OMRON

Machine Automation Controller NJ-series

# EtherNet/IP™ Connection Guide

## OMRON Corporation

FZ5-series Vision System

Network Connection Guide

SYSMAC always in control

P589-E1-01

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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 |
|---|---|---|
| W472 | CJ2H-CPU6[]-EIP<br>CJ2H-CPU6[]<br>CJ2M-CPU[][] | CJ-series CJ2 CPU Unit Hardware User's Manual |
| W473 | CJ2H-CPU6[]-EIP<br>CJ2H-CPU6[]<br>CJ2M-CPU[][] | CJ-series CJ2 CPU Unit Software User's Manual |
| W465 | CJ1W-EIP21<br>CJ2H-CPU6[]-EIP<br>CJ2M-CPU3[] | EtherNet/IP™Unit Operation Manual |
| W446 | - | CX-Programmer Operation Manual |
| 9524422-4 | FZ5-60[]/60[]-10<br>FZ5-110[]/110[]-10 | Image Processing System Instruction Sheet |
| 9910002-2 | FZ5-L35[]/L35[]-10 | Image Processing System Instruction Sheet |
| Z340 | FZ5-L35[]<br>FZ5-6[][]/11[][] | Vision Sensor FH/FZ5 Series Vision System<br>User's Manual |
| Z341 | FZ5-L35[]<br>FZ5-6[][]/11[][] | Vision Sensor FH/FZ5 Series Vision System<br>Processing Item Function Reference Manual |
| Z342 | FZ5-L35[]<br>FZ5-6[][]/11[][] | Vision Sensor FH/FZ5 Series Vision System<br>User's Manual (Communications Settings) |

# 2. Terms and Definitions

| Term | Explanation and Definition |
|---|---|
| Node | Controllers and devices are connected to the EtherNet/IP network via the EtherNet/IP ports. The EtherNet/IP recognizes each EtherNet/IP port connected to the network as one node.<br>When a device with two EtherNet/IP ports is connected to the EtherNet/IP network, the EtherNet/IP recognizes this device as two nodes.<br>The EtherNet/IP achieves the communications between controllers or the communications between controllers and devices by exchanging data between these nodes connected to the network. |
| Tag | A minimum unit of the data that is exchanged on the EtherNet/IP network is called a tag. The tag is defined as a network variable or as a physical address, and it is allocated to the memory area of each device. |
| Tag set | In the EtherNet/IP network, a data unit that consists of two or more tags can be exchanged. The data unit consisting of two or more tags for the data exchange is called a tag set. Up to eight tags can be configured per tag set for OMRON controllers. |
| Tag data link | In the EtherNet/IP, the tag and tag set can be exchanged cyclically between nodes without using the user program. This standard feature on the EtherNet/IP is called a tag data link. |
| Connection | A connection is used to exchange data as a unit within which data concurrency is maintained. The connection consists of tags or tag sets. Creating the concurrent tag data link between the specified nodes is called a "connection establishment ". When the connection is established, the tags or tag sets that configure the connection are exchanged between the specified nodes concurrently. |
| Originator and Target | To perform tag data links, one node requests the opening of a communications line called a "connection".<br>The node that requests opening the connection is called an "originator", and the node that receives the request is called a "target". |
| Tag data link parameter | The tag data link parameter is the setting data to perform the tag data link. It includes the data to set tags, tag sets, and connections. |
| EDS file | A file that describes the number of I/O points for the EtherNet/IP device and the parameters that can be set via EtherNet/IP. |

# 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 December 2013. 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. |

**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 you must do.

# 4. Overview

This document describes the procedure for connecting the Vision System (FZ5 Sensor Controller + Camera)(FZ5 series) of OMRON Corporation (hereinafter referred to as OMRON) to NJ-series Machine Automation Controller (hereinafter referred to as the Controller) via EtherNet/IP and provides the procedure for checking their connection.
It also contains the procedure for performing EtherNet/IP tag data link using the EtherNet/IP settings of the project file that is prepared beforehand (hereinafter referred to as the "Procedure for Using the Configuration Files").
*Section 9 Appendix 1* and *Section 10 Appendix 2* describe the procedures for setting parameters with software without using files (hereinafter referred to as the "Procedure for Setting Parameters from Beginning").

To follow the "Procedure for Using the Configuration Files", obtain the latest "Sysmac Studio project file" and "Network Configurator v3 network configuration file" (they are referred to as "Configuration Files") from OMRON in advance.

| Name | File name | Version |
|---|---|---|
| Sysmac Studio project file (extension: smc2) | OMRON_FZ5_EIP_EV100.smc2 | Ver.1.00 |
| Network Configurator v3 network configuration file (extension: nvf) | OMRON_FZ5_EIP_EV100.nvf | Ver.1.00 |

# 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-[][][][]<br>NJ301-[][][][] |
| OMRON | FZ5 Sensor Controller | |
| | LCD-integrated Controller | FZ5-60[]/60[]-10 |
| | | FZ5-110[]/110[]-10 |
| | Box-type Controller | FZ5-L35[]/L35[]-10 |
| OMRON | 0.3 Megapixel Digital Camera | FZ-SC/S |
| | 0.3 Megapixel Small Digital Camera | FZ-SFC/SF |
| | 0.3 Megapixel Small Digital Pen-Shaped Camera | FZ-SPC/SP |
| | 0.3 Megapixel High-Speed Camera | FZ-SHC/SH |
| | 2 Megapixel Digital Camera | FZ-SC2M/S2M |
| | 5 Megapixel Digital Camera | FZ-SC5M2/S5M2 |
| | Intelligent Camera | FZ-SLC100 |
| | Intelligent Compact Camera | FZ-SQ010F/SQ050F<br>FZ-SQ100F/SQ100N |

**Precautions for Correct Use**

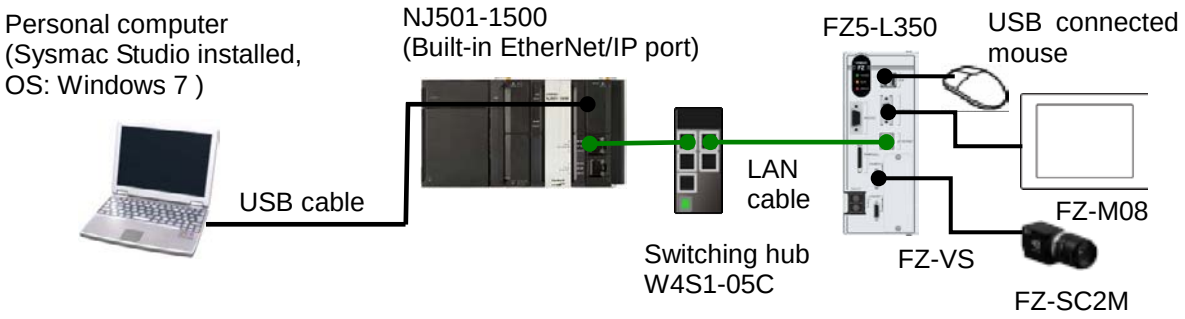
As applicable devices above, the devices with the models and versions listed in *Section 5.2.* are actually used in this document to describe the procedure for connecting devices and checking the connection.
You cannot use devices with versions lower than the versions listed in *Section 5.2.*
To use 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 your OMRON representative.

## 5.2. Device Configuration

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




| Manufacturer | Name | Model | Version |
|---|---|---|---|
| OMRON | NJ-series CPU Unit (Built-in EtherNet/IP port) | NJ501-1500 | Ver.1.07 |
| OMRON | Power Supply Unit | NJ-PA3001 | |
| OMRON | Switching hub | W4S1-05C | Ver.1.00 |
| OMRON | Sysmac Studio | SYSMAC-SE2[][][] | Ver.1.08 |
| OMRON | Network-Configurator | (Included in Sysmac Studio.) | Ver.3.56 |
| OMRON | Sysmac Studio project file | OMRON_FZ5_EIP_EV100.smc2 | Ver.1.00 |
| OMRON | Network Configurator v3 network configuration file | OMRON_FZ5_EIP_EV100.nvf | Ver.1.00 |
| - | Personal computer (OS: Windows 7) | - | |
| - | USB cable (USB 2.0 type B connector) | - | |
| - | LAN cable (STP (shielded, twisted-pair) cable of Ethernet category 5 or higher) | - | |
| OMRON | FZ5 Sensor Controller | FZ5-L350 | Ver.5.12 |
| OMRON | Camera | FZ-SC2M | |
| OMRON | Camera cable | FZ-VS | |
| OMRON | Monitor (analog RGB monitor) | FZ-M08 | |
| - | USB connected mouse | - | |

**Precautions for Correct Use**

Prepare the latest "Sysmac Studio project file" and "Network Configurator v3 network configuration file" from OMRON in advance.
(To obtain the files, contact your OMRON representative.)

**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) and Network Configurator Online Help.

**Additional Information**

The system configuration in this document uses USB for the connection to the Controller. For information on 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. EtherNet/IP Settings

This section describes the specifications such as communication parameters and tag data link that are set in this document.
Hereinafter, the FZ5 Sensor Controller is referred to as the "Destination Device" in some descriptions.

## 6.1. EtherNet/IP Communications Parameters

The communications parameter required connecting the Controller and the Destination Device via EtherNet/IP is given below.

| | Controller (node 1) | FZ5 Sensor Controller (node 2) |
|---|---|---|
| IP address | 192.168.250.1 | 192.168.250.2 |
| Subnet mask | 255.255.255.0 | 255.255.255.0 |

## 6.2. Data Types for Tag Data Links

The following data types are used for the data in the tag data links of the Destination Device. These data types are set in the "Configuration Files".

■ Definition of the data type to access the signals (Union)

These data types are used to access the control signals and status signals.

| Data type name | Data type |
|---|---|
| U_EIPFlag | UNION |
| F | BOOL[32] |
| W | DWORD |

■ Definition of the data type to access the command area (Structure)

These data types are used to access the command area.

| Data type name | Data type | Destination device data |
|---|---|---|
| S_EIPOutput | STRUCT | - |
| ControlFlag | U_EIPFlag | Control signal (32 bits) |
| CommandCode | DWORD | Command code (CMD-CODE) |
| CommandParam1 | DINT | Command parameter (CMD-PARAM) |
| CommandParam2 | DINT | |
| CommandParam3 | DINT | |

■ Definition of the data type to access the response/output areas (Structure)

These data types are used to access the response/output areas.

| Data type name | Data type | Destination device data |
|---|---|---|
| S_EIPInput | STRUCT | - |
| StatusFlag | U_EIPFlag | Control output (32 bits) |
| CommandCodeEcho | DWORD | Command code (CMD-CODE) |
| ResponseCode | DINT | Response code (RES-CODE) |
| ResponseData | DINT | Response data (RES-DATA) |
| OutputData | DINT[8] | Output data 0 to 7 (DATA 0 to 7) |

## 6.3. Allocating the Tag Data Links

The data in the tag data links of the Destination Device is allocated to the global variables of the Controller. The relationship between the destination device data and the global variables is shown below.
The following global variables are set in the "Configuration Files".

■ Output area (from Controller to FZ5 Sensor Controller)

| Variable | Data type | Data size |
|---|---|---|
| EIP002_OUT | S_EIPOutput | 20 bytes |

| Offset | Destination device data | Global variable | Data type |
|---|---|---|---|
| +0 to +1 | Control signal (32 bits) (Data type: U_EIPFlag) | EIP002_OUT.ControlFlag.F*1 | BOOL[32] |
| | | EIP002_OUT.ControlFlag.W*1 | DWORD |
| +2 to +3 | Command code (CMD-CODE) | EIP002_OUT.CommandCode | DWORD |
| +4 to +5 | Command parameter (CMD-PARAM) | EIP002_OUT.CommandParam1 | DINT |
| +6 to +7 | | EIP002_OUT.CommandParam2 | DINT |
| +8 to +9 | | EIP002_OUT.CommandParam3 | DINT |

*1: Details on allocation of control signal

Allocation of ControlFlag.F

| Offset | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +0 | ERCLR | | | | | | | XEXE | | | | | | | STEP | EXE |
| +1 | | | | | | | | | | | | | | | | DSA |

EXE: Command Request Bit: Turned ON to execute a command.
STEP: Measure Bit: Turned ON to execute a measurement.
XEXE: Flow Command Request Bit: Turned ON to request execution of a command during execution of fieldbus flow control.
ERCLR: Error Clear Bit: Turned ON to clear the Error Status bit.
DSA: Data Output Request Bit: Turned ON to request data output.

Allocation of ControlFlag.W.

| Offset | 15 | 14 | 13 | ・・・ | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|
| +0 | 15 | 14 | 13 | ・・・ | 2 | 1 | 0 |
| +1 | 31 | 30 | 29 | ・・・ | 18 | 17 | 16 |

Bits 31 to 0: ControlFlag.W uses DWORD data from the offset +0 word.

■ Input area (from FZ5 Sensor Controller to Controller)

| Variable | Data type | Data size |
|---|---|---|
| EIP002_IN | S_EIPInput | 48 bytes |

| Offset | Destination device data | Global variable | Data type |
|---|---|---|---|
| +0 to +1 | Control output (32 bits) (Data type: U_EIPFlag) | EIP002_IN.StatusFlag.F*1 | BOOL[32] |
| | | EIP002_IN.StatusFlag.W*1 | DWORD |
| +2 to +3 | Command code (CMD-CODE) | EIP002_IN.CommandCodeEcho | DWORD |
| +4 to +5 | Response code (RES-CODE) | EIP002_IN.ResponseCode | DINT |
| +6 to +7 | Response data (RES-DATA) | EIP002_IN.ResponseData | DINT |
| +8 to +9 | Output data 0 (DATA0) | EIP002_IN.OutputData[0] to EIP002_IN.OutputData[7] | DINT[8] |
| +10 to +11 | Output data 1 (DATA1) | | |
| +12 to +13 | Output data 2 (DATA2) | | |
| +14 to +15 | Output data 3 (DATA3) | | |
| +16 to +17 | Output data 4 (DATA4) | | |
| +18 to +19 | Output data 5 (DATA5) | | |
| +20 to +21 | Output data 6 (DATA6) | | |
| +22 to +23 | Output data 7 (DATA7) | | |

*1: Details on allocation of control signal

Allocation of StatusFlag.F

| Offset | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +0 | ERR | | | | | XWAIT | XBUSY | XFLG | | | | RUN | OR | | BUSY | FLG |
| +1 | | | | | | | | | | | | | | | | GATE |

FLG: Command Completion Bit: Turned ON when command execution is completed.
BUSY: Command Busy Bit: Turned ON when command execution is in progress.
OR: Overall Judgement Bit: Turned ON when the overall judgement is NG.
RUN: Run Mode Bit: Turned ON while the Sensor Controller is in Run Mode.
XFLG: Flow Command Completion Bit: Turned ON when execution of a command that was input during the execution of fieldbus flow control has been completed (i.e., when XBUSY turns OFF).
XBUSY: Flow Command Busy Bit: Turned ON when execution of a command that was input during execution of fieldbus flow control is in progress.
XWAIT: Flow Command Wait Bit: Turned ON when a command can be input during the execution of fieldbus flow control.
ERR: Error Signal: Turned ON when the Sensor Controller detects an error signal.
GATE: Data Output Completion Bit: Turned ON when data output is completed.

