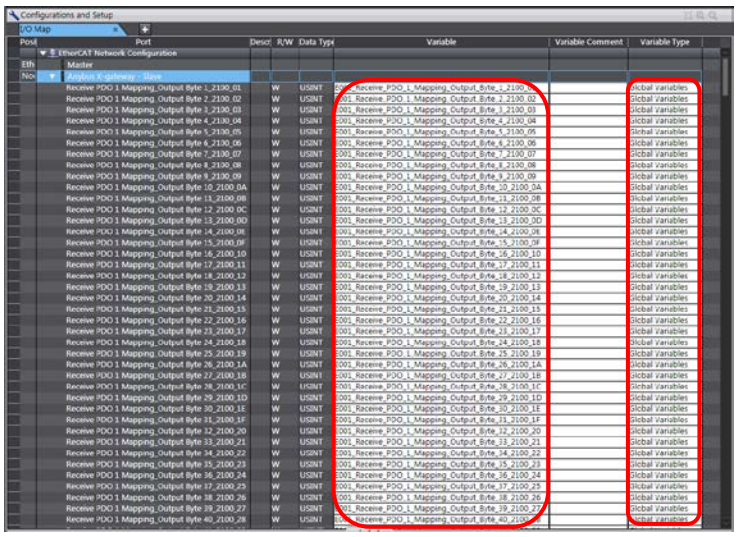
16 Node address 1, E001 and Anybus X-gateway-Slave Rev:0x00030014 are added to the EtherCAT Tab Page in the Edit Pane.



7.3.3. Setting the Device Variables

Set the device variables used for the EtherCAT Slave Unit.

1	Select ***Offline*** from the Controller Menu. The yellow bar on the top of the Edit Pane disappears.	
2	Double-click **I/O Map** under **Configurations and Setup** on the Multiview Explorer.	
3	The I/O Map Tab is displayed on the Edit Pane. Confirm that Node1 is displayed in the *Position* Column and the Slave Unit is displayed. *To manually set a variable name for the Slave Unit, click a column under *Variable* Column and enter a name.	
4	Right-click **Node1** and select ***Create Device Variable***.	

5	The variable names and variable types are automatically set.	

Additional Information

The device variables are named automatically from a combination of the device names and the port names.
For slave units, the default device names start with an "E" followed by a sequential number starting from "001".

Additional Information

In this document, device variables are automatically named for a unit (a slave). Device variables can also be manually named for ports.

7.3.4. Transferring the Project Data

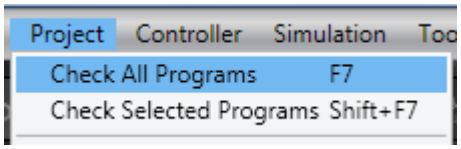
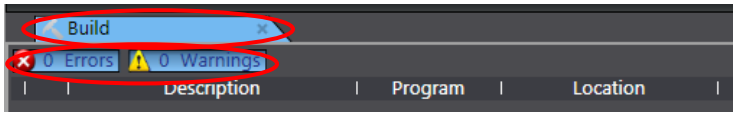
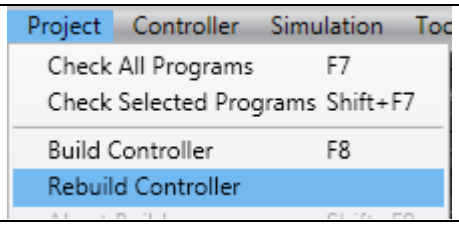
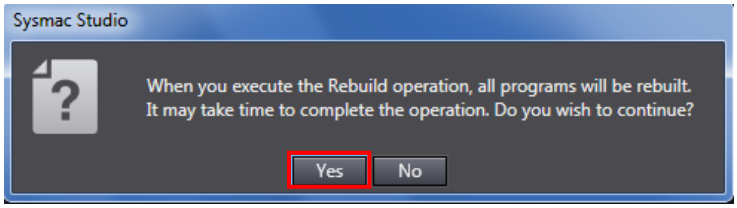
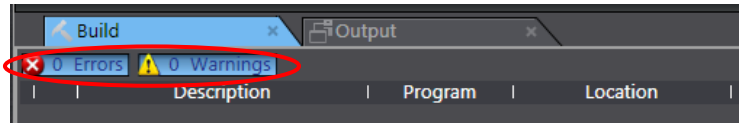
Transfer the project data from the Sysmac Studio to the Controller.