Allocation of StatusFlag.W

| Offset | 15 | 14 | 13 | ・・・ | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|
| +0 | 15 | 14 | 13 | ・・・ | 2 | 1 | 0 |
| +1 | 31 | 30 | 29 | ・・・ | 18 | 17 | 16 |

Bits 31 to 0: EIPInput.StatusFlag.W uses DWORD data from the offset +0 word.

**Precautions for Correct Use**

If the data size in tag data links of the Destination Device is an odd-numbered byte, use BYTE type to define, but not BOOL type.

**Additional Information**

For details on the command codes and response codes, refer to *Accessing Communications Areas Using Variables with NJ-series Controllers* in *Section 2 Methods for Connecting and Communicating with External Devices - Communicating with EtherNet/IP - Memory Allocation* of the *Vision Sensor FH/FZ5 Series Vision System User's Manual (Communications Settings)* (Cat. No. Z342).

**Additional Information**

With the Sysmac Studio, two methods can be used to specify an array for a data type. After specifying, (1) is converted to (2) and the data type is always displayed as (2).

(1)WORD[3]/(2)ARRAY[0..2]OF WORD

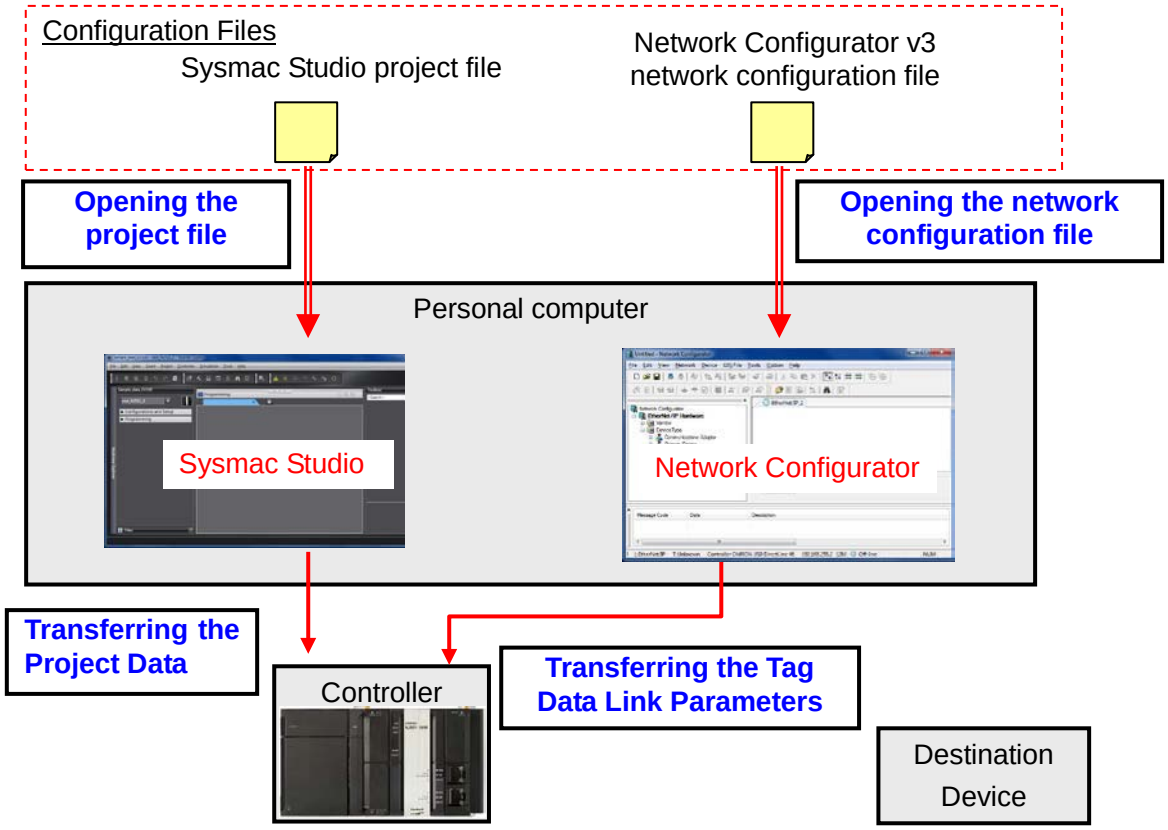
In this document, the data type is simplified by describing WORD[3].
(The example above means a WORD data type with three array elements.)

# 7. EtherNet/IP Connection Procedure

This section describes the procedure for connecting the FZ5 Sensor Controller to the Controller via EtherNet/IP using the "Procedure for Using the Configuration Files".
This document explains the procedures for setting up the Controller and the FZ5 Sensor Controller from the factory default setting. For the initialization, refer to *Section 8 Initialization Method*.

■ Setting Overview

The following figure shows the relationship of operating the EtherNet/IP tag data link using the "Procedure for Using the Configuration Files".




**Precautions for Correct Use**

Prepare the latest "Sysmac Studio project file" and "Network Configurator v3 network configuration file" from OMRON in advance.
(To obtain the files, contact your OMRON representative.)

## 7.1. Work Flow

Take the following steps to operate the tag data link for EtherNet/IP.

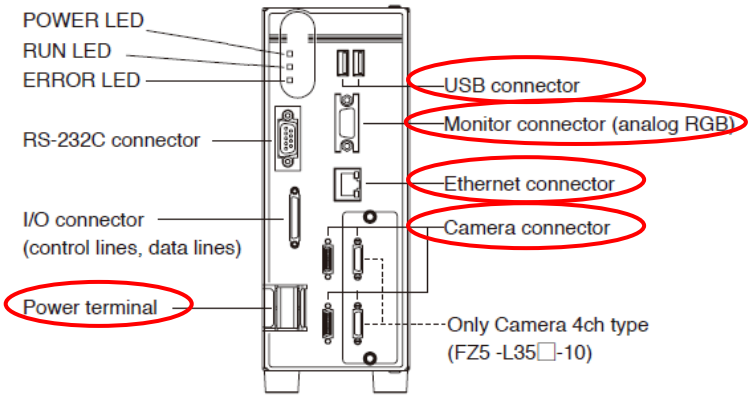
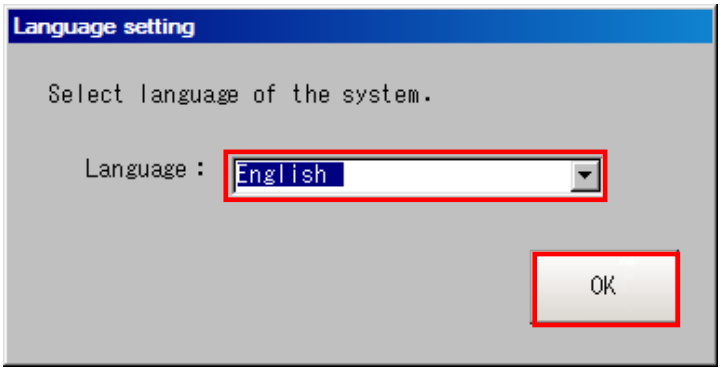
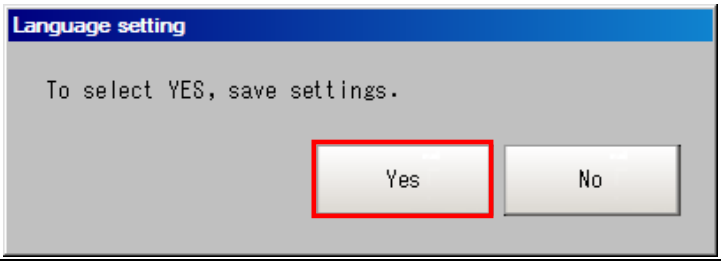
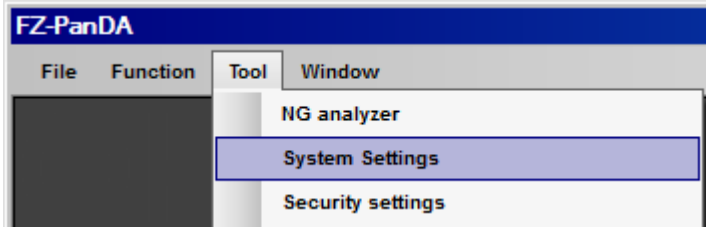
| | |
|---|---|
| **7.2. Setting Up the FZ5 Sensor Controller** | Set up the FZ5 Sensor Controller. |
| ↓ | |
| 7.2.1. Parameter Settings | Set the parameters for the FZ5 Sensor Controller. |
| ↓ | |
| **7.3. Setting Up the Controller** | Set up the Controller. |
| ↓ | |
| 7.3.1. Starting the Sysmac Studio and Importing the Project File | Start the Sysmac Studio and import the Sysmac Studio project file. |
| ↓ | |
| 7.3.2. Connecting Online and Transferring the Project Data | Connect online with the Sysmac Studio and transfer the project data to the Controller. |
| ↓ | |
| **7.4. Setting Up the Network** | Set the tag data links for the EtherNet/IP. |
| ↓ | |
| 7.4.1. Starting the Network Configurator and Opening the Network Configuration File. | Start up the Network Configurator and open the Network Configurator v3 network configuration file. |
| ↓ | |
| 7.4.2. Transferring the Tag Data Link Parameters | Transfer the tag data link parameters to the Controller. |
| ↓ | |
| **7.5. Checking the EtherNet/IP Communications** | Confirm that the EtherNet/IP tag data links are operated normally. |
| ↓ | |
| 7.5.1 Checking the Connection Status | Check the connection status of EtherNet/IP. |
| ↓ | |
| 7.5.2 Checking the Data that are Sent and Received | Confirm that the correct data are sent and received. |

## 7.2. Setting Up the FZ5 Sensor Controller

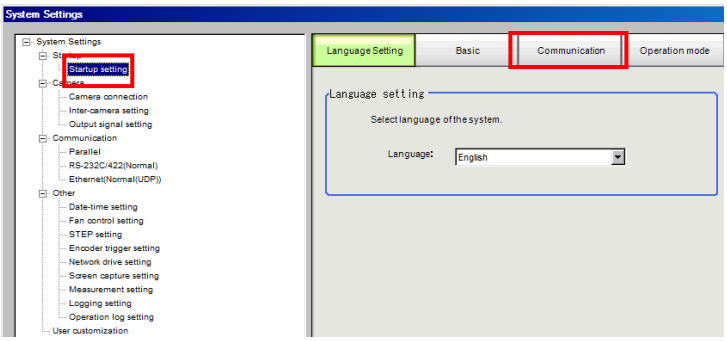
Set up the FZ5 Sensor Controller.

### 7.2.1. Parameter Settings

Set the parameters for the FZ5 Sensor Controller.

| | | |
|---|---|---|
| 1 | Connect the Camera, Monitor, USB connected mouse, and the LAN cable to the FZ5 Sensor Controller.<br>Connect the LAN cable at the other end to the Switching hub.<br>Connect the power supply cable to the Power terminal. |  |
| 2 | Turn ON the power supply to the FZ5 Sensor Controller. | |
| 3 | The Language setting Dialog Box is displayed on the Monitor connected to the FZ5 Sensor Controller only at the initial start.<br>Select ***English*** and click the **OK** Button.<br><br>Confirm that your desired Language is selected and click the **Yes** Button. |  <br>  |
| 4 | Select ***System Settings*** from the Tool Menu in the FZ-PanDA Dialog Box on the Monitor. |  |

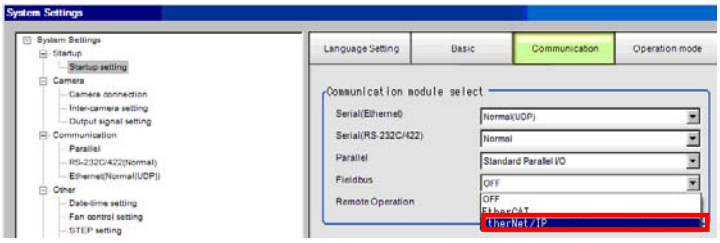
5 Select **System Settings**-**Startup**-**Startup setting** from the tree. The setting dialog box is displayed. Select the **Communication** Tab.

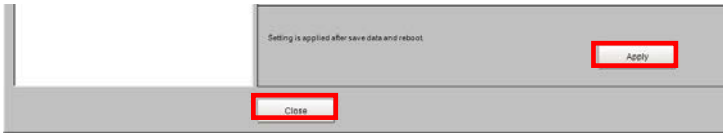



6 The Communication module select Dialog Box is displayed. Select ***EtherNet/IP*** from the Fieldbus pull-down list.

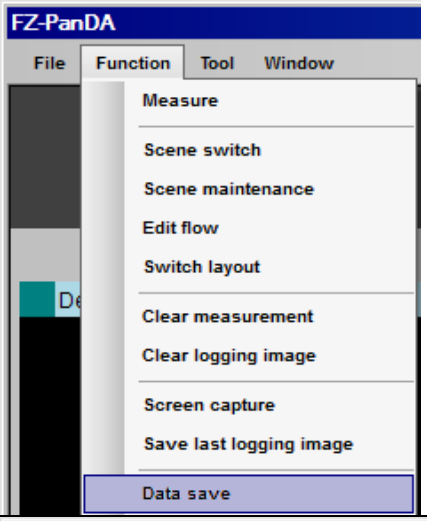
Then, click the **Apply** Button. Click the **Close** Button to close the System Settings Dialog Box.

* The data set in the System Settings Dialog Box as shown on the right becomes enabled after the settings are saved, and then the FZ5 Sensor Controller is restarted.

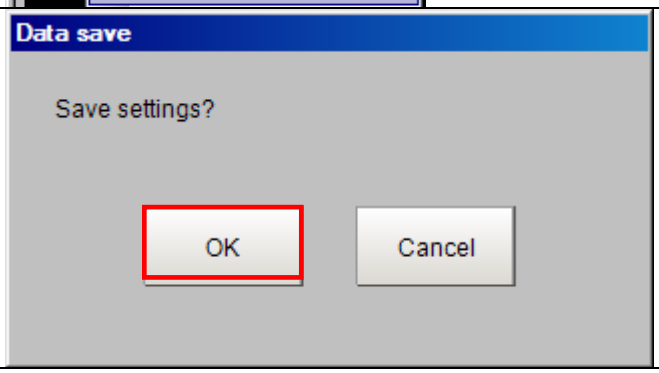


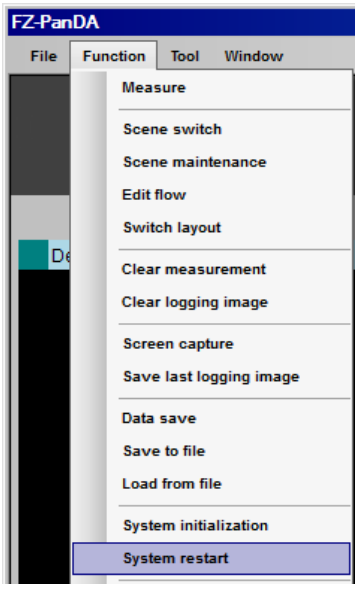
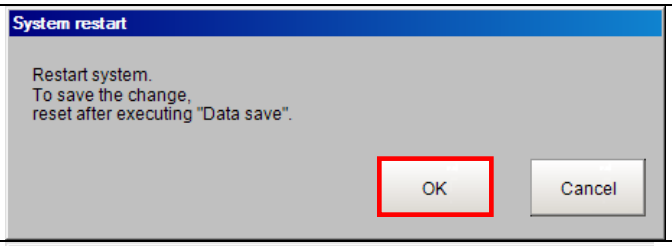
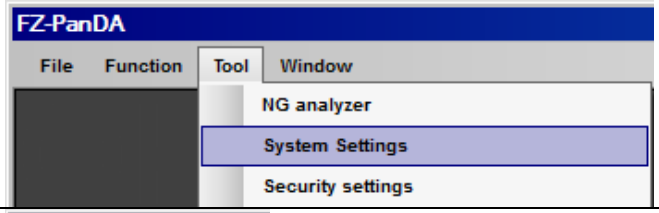
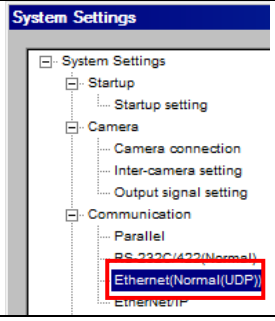




7 Select ***Data save*** from the Function Menu.

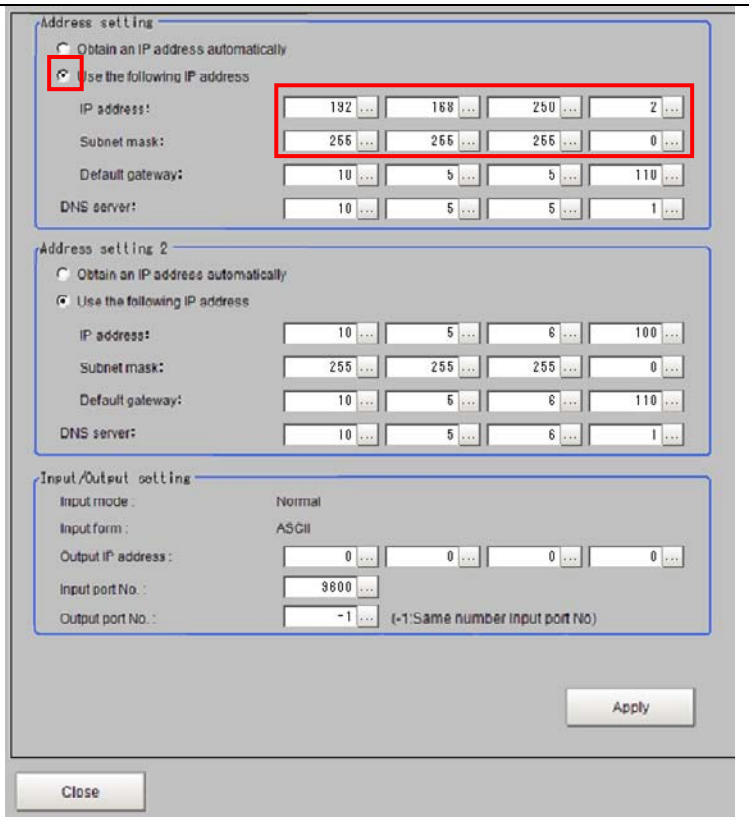



8 The Data save Dialog Box is displayed. Click the **OK** Button.



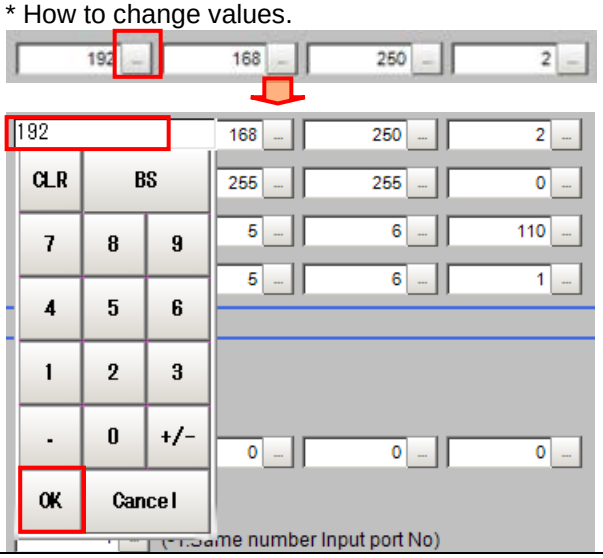
| | | |
|---|---|---|
| 9 | Select ***System restart*** from the Function Menu. |  |
| 10 | The System restart Dialog Box is displayed. Check the contents and click the **OK** Button. |  |
| 11 | After restarting, select ***System Settings*** from the Tool Menu. |  |
| 12 | Select **System Settings** - **Communication** - **Ethernet:Normal(UDP)** from the tree. |  |

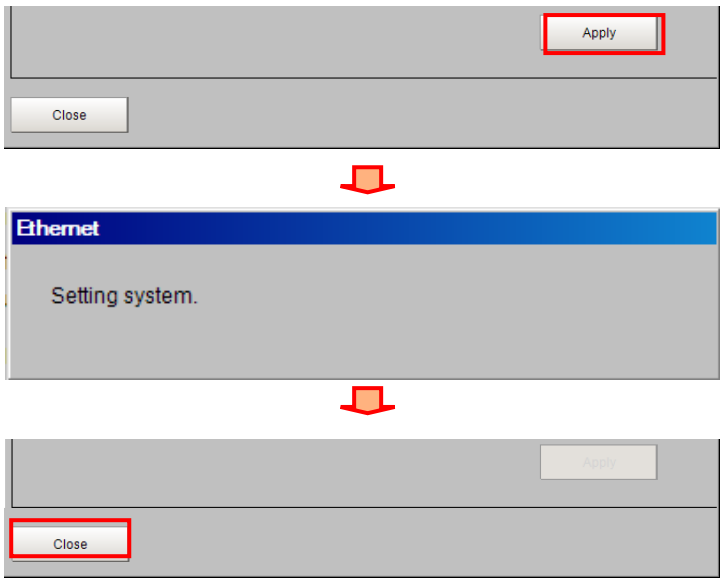
13 The dialog box on the right is displayed. Select the *Use the following IP address* Option for Address setting and set the following values.
IP address: *192.168.250.2*
Subnet Mask: *255.255.255.0*




* To change a value, click the … Button in the item in which a value is to be set. The numeric keyboard is displayed. Enter values using the mouse.
After entering the values, click the **OK** Button on the numeric keyboard.

* How to change values.



| | | |
|---|---|---|
| 14 | When a value is changed, the Apply Button is displayed. Click the **Apply** Button.<br><br>While the setting is being processed, the dialog box on the right is displayed.<br><br>After the dialog box disappears, click the **Close** Button to close the System Settings Dialog Box. |  |
| 15 | In the same way as steps 7 and 8, select ***Data save*** from the Function Menu. | |
| 16 | In the same way as steps 9 and 10, select ***System restart*** from the Function Menu. | |

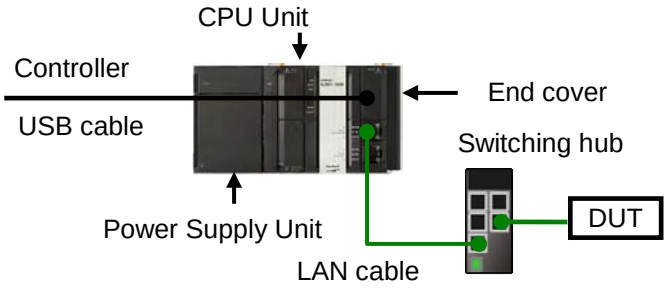
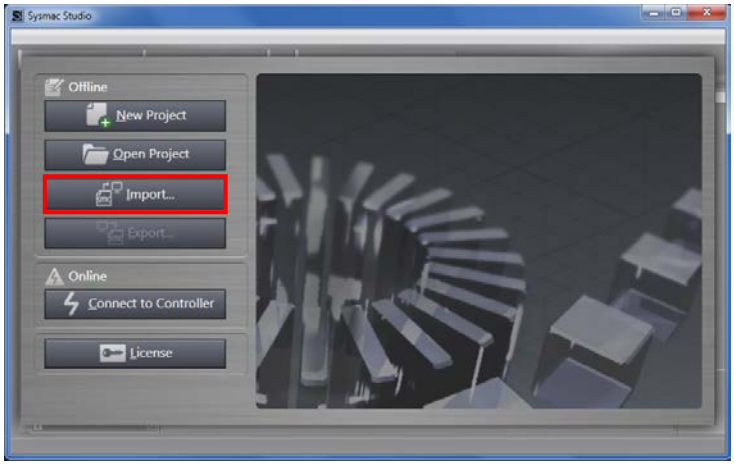
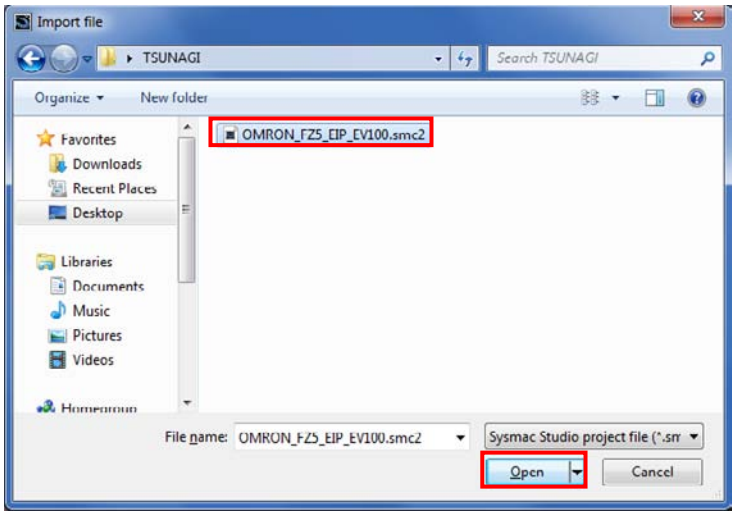
## 7.3. Setting Up the Controller

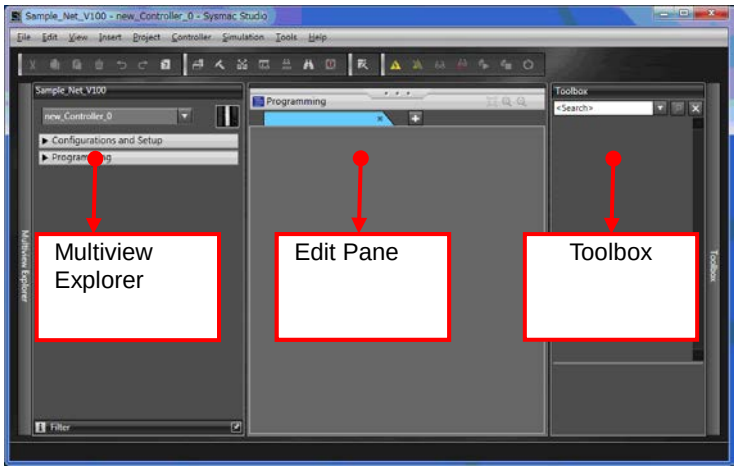
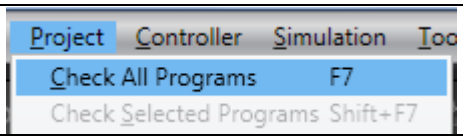
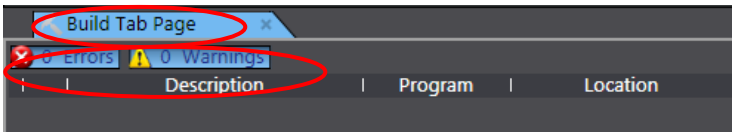
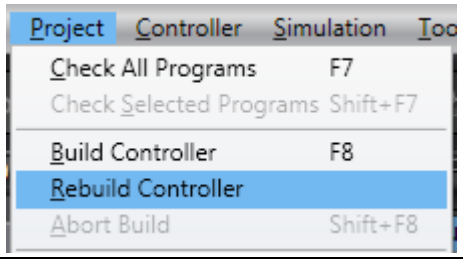
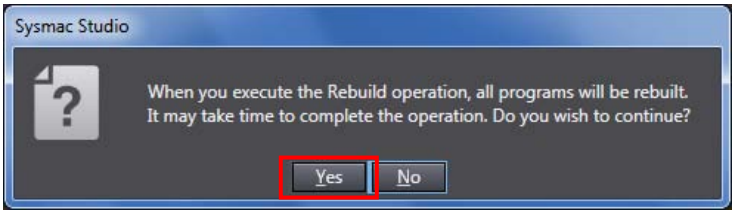
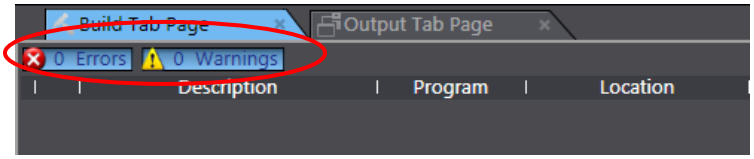
Set up the Controller.

### 7.3.1. Starting the Sysmac Studio and Importing the Project File

Start the Sysmac Studio and import the Sysmac Studio project file.

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

| | | |
|---|---|---|
| 1 | Connect the LAN cable to the Built-in EtherNet/IP port (PORT1) of the Controller and the USB cable to the peripheral (USB) port. Then connect the Controller, Personal computer, and Switching hub by referring to *5.2. Device Configuration*. |  |
| 2 | Turn ON the power supply to the Controller and Switching hub. | |
| 3 | Start the Sysmac Studio.<br><br>Click the **Import** Button.<br><br>* If a confirmation dialog for an access right is displayed at start, select to start. |  |
| 4 | The Import file Dialog Box is displayed.<br><br>Select *OMRON_FZ5_EIP_EV100.smc 2* (Sysmac Studio project file) and click the **Open** Button.<br><br>* Obtain the Sysmac Studio project file from OMRON. |  |

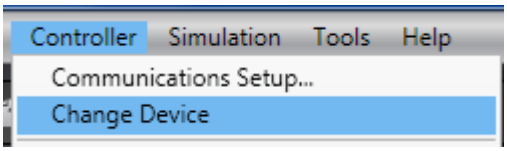
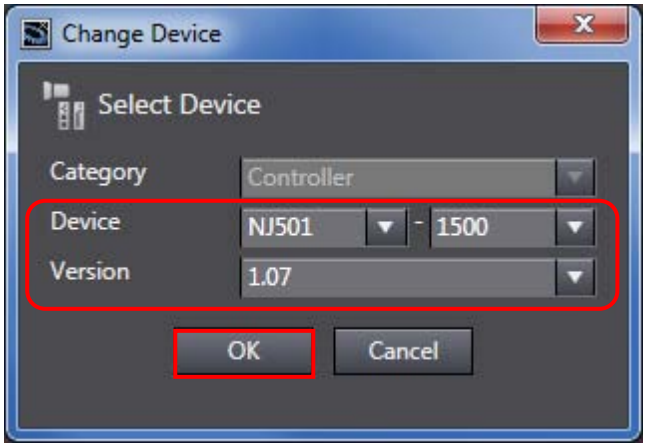
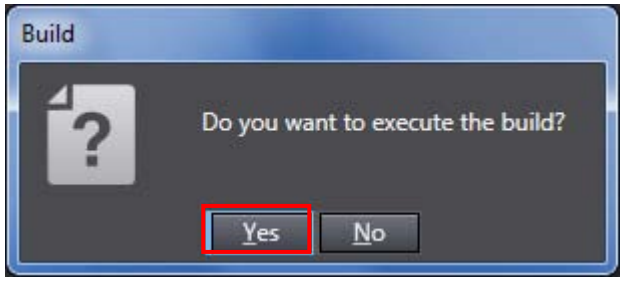
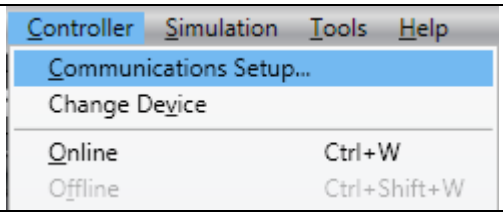
| | | |
|---|---|---|
| 5 | The OMRON_FZ5_EIP_EV100 project is displayed.<br><br>The left pane is called Multiview Explorer, the right pane is called Toolbox and the middle pane is called Edit Pane.<br><br>* If an error message is displayed stating "Failed to Load Descendants", change the version of the Sysmac Studio to the version specified in *5.2. Device Configuration* or higher version. |  |
| 6 | Select ***Check All Programs*** from the Project Menu. |  |
| 7 | The Build Tab Page is displayed on the Edit Pane.<br><br>Confirm that "0 Errors" and "0 Warnings" are displayed. |  |
| 8 | Select ***Rebuild Controller*** from the Project Menu. |  |
| 9 | A confirmation dialog box is displayed. Confirm that there is no problem and click the **Yes** Button. |  |
| 10 | Confirm that "0 Errors" and "0 Warnings" are displayed in the Build Tab Page. |  |

### 7.3.2. Connecting Online and Transferring the Project Data

Connect online with the Sysmac Studio and transfer the project data to the Controller.