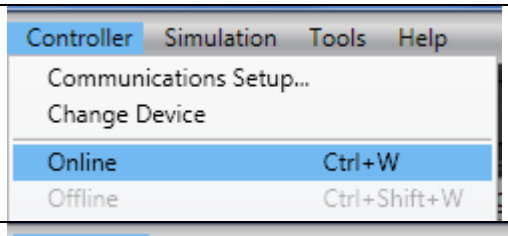
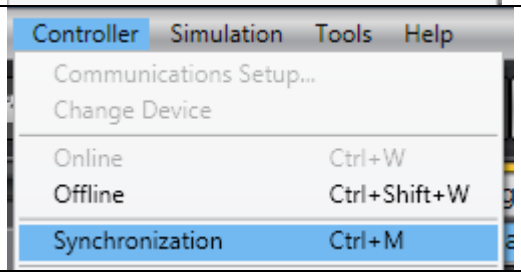
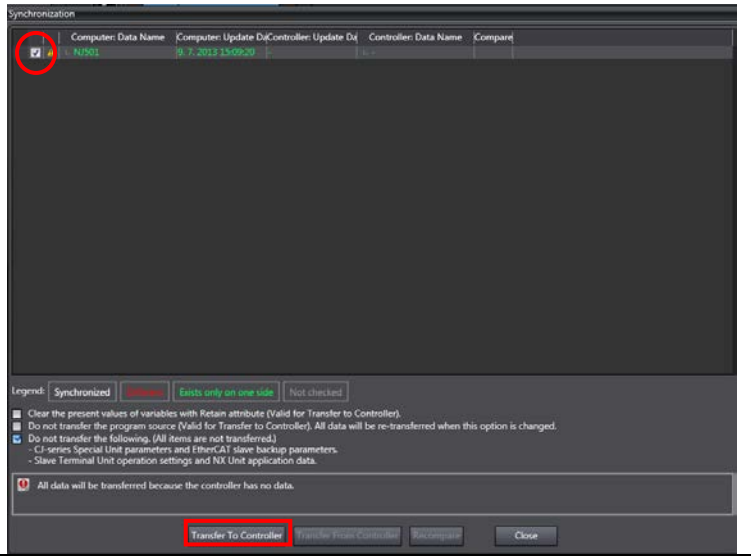
⚠ WARNING

Always confirm safety at the Destination Device before you transfer a user program, configuration data, setup data, device variables, or values in memory used for CJ-series Units from the Sysmac Studio.
The devices or machines may perform unexpected operation regardless of the operating mode of the CPU Unit.

Precautions for Safe Use

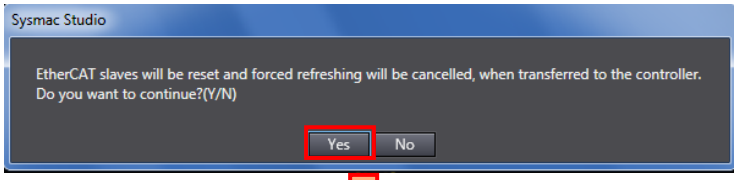
After you transfer the user program, the CPU Unit restarts and communications with the EtherCAT slaves are cut off. During that period, the slave outputs behave according to the slave settings. The time that communications are cut off depends on the EtherCAT network configuration.
Before you transfer the user program, confirm that the system will not be adversely affected.

1	Select ***Check All Programs*** from the Project Menu.	
2	The Build Tab Page is displayed in the Edit Pane. Confirm that "0 Errors" and "0 Warnings" are displayed.	
3	Select ***Rebuild Controller*** from the Project Menu.	
4	A confirmation dialog box is displayed. Confirm that there is no problem and click the **Yes** Button.	
5	Confirm that "0 Errors" and "0 Warnings" are displayed in the Build Tab Page.	