**⚠ WARNING**

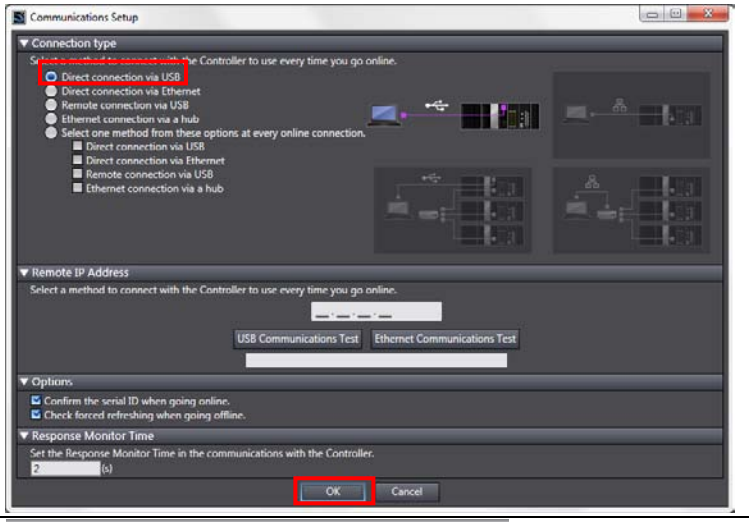
Always confirm safety at the Destination Device before you transfer a user program, configuration data, setup data, device variables, or values in memory used for CJ-series Units from the Sysmac Studio.
The devices or machines may perform unexpected operation regardless of the operating mode of the CPU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

| | | |
|---|---|---|
| 1 | Select ***Change Device*** from the Controller Menu. |  |
| 2 | The Change Device Dialog Box is displayed.<br><br>Confirm that the *Device* and *Version* Fields are set as shown on the right.<br><br>* If the settings are different, select the setting items from the pull-down list.<br>Click the **OK** Button. |  |
| 3 | If you changed the settings in step 2, the Build Dialog Box is displayed. Check the contents and click the **Yes** Button. |  |
| 4 | Select ***Communications Setup*** from the Controller Menu. |  |

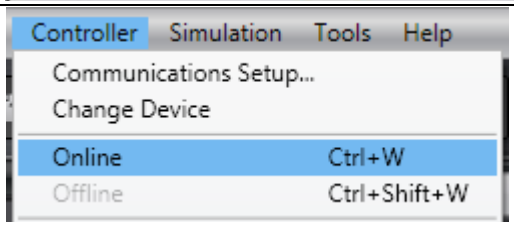
5 The Communications Setup Dialog Box is displayed.

Confirm that the *Direct connection via USB* Option is selected for Connection type.

Click the **OK** Button.

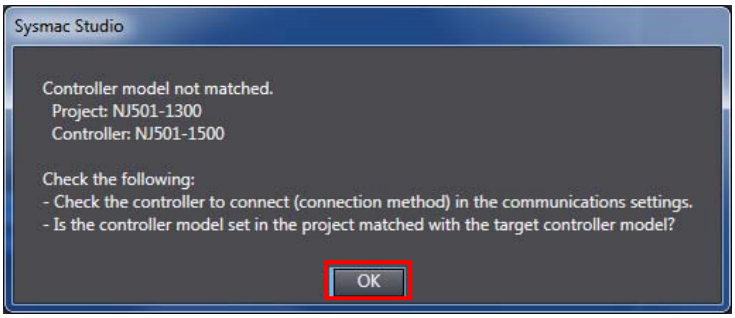



6 Select ***Online*** from the Controller Menu.

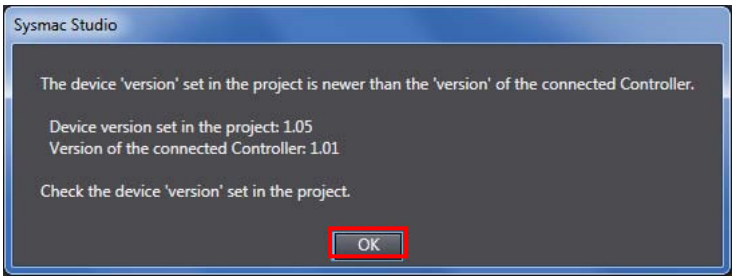



* If the dialog on the right is displayed, the model or version of the Controller does not match that of the project file. Match the Controller model and version by changing the device settings of the project file, and then repeat the procedure from step 1 in this section. Close the dialog box by clicking the **OK** Button.

*Example of confirmation dialog box

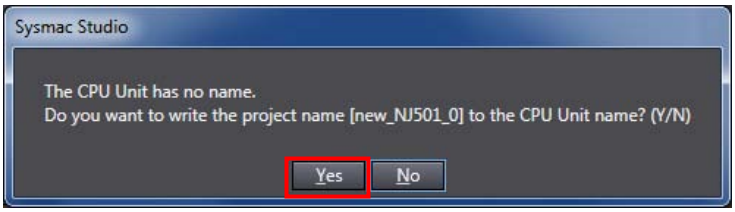
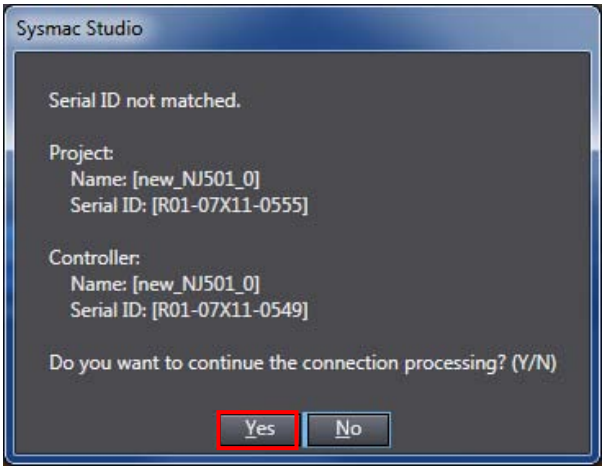
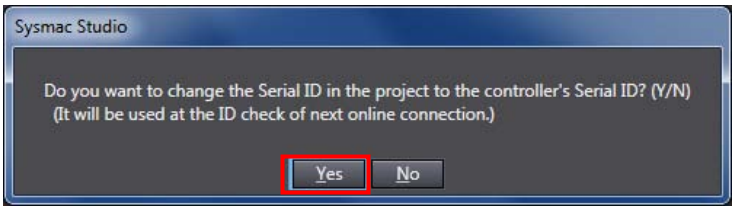
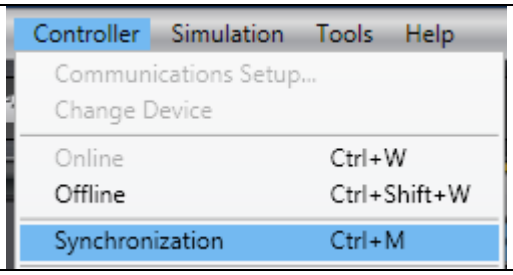
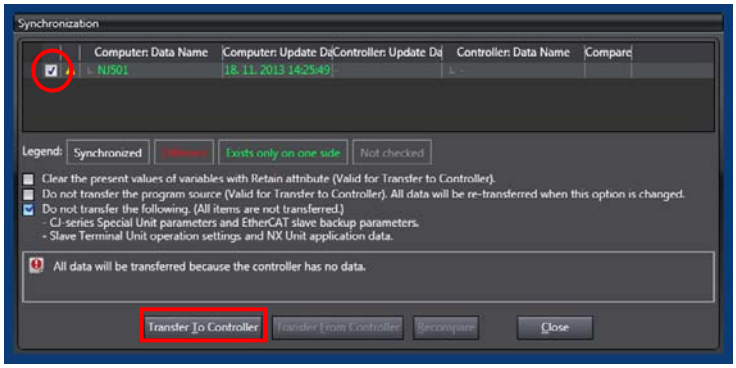



* The model and version displayed on the confirmation dialog box differ depending on the Controller used and the device setting of the project file.




**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).

| | | |
|---|---|---|
| 7 | A confirmation dialog box is displayed as shown on the right. Confirm that there is no problem and click the **Yes** Button.<br><br>* The displayed dialog depends on the status of the Controller used. Click the **Yes** Button to proceed with the processing.<br><br>* The displayed serial ID differs depending on the device. |  <br>  <br>  |
| 8 | When an online connection is established, a yellow bar is displayed on the top of the Edit Pane. |  |
| 9 | Select ***Synchronization*** from the Controller Menu. |  |
| 10 | The Synchronization Dialog Box is displayed.<br><br>Confirm that the data to transfer (NJ501 in the right dialog) is selected. Then, click the **Transfer To Controller** Button.<br><br>* After executing the Transfer To Controller, the Sysmac Studio data is transferred to the Controller and the data is compared. |  |

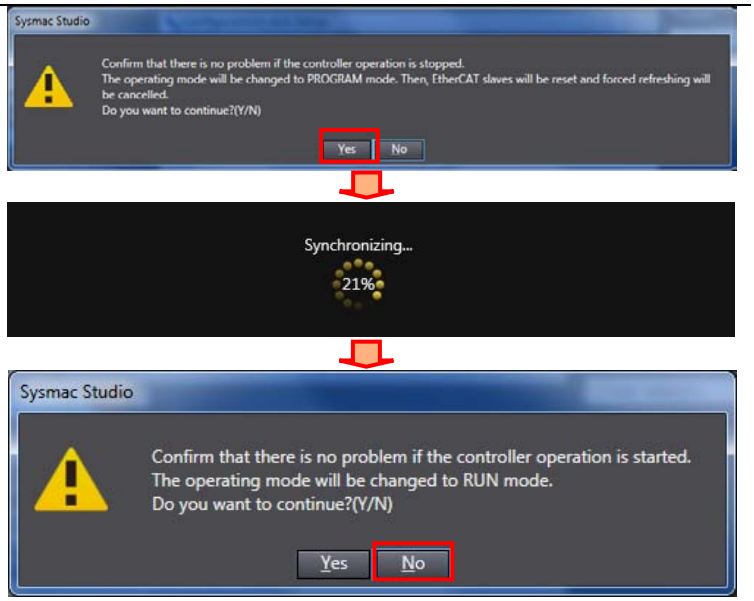
11

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 **No** Button.

* Do not return it to RUN mode.



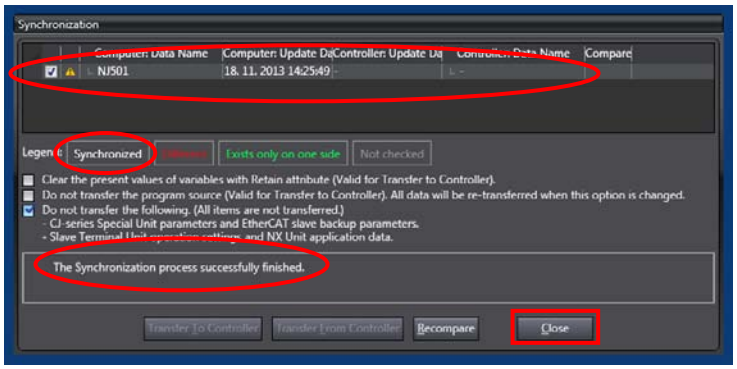

12

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. Setting Up the Network

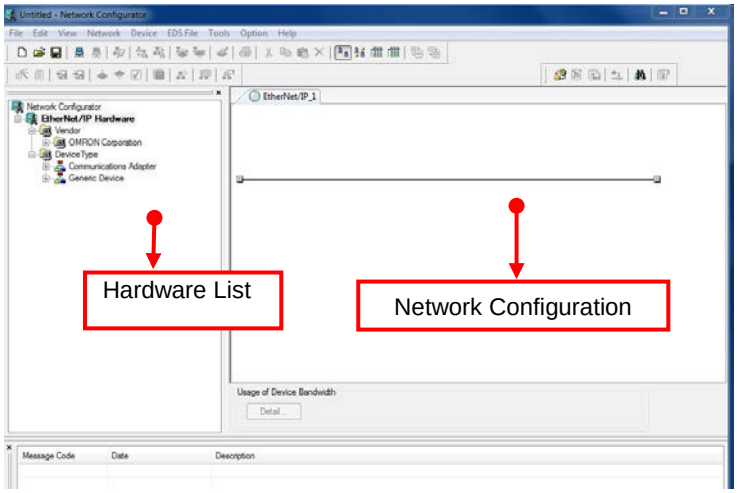
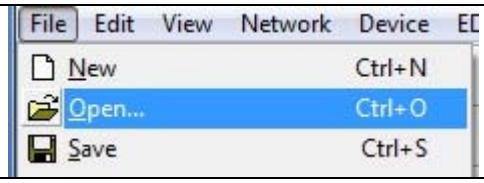
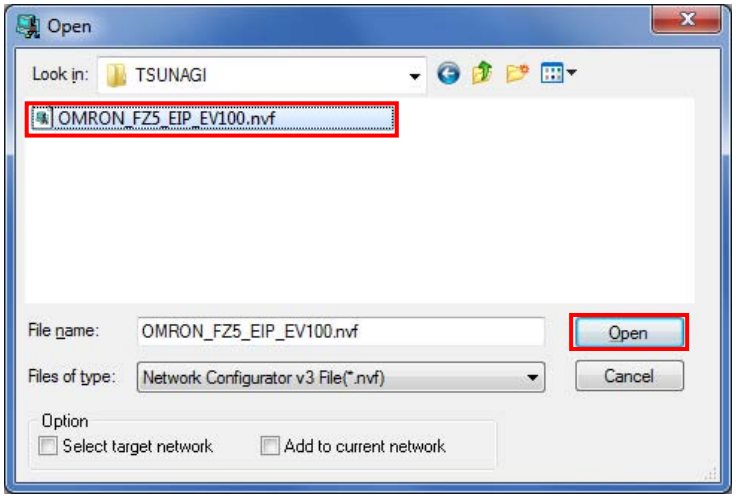
Set the tag data links for the EtherNet/IP.

### 7.4.1. Starting the Network Configurator and Opening the Network Configuration File

Start up the Network Configurator and open the Network Configurator v3 network configuration file.