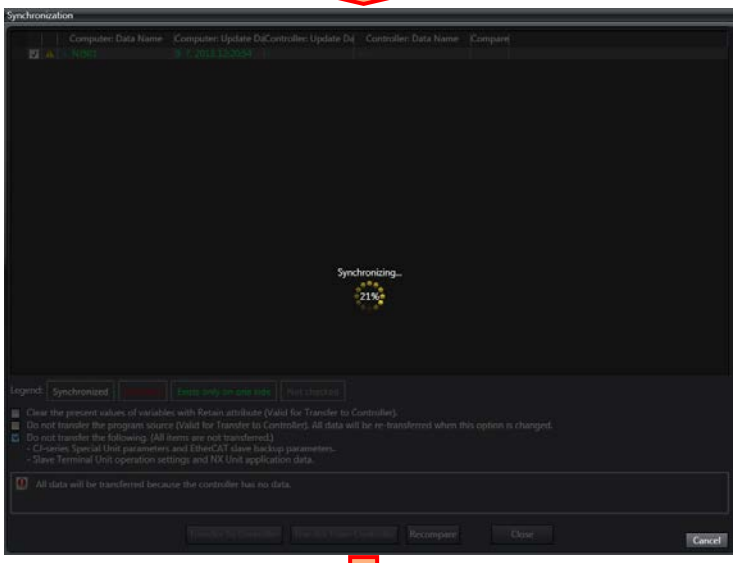
6	Select ***Online*** from the Controller Menu.	
7	Select ***Synchronization*** from the Controller Menu.	
8	The Synchronization Dialog Box is displayed. Confirm that the data to transfer (NJ501 in the right dialog) is selected. Then, click the **Transfer To Controller** Button. *After executing the Transfer To Controller, the Sysmac Studio data is transferred to the Controller and the data are compared.	

9

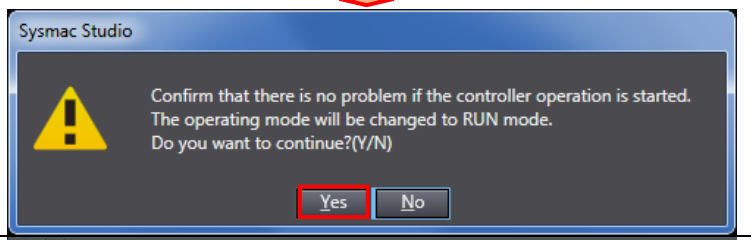
A confirmation dialog box is displayed. Confirm that there is no problem and click the **Yes** Button.



A screen stating "Synchronizing" is displayed.



A confirmation dialog box is displayed. Confirm that there is no problem and click the **Yes** Button.



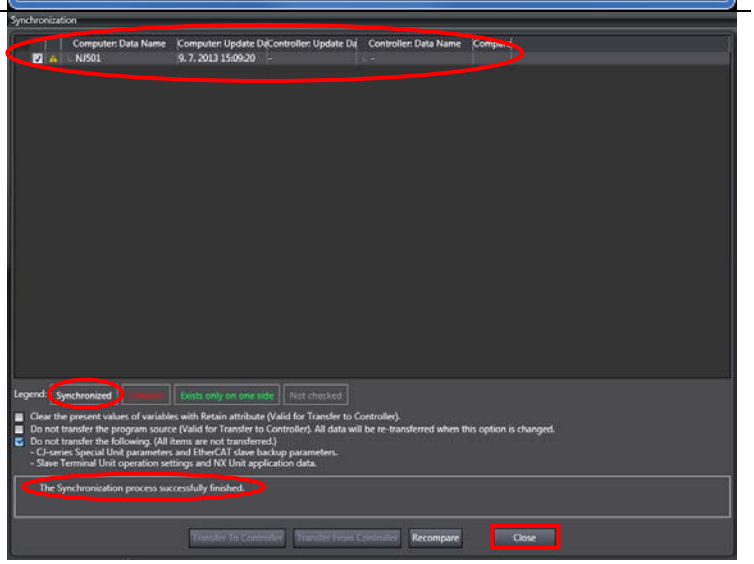
10

Confirm that the synchronized data is displayed with the color specified by "Synchronized" and that a message is displayed stating "The synchronization process successfully finished".

If there is no problem, click the **Close** Button.

*A message stating "The synchronization process successfully finished" is displayed if the Sysmac Studio project data and the data in the Controller match.

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



7.4. Checking the EtherCAT Communications

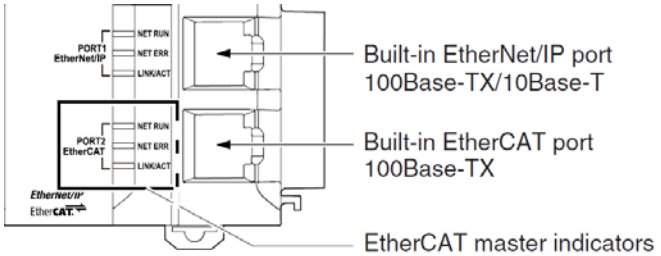
Confirm that the PDO communications of EtherCAT are performed normally.

7.4.1. Checking the Connection Status

Check the connection status of the EtherCAT network.