**Precautions for Correct Use**

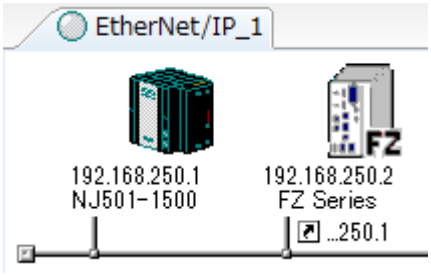
Confirm that the LAN cable is connected before taking the following procedure.
When it is not connected, turn OFF the power supply to each device and then connect the LAN cable.

| | | |
|---|---|---|
| 1 | Start the Network Configurator. |  |
| 2 | Select ***Open*** from the File Menu. |  |
| 3 | The Open Dialog Box is displayed.<br><br>Select *OMRON_FZ5_EIP_EV100.nvf* (Network Configurator v3 network configuration file) and click the **Open** Button.<br><br>* Obtain the Network Configurator v3 network configuration file from OMRON. |  |

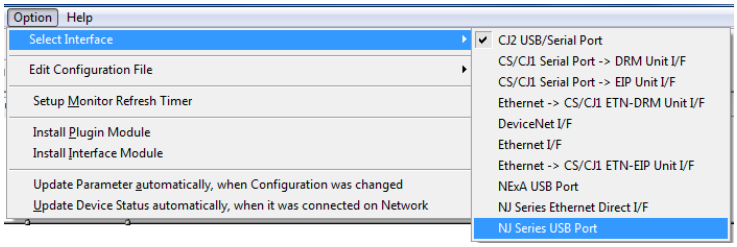
4 The following devices are displayed in the Network Configuration Pane as shown on the right.

IP address of node 1: 192.168.250.1
IP address of node 2: 192.168.250.2

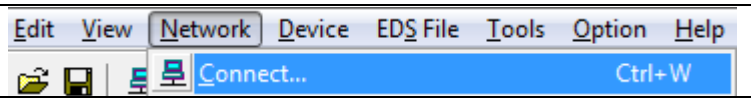
* The destination device icon changes to the FZ Series device.




5 Select ***Select Interface*** - ***NJ Series USB Port*** from the Option Menu.

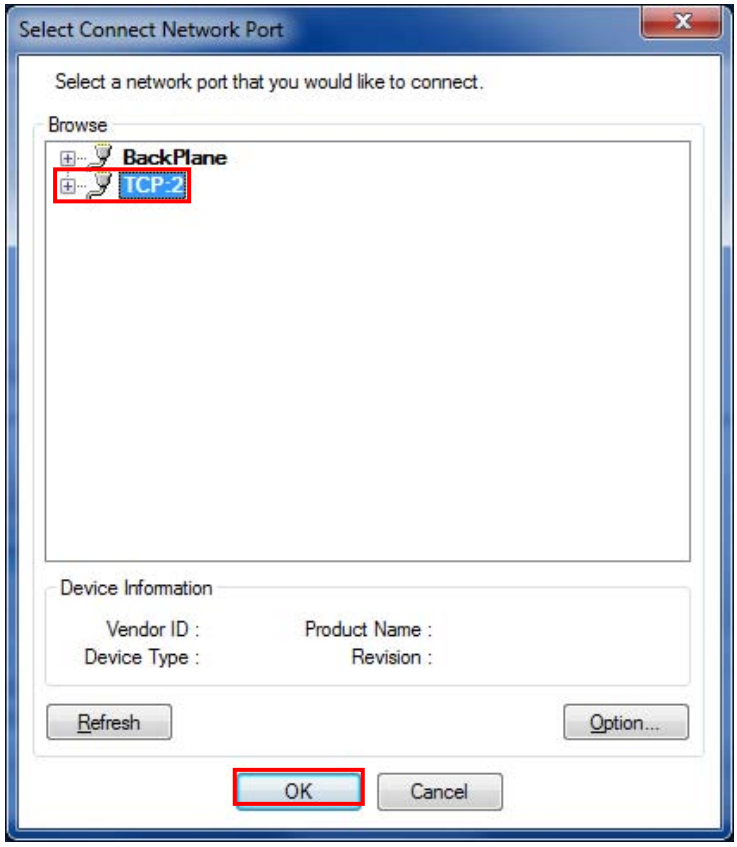


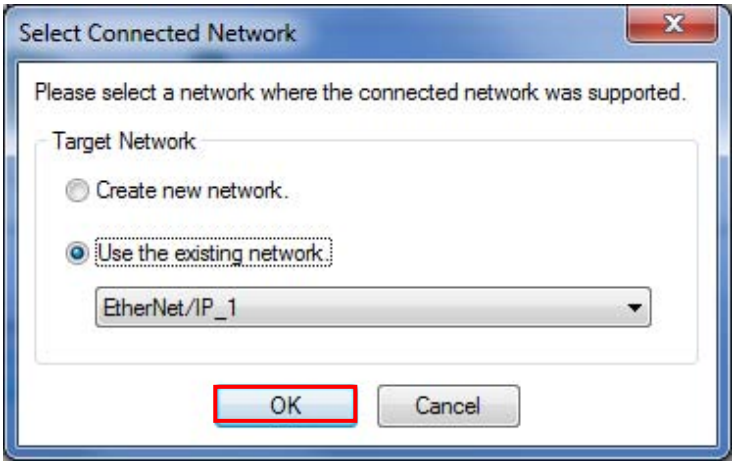
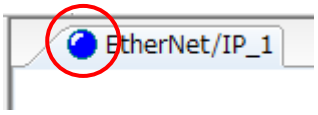

6 Select ***Connect*** from the Network Menu.




7 The Select Connect Network Port Dialog Box is displayed. Select *TCP:2*.

Click the **OK** Button.



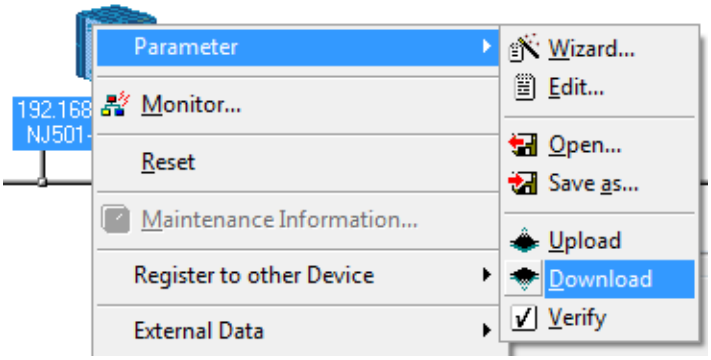
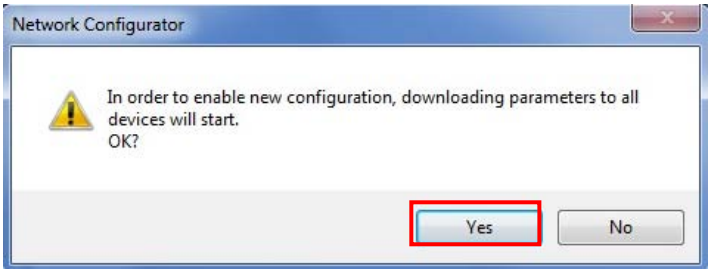
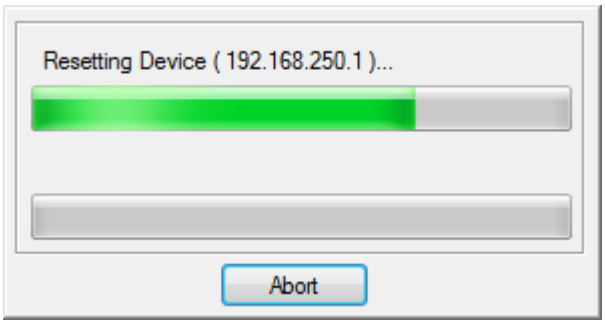
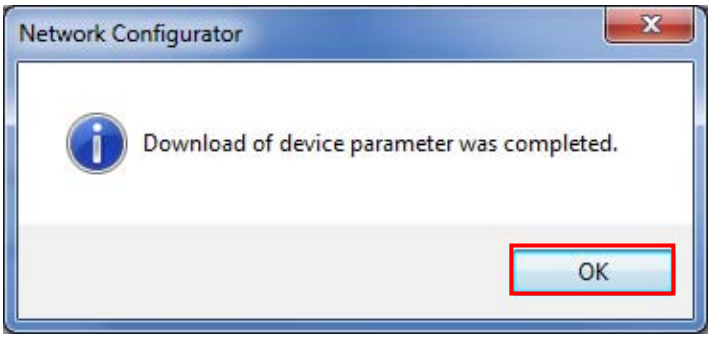
| | | |
|---|---|---|
| 8 | The Select Connected Network Dialog Box is displayed. Check the contents and click the **OK** Button. |  |
| 9 | When an online connection is established normally, the color of the icon on the right figure changes to blue. |  |

**Additional Information**

If an online connection cannot be made to the Controller, check the cable connection. Or, return to step 4, check the settings and repeat each step.
For details, refer to *7.2.8 Connecting the Network Configurator to the Network* in *Section 7 Tag Data Link Functions* of the *NJ-series CPU Unit Built-in EtherNet/IP Port User's Manual* (Cat. No. W506).

### 7.4.2. Transferring the Tag Data Link Parameters

Transfer the tag data link parameters to the Controller.

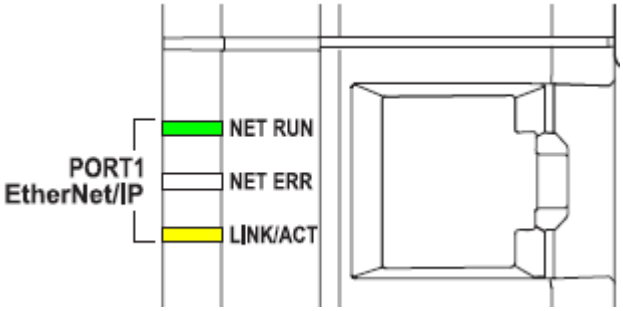
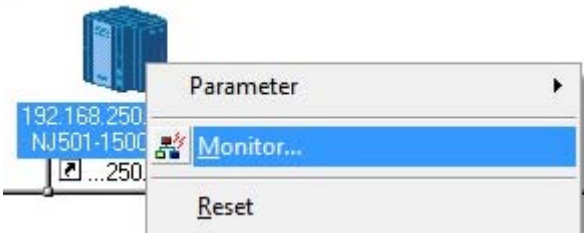
| | | |
|---|---|---|
| 1 | Right-click the device icon of node 1 on the Network Configuration Pane and select ***Parameter*** - ***Download***. |  |
| | The dialog box on the right is displayed. Confirm that there is no problem and click the **Yes** Button. |  |
| 2 | Tag data link parameters are downloaded from the Network Configurator to the Controller. |  |
| 3 | The dialog box on the right is displayed. Check the contents and click the **OK** Button. |  |

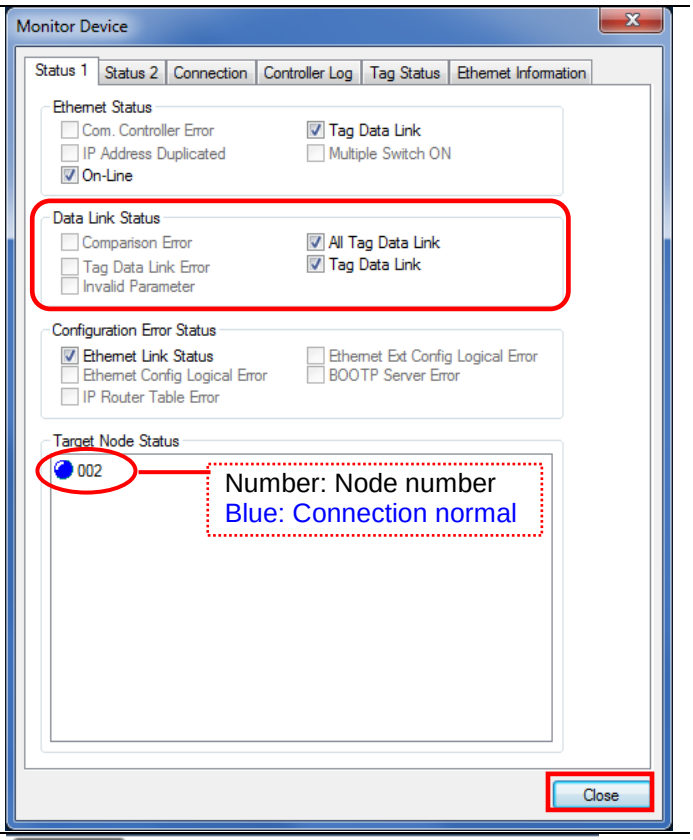
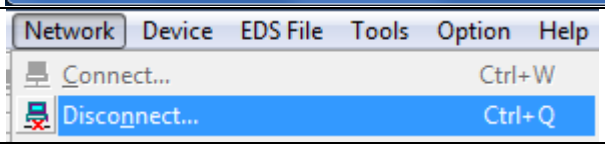
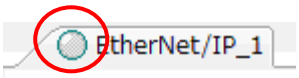
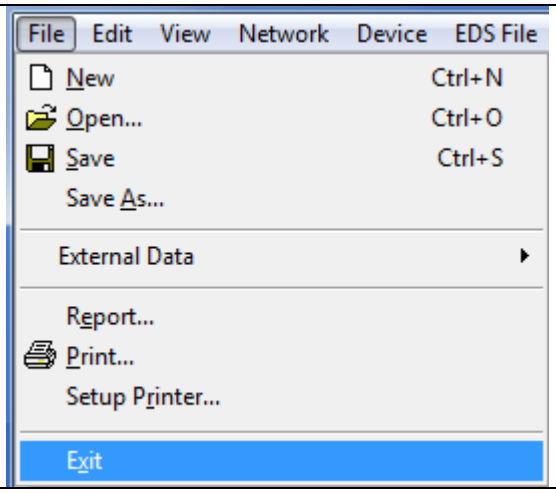
## 7.5. Checking the EtherNet/IP Communications

Confirm that the EtherNet/IP tag data links are operated normally.

### 7.5.1. Checking the Connection Status

Check the connection status of EtherNet/IP.

| | | |
|---|---|---|
| 1 | Confirm that the tag data links are normally in operation by checking the LED indicators on each device.<br><br>・Controller (Built-in EtherNet/IP port)<br>The LED indicators in normal status are as follows:<br>[NET RUN]: Lit green<br>[NET ERR]: Not lit<br>[LINK/ACT]: Flashing yellow<br>(Flashing while packets are being sent and received) |  <br>(Controller) |
| 2 | Confirm that the tag data links are normally in operation by checking the status information on the Monitor Device Window of the Network Configurator.<br><br>Right-click the device icon of node 1 on the Network Configuration Pane and select ***Monitor***. |  |

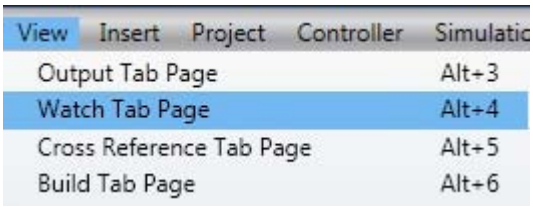
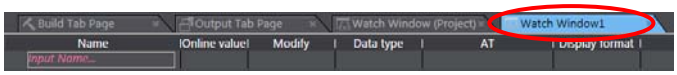
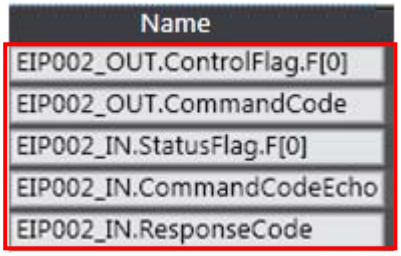
| | | |
|---|---|---|
| 3 | The dialog box on the right displays the Status 1 Tab Page of the Device Monitor Dialog Box.<br><br>When the same items as shown on the right are selected in the *Data Link Status* Field, the data links are normally in operation.<br><br>* The *Tag Data Link* Check Box in the *Ethernet Status* Field can not be checked shortly after tag data link parameters have been transferred.<br><br>Click the **Close** Button. |  |
| 4 | Select ***Disconnect*** from the Network Menu to go offline. |  |
| 5 | The color of the icon on the figure changes from blue. |  |
| 6 | Select ***Exit*** from the File Menu to exit the Network Configurator. |  |

### 7.5.2. Checking the Data that are Sent and Received

Confirm that the correct data are sent and received.

**⚠ WARNING**

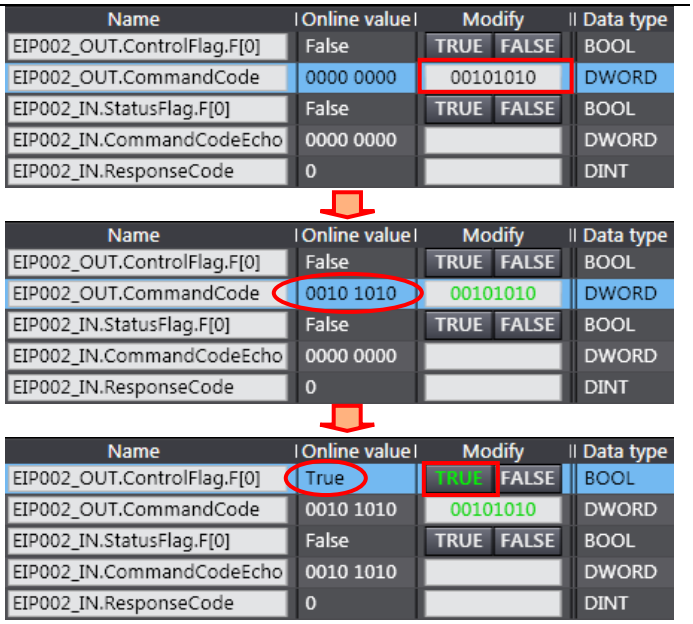
Always confirm safety at the Destination Device before you transfer a user program, configuration data, setup data, device variables, or values in memory used for CJ-series Units from the Sysmac Studio.
The devices or machines may perform unexpected operation regardless of the operating mode of the CPU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

| | | |
|---|---|---|
| 1 | Select ***Watch Tab Page*** from the View Menu. |  |
| 2 | The Watch Window1 Tab Page is displayed in the lower section of the Edit Pane. |  |
| 3 | The following names are entered in the Watch Window1 Tab Page for monitoring.<br>*EIP002_OUT.ControlFlag.F[0]:* Command Request Bit (EXE)<br>*EIP002_OUT.CommandCode*: Command code (CMD-CODE)<br>*EIP002_IN.StatusFlag.F[0]*: Command Completion Bit (FLG)<br>*EIP002_IN.CommandCodeEcho*: Command code (CMD-CODE)<br>*EIP002_IN.ResponseCode*: Response code (RES-CODE) |  |

4 Enter *00101010* in the *Modify* Column of *EIP002_OUT.CommandCode*. (CommandCode [00101010]: Measurement)

By pressing the **Enter** Key, the value is set and the Online value of *EIP002_OUT.CommandCode* changes to 00101010.

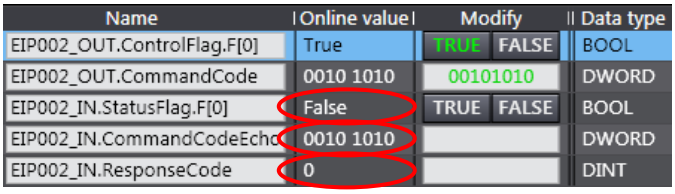
Click **TRUE** in the *Modify* Column of *EIP002_OUT.ControlFlag.F[0]*. The Online value changes to True. (EIPOutput.ControlFlag.F[0]: Command Request Bit)




5 After the measurement is completed, OK is displayed on the dialog box.


6 The execution results are reflected in the following variables.

- *EIP002_IN.StatusFlag.F[0]*: True (It returns to False after a certain time)
- *EIP002_IN.CommandCodeEcho*: 00101010 (The sent command code is returned)
- *EIP002_IN.ResponseCode*: 0 (The execution result of the command (0: OK, -1: NG))



# 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

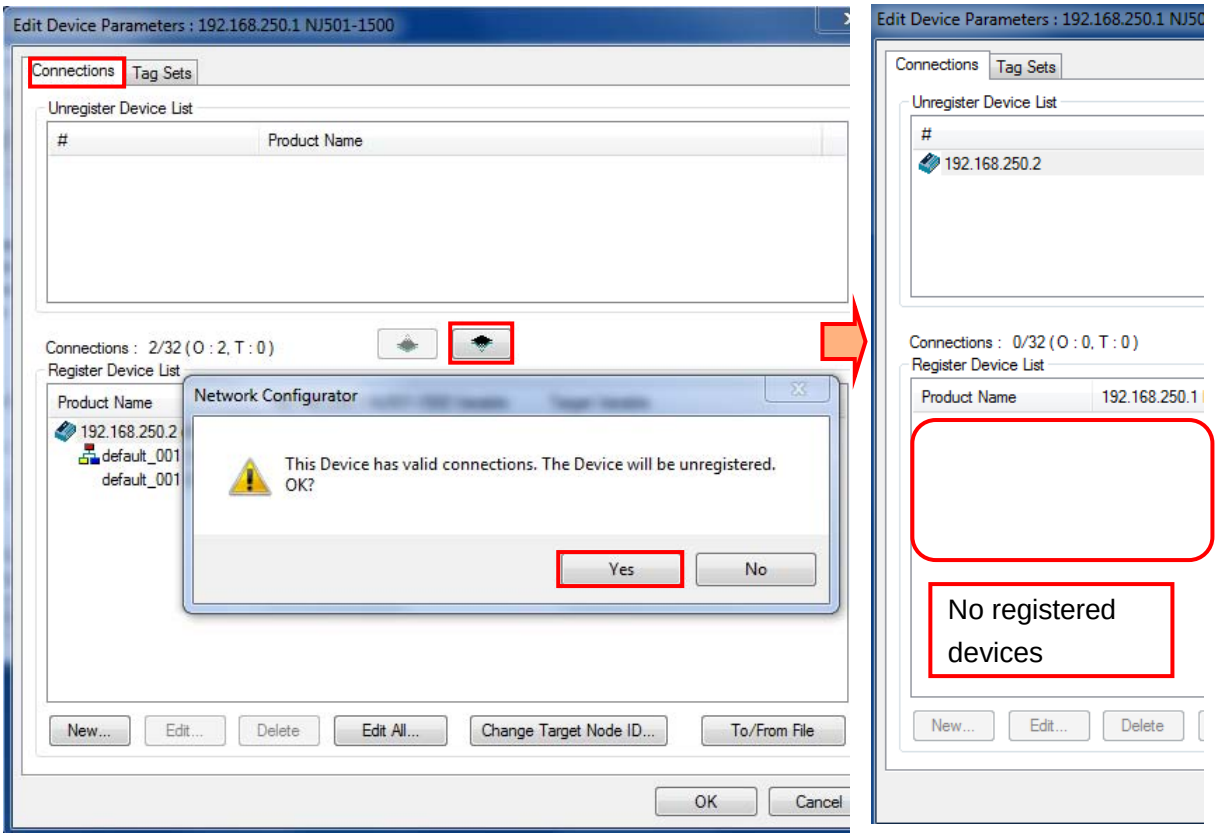
To initialize the settings of the Controller, the CPU Unit and EtherNet/IP port need to be initialized. Change the Controller to PROGRAM mode before the initialization.

### 8.1.1. EtherNet/IP port

Delete the connection information and tag information that are set for the EtherNet/IP port. Follow the procedure below to set blank connection information and blank tag information and delete them using the Network Configurator.

(1) Deleting connection information

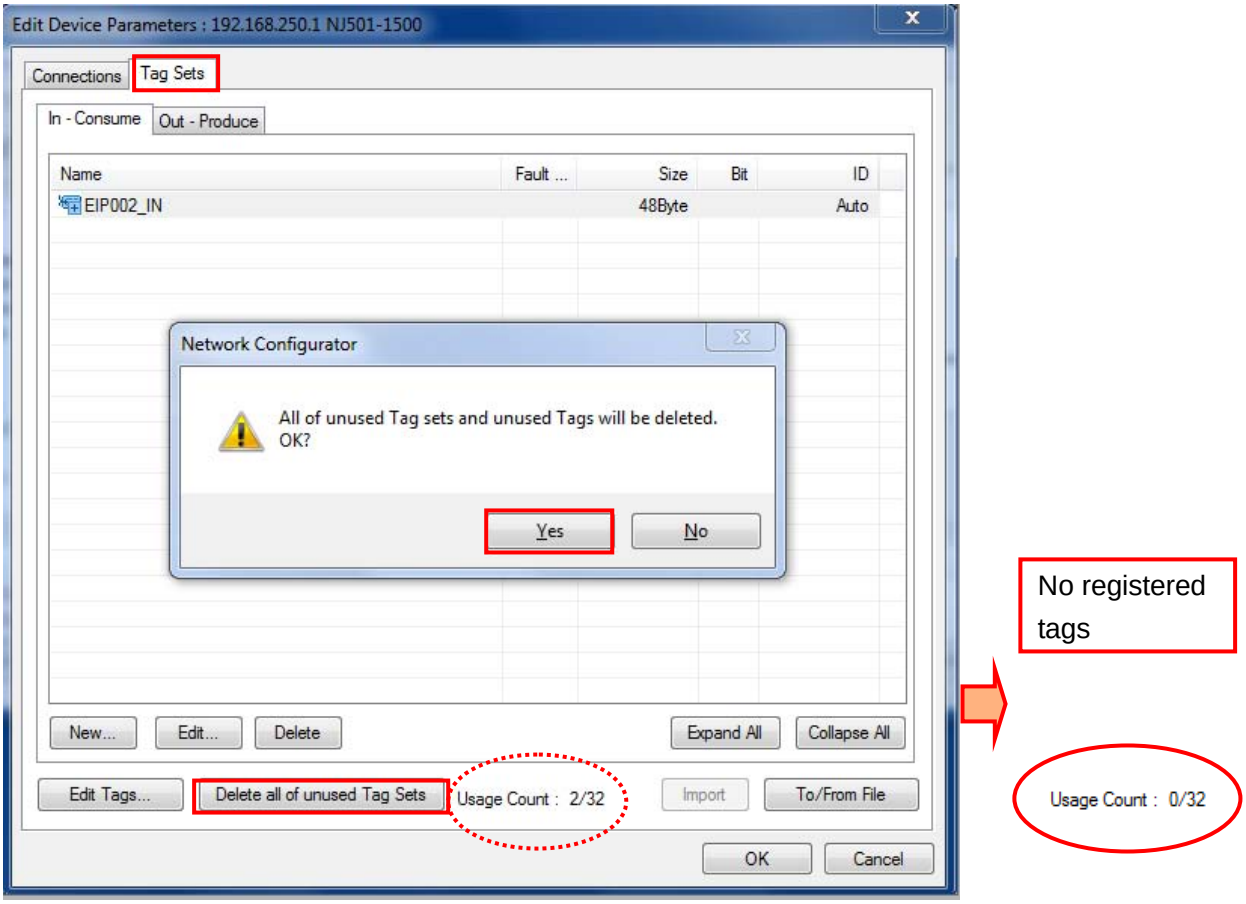
Select the **Connections** Tab of the Edit Device Parameters Dialog Box and move all devices registered in the *Register Device List* Field to the *Unregister Device List* Field. If a confirmation dialog is displayed when you remove devices from the registration list, click the **Yes** Button.



(2) Deleting tag information

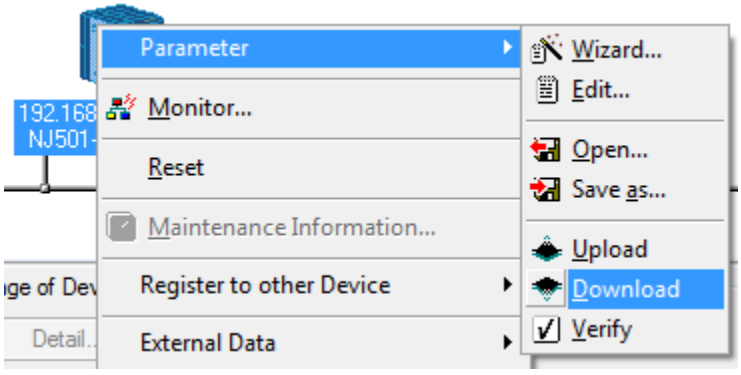
Select the **Tag Sets** Tab of the Edit Device Parameters Dialog Box and click the **Delete all of unused Tag Sets** Button.

If a confirmation dialog is displayed when you delete tag sets from the registration list, confirm that there is no problem and click the **Yes** Button.



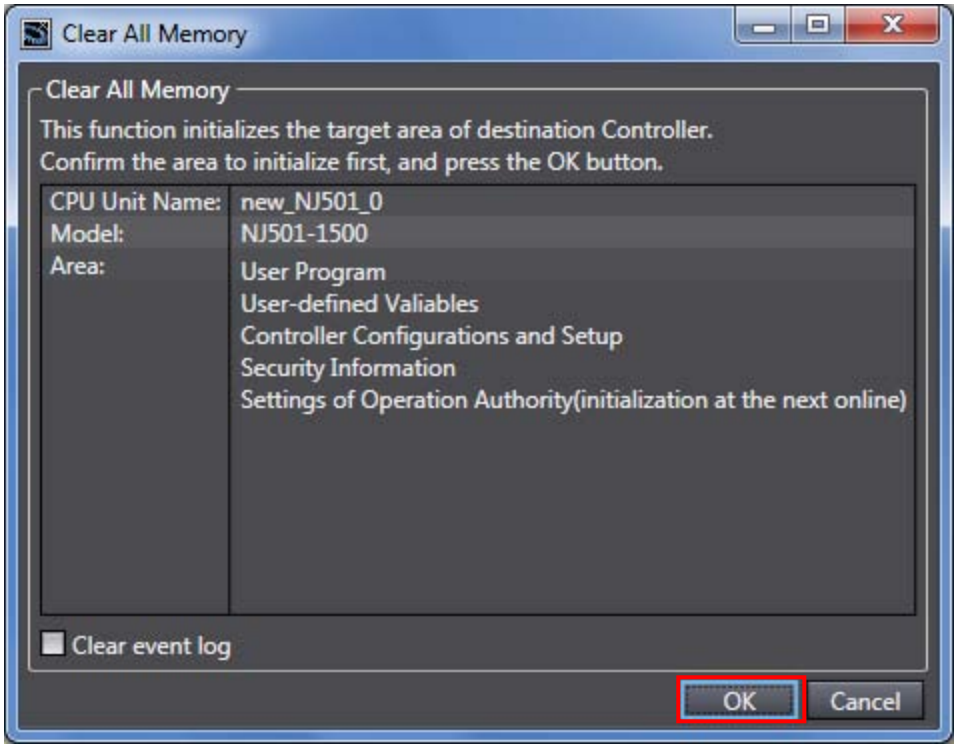

(3) Download

Right-click the Controller and select ***Parameter*** - ***Download*** from the menu that is displayed.