1 Check the LED indicators on the Controller and confirm that the EtherCAT communications are performed normally.

LED indicators in normal status:
[NET RUN]:Lit green
[NET ERR]:Not lit
[LINK/ACT]:Flashing yellow

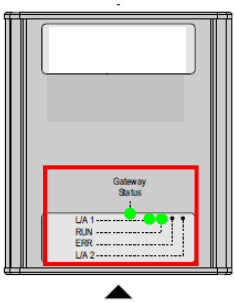


Label	Name	Color	Status	Meaning
EtherCAT NET RUN	RUN	Green	Lit	EtherCAT communications are in progress. • I/O data is being input and output.
			Flashing	EtherCAT communications are established. Communications is in one of the following states. • Only message communications is functioning. • Only message communications and I/O data input operations are functioning.
			Not lit	EtherCAT communications are stopped. • Power is OFF or the Unit is being reset. • There is a MAC address error, communications controller error, or other error.
EtherCAT NET ERR	ERROR	Red	Lit	There is an unrecoverable error, such as a hardware error or an exception.
			Flashing	There is a recoverable error.
			Not lit	There is no error.
EtherCAT LINK/ACT	Link/Activity	Yellow	Lit	The link is established.
			Flashing	A link is established and data is being sent and received. The indicator flashes whenever data is sent or received.
			Not lit	The link is not established.

2 Check the LED indicators on the X-gateway.

LED indicators in normal status:
[L/A 1]: Flashing green
[RUN]: Lit green
[ERR]: Not lit
[L/A 2]: Not lit
[Gateway Status]: Lit green

LED	Colour	Indication
L/A 1	Off	No link sensed on port 1 (no power)
	Green	Link sensed on port 1
	Green, flickering	Exchanging packets on port 1
RUN	Off	Device in INIT state (no power)
	Green, blinking	Device in PRE-OPERATIONAL state
	Green, single flash	Device in SAFE-OPERATIONAL state
	Green	Device in OPERATIONAL state
ERR	Off	Normal operation (no power)
	Red, blinking	General EtherCAT configuration error
	Red, single flash	EtherCAT state changed autonomously
	Red, double flash	Major internal fault
	Red	Sync manager watchdog timeout
L/A 2	Off	No link sensed on port 2 (no power)
	Green	Link sensed on port 2
	Green, flickering	Exchanging packets on port 2
Gateway Status	(Consult the user manual for further details)	

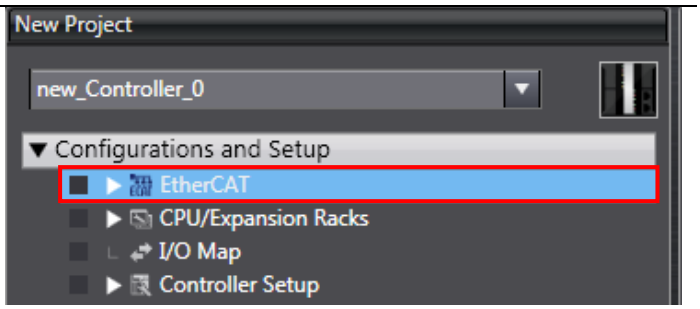
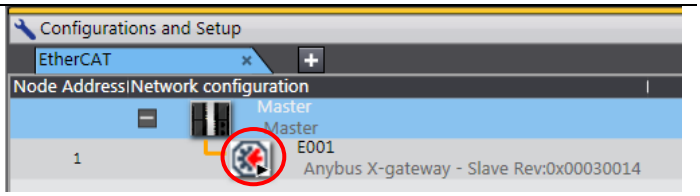
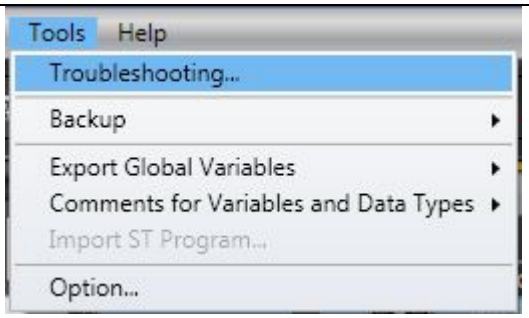
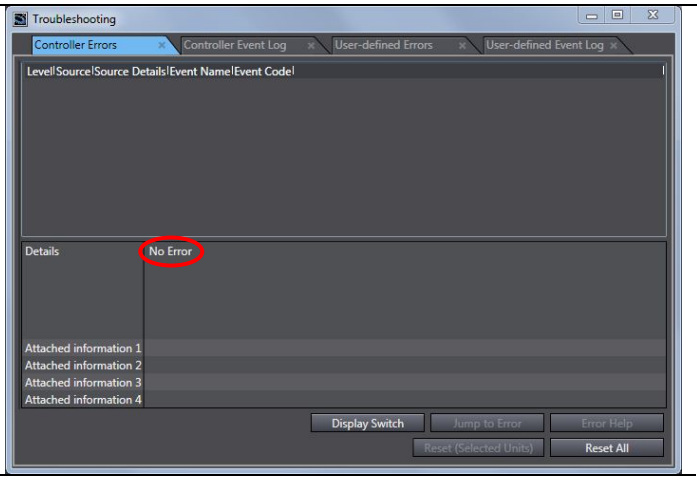