### 8.1.2. CPU Unit

To initialize the settings of the CPU Unit, 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 FZ5 Sensor Controller

For how to initialize the FZ5 Sensor Controller, refer to *Initializing the Controller* in *Section 1 Before Operation* of the *Vision Sensor FH/FZ5 Series Vision System User's Manual* (Cat.No.Z340).

# 9. Appendix 1 Detailed Settings of the Tag Data Links

This section provides the detailed settings necessary to perform tag data links which are set in this document.

## 9.1. Global Variable Table

The Controller accesses the data in tag data links as global variables. The following are the settings of the global variables. Use the Sysmac Studio to register a global variable table.

| Name | Data type | Network publish | Destination device allocation |
|---|---|---|---|
| EIP002_OUT | S_EIPOutput | Output | Output data (20Bytes) |
| EIP002_IN | S_EIPInput | Input | Input data (48Bytes) |

* For details on data types, refer to *6.2 Data Types for Tag Data Links*.

**Precautions for Correct Use**

If the data size in tag data links of the Destination Device is an odd-numbered byte, use BYTE type to define, but not BOOL type.

**Additional Information**

For details on the command codes and response codes, refer to *Accessing Communications Areas Using Variables with NJ-series Controllers* in *Section 2 Methods for Connecting and Communicating with External Devices - Communicating with EtherNet/IP - Memory Allocation* of the *Vision Sensor FH/FZ5 Series Vision System User's Manual (Communications Settings)* (Cat. No. Z342).

**Additional Information**

With the Sysmac Studio, two methods can be used to specify an array for a data type. After specifying, (1) is converted to (2) and the data type is always displayed as (2).

(1)WORD[3]/(2)ARRAY[0..2]OF WORD

In this document, the data type is simplified by describing WORD[3].

(The example above means a WORD data type with three array elements.)

## 9.2. Relationship between Destination Device and Global Variables

Global variables need to be arranged in offset order of the Destination Device before setting the tag data link parameters. The order of offset is the same as that of described in *6.2. Data Types for Tag Data Link*s.

The relationship between the memory allocation of the Destination Device and the global variables is shown below.

■ Output area (from Controller to FZ5 Sensor Controller)

| Variable | Data type | Data size |
|---|---|---|
| EIP002_OUT | S_EIPOutput | 20 bytes |

| Offset | Destination device data | Global variable | Data type |
|---|---|---|---|
| +0 to +1 | Control signal (32 bits) (Data type: U_EIPFlag) | EIP002_OUT.ControlFlag.F*1 | BOOL[32] |
| | | EIP002_OUT.ControlFlag.W*1 | DWORD |
| +2 to +3 | Command code (CMD-CODE) | EIP002_OUT.CommandCode | DWORD |
| +4 to +5 | Command parameter (CMD-PARAM) | EIP002_OUT.CommandParam1 | DINT |
| +6 to +7 | | EIP002_OUT.CommandParam2 | DINT |
| +8 to +9 | | EIP002_OUT.CommandParam3 | DINT |

*1: Details on allocation of control signal

Allocation of ControlFlag.F

| Offset (word) | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +0 | ERCLR | | | | | | | XEXE | | | | | | | STEP | EXE |
| +1 | | | | | | | | | | | | | | | | DSA |

EXE: Command Request Bit: Turned ON to execute a command.
STEP: Measure Bit: Turned ON to execute a measurement.
XEXE: Flow Command Request Bit: Turned ON to request execution of a command during execution of fieldbus flow control.
ERCLR: Error Clear Bit: Turned ON to clear the Error Status bit.
DSA: Data Output Request Bit: Turned ON to request data output.

Allocation of ControlFlag.W

| Offset | 15 | 14 | 13 | ・・・ | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|
| +0 | 15 | 14 | 13 | ・・・ | 2 | 1 | 0 |
| +1 | 31 | 30 | 29 | ・・・ | 18 | 17 | 16 |

Bits 31 to 0: ControlFlag.W uses DWORD data from the offset +0 word.

■ Input area (from FZ5 Sensor Controller to Controller)

| Variable | Data type | Data size |
|---|---|---|
| EIP002_IN | S_EIPInput | 48 bytes |

| Offset | Destination device data | Global variable | Data type |
|---|---|---|---|
| +0 to +1 | Control output (32 bits) (Data type: U_EIPFlag) | EIP002_IN.StatusFlag.F*1 | BOOL[32] |
| | | EIP002_IN.StatusFlag.W*1 | DWORD |
| +2 to +3 | Command code (CMD-CODE) | EIP002_IN.CommandCodeEcho | DWORD |
| +4 to +5 | Response code (RES-CODE) | EIP002_IN.ResponseCode | DINT |
| +6 to +7 | Response data (RES-DATA) | EIP002_IN.ResponseData | DINT |
| +8 to +9 | Output data 0 (DATA0) | EIP002_IN.OutputData[0] to EIP002_IN.OutputData[7] | DINT[8] |
| +10 to +11 | Output data 1 (DATA1) | | |
| +12 to +13 | Output data 2 (DATA2) | | |
| +14 to +15 | Output data 3 (DATA3) | | |
| +16 to +17 | Output data 4 (DATA4) | | |
| +18 to +19 | Output data 5 (DATA5) | | |
| +20 to +21 | Output data 6 (DATA6) | | |
| +22 to +23 | Output data 7 (DATA7) | | |

*1: Details on allocation of control signal

Allocation of StatusFlag.F

| Offset | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| +0 | ERR | | | | | XWAIT | XBUSY | XFLG | | | | RUN | OR | | BUSY | FLG |
| +1 | | | | | | | | | | | | | | | | GATE |

FLG: Command Completion Bit: Turned ON when command execution is completed.
BUSY: Command Busy Bit: Turned ON when command execution is in progress.
OR: Overall Judgement Bit: Turned ON when the overall judgement is NG.
RUN: Run Mode Bit: Turned ON while the Sensor Controller is in Run Mode.
XFLG: Flow Command Completion Bit: Turned ON when execution of a command that was input during the execution of fieldbus flow control has been completed (i.e., when XBUSY turns OFF).
XBUSY: Flow Command Busy Bit: Turned ON when execution of a command that was input during execution of fieldbus flow control is in progress.
XWAIT: Flow Command Wait Bit: Turned ON when a command can be input during the execution of fieldbus flow control.
ERR: Error Signal: Turned ON when the Sensor Controller detects an error signal.
GATE: Data Output Completion Bit: Turned ON when data output is completed.

Allocation of StatusFlag.W

| Offset | 15 | 14 | 13 | ・・・ | 2 | 1 | 0 |
|---|---|---|---|---|---|---|---|
| +0 | 15 | 14 | 13 | ・・・ | 2 | 1 | 0 |
| +1 | 31 | 30 | 29 | ・・・ | 18 | 17 | 16 |

Bits 31 to 0: EIPInput.StatusFlag.W uses DWORD data from the offset +0 word.

## 9.3. Associating the Tag Data Links

Tag data link parameters are required to perform tag data links with a Destination Device.
Follow the procedures below to associate the tag data links.

(1) Use the Sysmac Studio to define the global variables to publish on the network.
Store the created global variables in a CSV file to use in the Network Configurator.
(2) Read the CSV file (tag list) created in step (1) to the Network Configurator.
(3) Install the EDS file for the Destination Device in the Network Configurator.
(4) Make a single tag set that includes the tag lists.
(5) Link the tag set with the destination device information and create tag data link parameters.

The numbers shown in the tables below correspond to the steps above.

■ Output area (from Controller to FZ5 Sensor Controller)

| Controller setting (Set with Sysmac Studio.) | | Data link table setting (Set with Network Configurator.) | | | | Destination device information | |
|---|---|---|---|---|---|---|---|
| (1) | | | Tag set: EIP002_OUT | | 20Byte (4) | <= | Output_100-[20Byte] |
| Global variable (Data type) | | | (3) | Tag list | | | |
| EIP002_OUT | S_EIPOutput | => (2) | | EIP002_OUT | (20Byte) | | |

■ Input area (from FZ5 Sensor Controller to Controller)

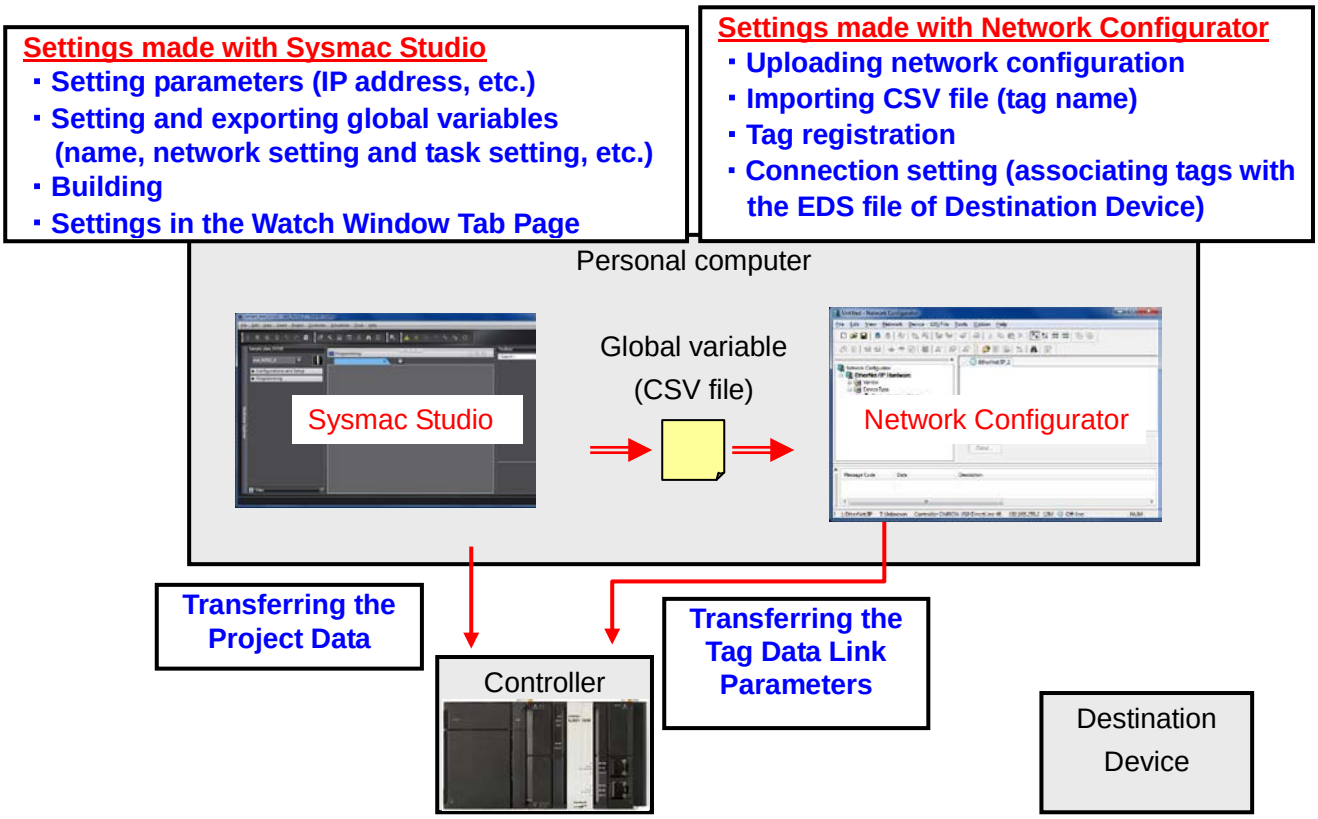
| Controller setting (Set with Sysmac Studio.) | | Data link table setting (Set with Network Configurator.) | | | | Destination device information | |
|---|---|---|---|---|---|---|---|
| (1) | | | Tag set: EIP002_IN | | 48Byte (4) | <= | Input_101-[48Byte] |
| Global variable (Data type) | | | (3) | Tag list | | | |
| EIP002_IN | S_EIPInput | => (2) | | EIP002_IN | (48Byte) | | |

# 10. Appendix 2 Setting the Tag Data Links Using the Software

This section describes the procedure for setting the Controller without the Configuration Files (Procedure for Setting Parameters from Beginning).
You can also refer to this section to change parameter settings of the Configuration Files.

## 10.1. Overview of Setting Tag Data Links

The following figure shows the relationship of operating the tag data links using the "Procedure for Setting Parameters from Beginning".



## 10.2. Work Flow of "Procedure for Setting Parameters from Beginning"

Take the following steps to make the tag data link settings for EtherNet/IP using the "Procedure for Setting Parameters from Beginning"

*10.3. Setting Up the Controller Using the Software* and *10.4. Setting Up the Network Using the Software* (in red frames below) explain the connection procedures by setting with the software in stead of using the Configuration Files.

The proceeding for the "Procedure for Using the Configuration Files" described in *7.2. Setting Up the FZ5 Sensor Controller* and *7.5. Checking the EtherNet/IP Communications* applies to those of "Procedure for Setting Parameters from Beginning". Refer to the procedures in *Section 7*.

| | |
|---|---|
| **7.2. Setting Up the FZ5 Sensor Controller** | Set up the FZ5 Sensor Controller. |
| ↓ | |
| 7.2.1. Parameter Settings | Set the parameters for the FZ5 Sensor Controller. |
| ↓ | |
| **10.3. Setting Up the Controller Using the Software** | Set up the Controller using the software. |
| ↓ | |
| 10.3.1. Starting the Sysmac Studio and Setting the Parameters for the Controller | Start the Sysmac Studio and set the parameters for the Controller. |
| ↓ | |
| 10.3.2. Setting and Exporting the Global Variables | Set the global variables and data types to use for the tag data links. |
| ↓ | |
| 10.3.3. Connecting Online and Transferring the Project Data | Connect online with the Sysmac Studio and transfer the project data to the Controller. |
| ↓ | |
| 10.3.4. Settings in the Watch Window Tab Page | Make settings in the Watch Window Tab Page to check the data that is sent and received. |
| ↓ | |

| | |
|---|---|
| **10.4. Setting Up the Network Using the Software** | Set the tag data links for EtherNet/IP using the software. |
| ↓ | |
| 10.4.1. Start the Network Configurator and Uploading Configuration | Start the Network Configurator and upload the network configuration. |
| ↓ | |
| 10.4.2. Importing the File and Registering the Tags | Import the CSV file that you saved with the Sysmac Studio, and register tags of originator's send /receive areas as well as tag sets. |
| ↓ | |
| 10.4.3. Setting the Connection | Associate the tags of the target device with the tags of the originator. |
| ↓ | |
| 10.4.4. Transferring the Tag Data Link Parameters | Transfer the set tag data link parameters to the Controller. |
| ↓ | |
| **7.5. Checking the EtherNet/IP Communications** | Confirm that the EtherNet/IP tag data links are operated normally. |
| ↓ | |
| 7.5.1 Checking the Connection Status | Check the connection status of EtherNet/IP. |
| ↓ | |
| 7.5.2 Checking the Data that are Sent and Received | Confirm that the correct data are sent and received. |

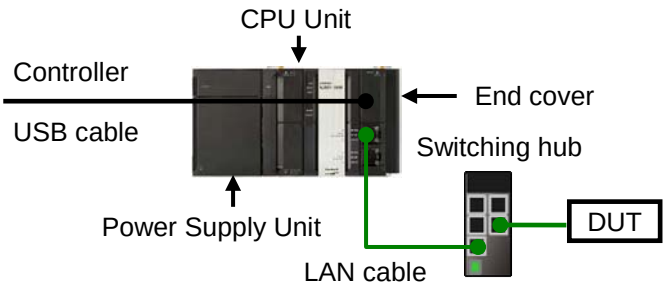
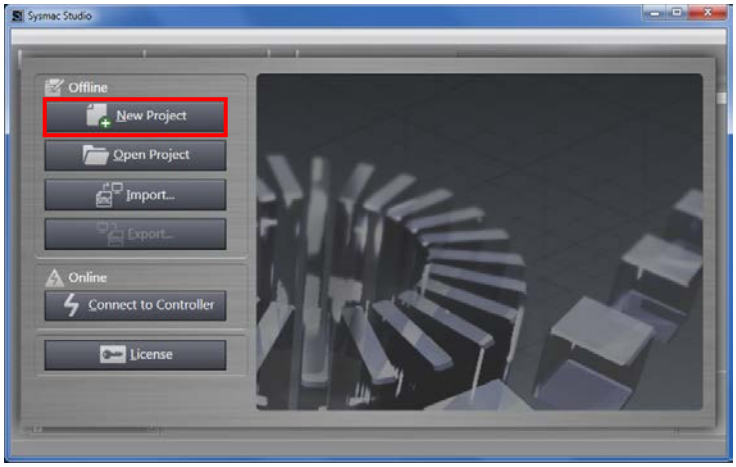
## 10.3. Setting Up the Controller Using the Software

Set up the Controller using the software.