(Bottom mounted EtherCAT Interface)

The Gateway Status LEDs

These LEDs reflect the overall status of each network interface.

Colour	Indication
Green	Communication running
Red	Communication fault
Red, flashing	Network interface fault
Off	No power

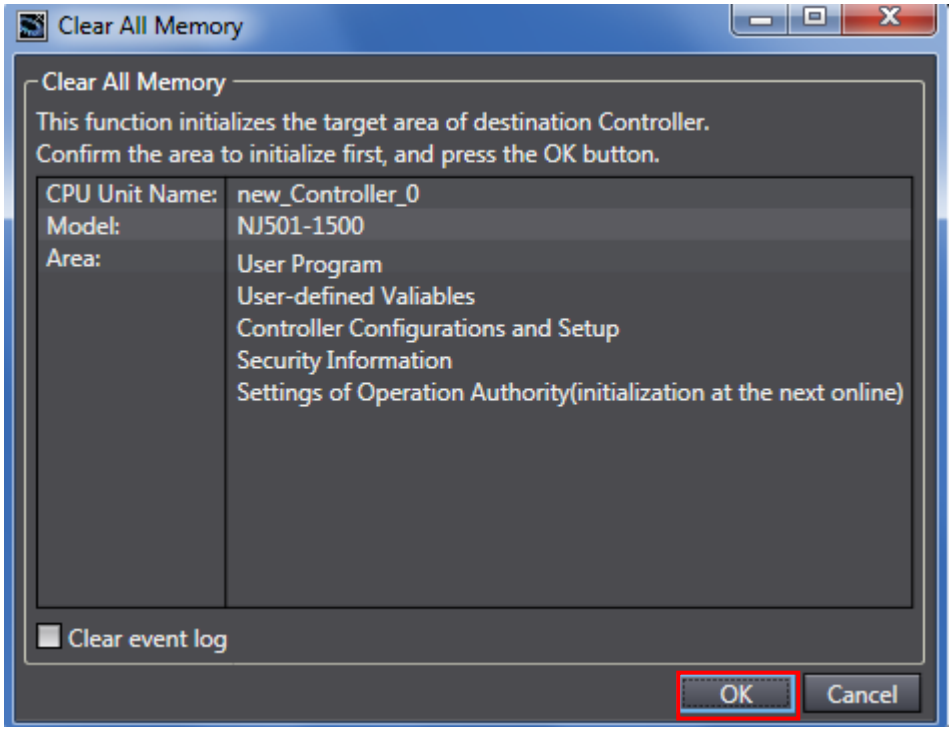
3	Double-click **EtherCAT** under **Configurations and Setup** in the Multiview Explorer.	
4	The icon for E001 is displayed on the Edit Pane. Confirm that the ▶ mark which indicates normal communications of EtherCAT is displayed.	
5	Select ***Troubleshooting*** from the Tools Menu.	
6	The Troubleshooting Dialog Box is displayed. Confirm that "No Error" is displayed on the Details Pane in the Controller Errors Tab. *A message stating "No Error" is displayed if there is no error in the EtherCAT communications.	

8. Initialization Method

This document explains the setting procedure from the factory default setting.
Some settings may not be applicable as described in this document unless you use the devices with the factory default setting.

8.1. Initializing the Controller

To initialize the settings of the Controller, select ***Clear All Memory*** from the Controller Menu of the Sysmac Studio. The Clear All Memory Dialog Box is displayed. Check the contents and click the **OK** Button.



8.2. Initializing the X-gateway

For how to initialize the X-gateway, contact HMS Industrial Networks.

9. Revision History

Revision code	Date of revision	Revision reason and revision page
01	2013/8/8	First edition
02	2014/3/4	Correction of device variable names for input area Correction of erroneous description

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