### 10.3.1. Starting the Sysmac Studio and Setting the Parameters for the Controller

Start the Sysmac Studio and set the parameters for the Controller.

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

| | | |
|---|---|---|
| 1 | Connect the LAN cable and the USB cable to the Controller.<br><br>* For details, refer to step 1 of *7.3.1. Starting the Sysmac Studio and Importing the Project File.* |  |
| 2 | Turn ON the power supply to the Controller and Switching hub. | |
| 3 | Start the Sysmac Studio.<br><br>Click the **New Project** Button.<br><br>* If a confirmation dialog for an access right is displayed at start, select to start. |  |

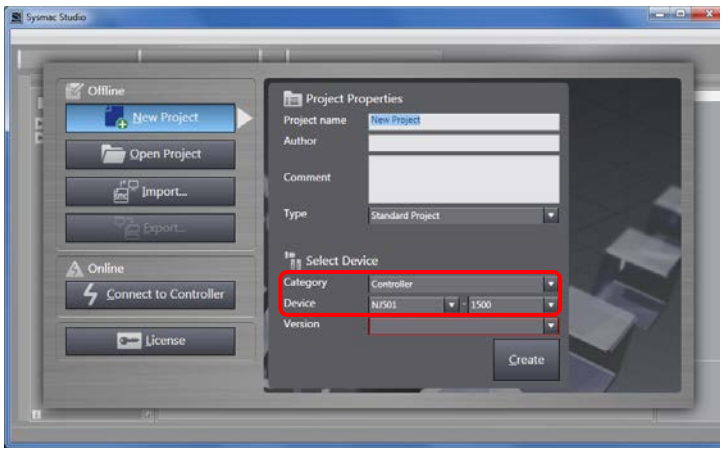
3 The Project Properties Dialog Box is displayed.

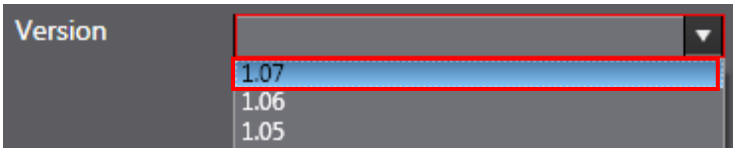
* In this document, New Project is used as the Project name.

Confirm that the device you use is shown in the *Category* and *Device* Fields of Select Device.

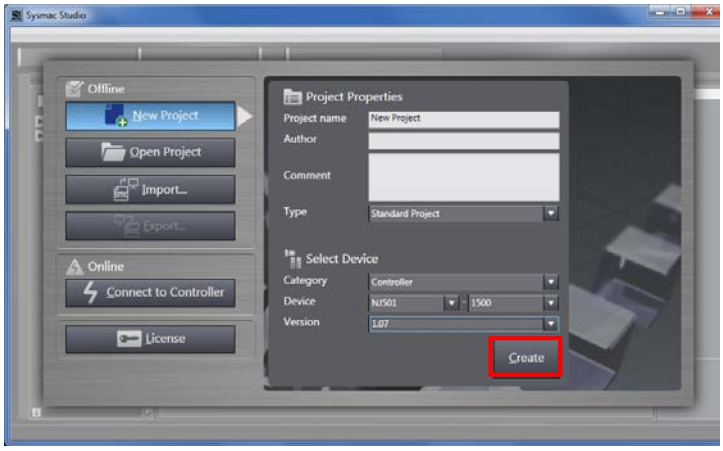
Select version ***1.07*** from the pull-down list of Version.

* Although 1.07 is selected in this document for example, select the version you actually use.



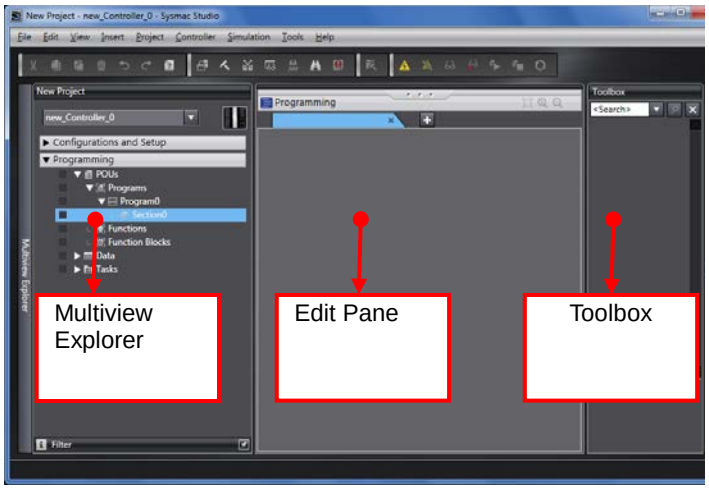



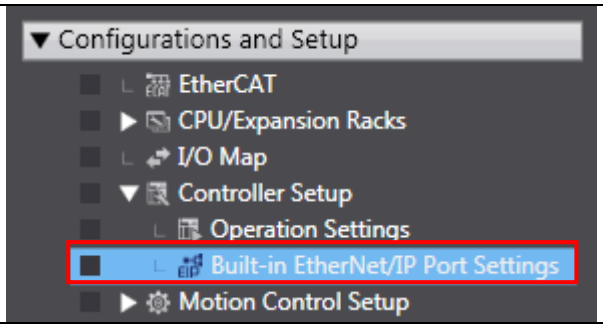
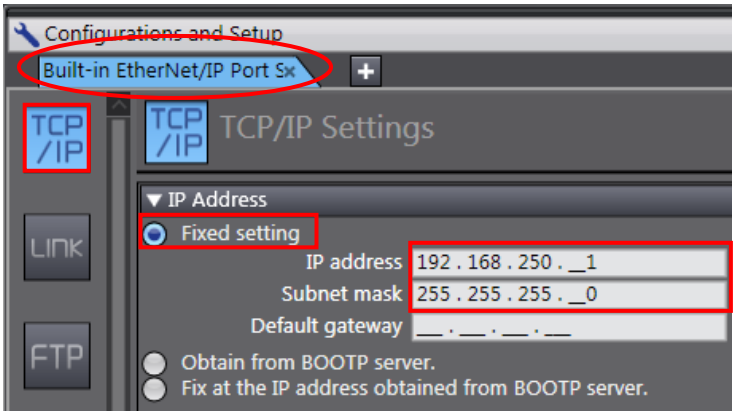

4 Click the **Create** Button.




5 The New Project is displayed.

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

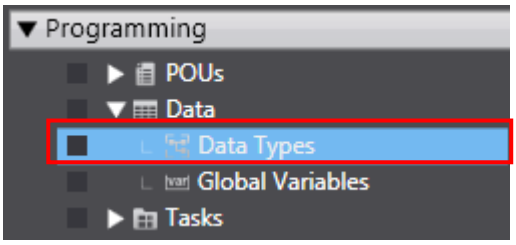
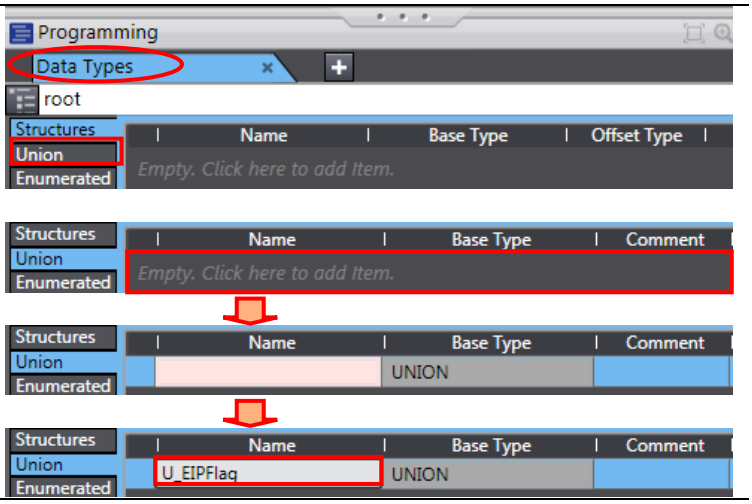
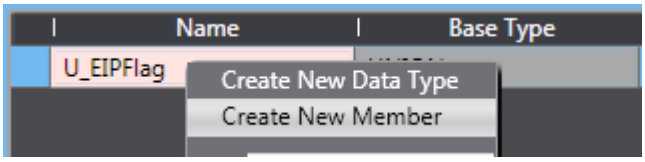
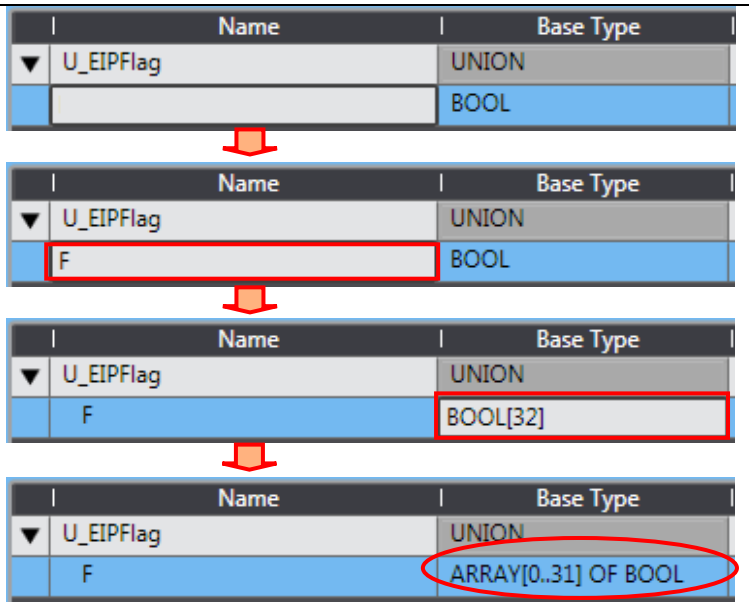


| | | |
|---|---|---|
| 6 | Double-click **Built-in EtherNet/IP Port Settings** under **Configurations and Setup** - **Controller Setup** in the Multiview Explorer. |  |
| 7 | The Built-in EtherNet/IP Port Settings Tab Page is displayed in the Edit Pane.<br><br>Confirm that the following settings are made in the *IP Address* Field.<br><br>IP address: *192.168.250.1*<br>Subnet mask: *255.255.255.0* |  |

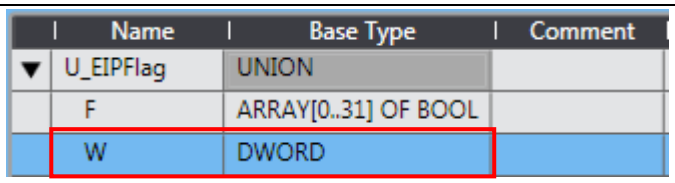
### 10.3.2. Setting and Exporting the Global Variables

Set the global variables and data types to use for the tag data links.

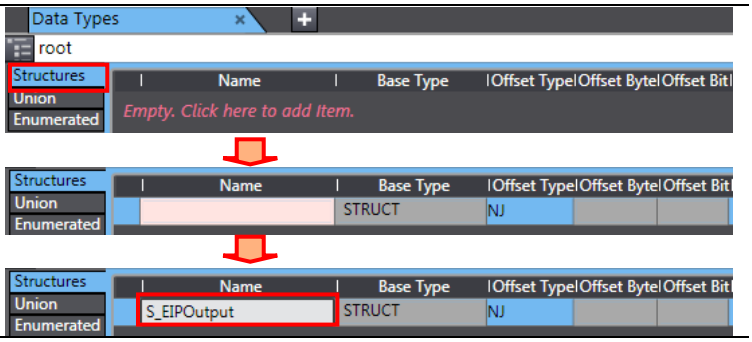
Export the global variables in a CSV file to use as tags in the Network Configurator.

| | | |
|---|---|---|
| 1 | Double-click **Data Types** under **Programming** - **Data** in the Multiview Explorer. |  |
| 2 | The Data types Tab Page is displayed in the Edit Pane. Select the **Union** Tab.<br><br>Click a *Name* Column to enter a new data type.<br><br>Enter *U_EIPFlag* in the *Name* Column. |  |
| 3 | While the *Base Type* Column is being selected, right-click and select ***Create New Member*** from the menu. |  |
| 4 | The **Down Arrow** Button is displayed, allowing you to enter a new member.<br><br>Enter *F* in the *Name* Column.<br><br>Enter *BOOL[32]* in the *Base Type* Column.<br><br>After entering, confirm that the Base Type changes to ARRAY[0..31] OF BOOL. |  |

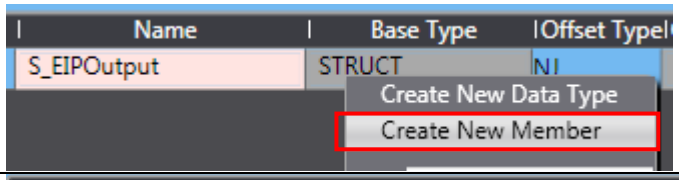
5 In the same way as steps 3 and 4, enter the following data in the new columns.
- Name: *W*
  Base Type: *DWORD*




6 Select the **Structures** Tab.
Click a *Name* Column to enter a new base type.
Enter *S_EIPOutput* in the *Name* Column.

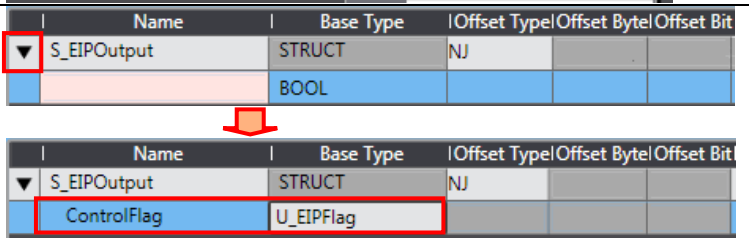



7 While the *Base Type* Column is being selected, right-click and select ***Create New Member*** from the menu.

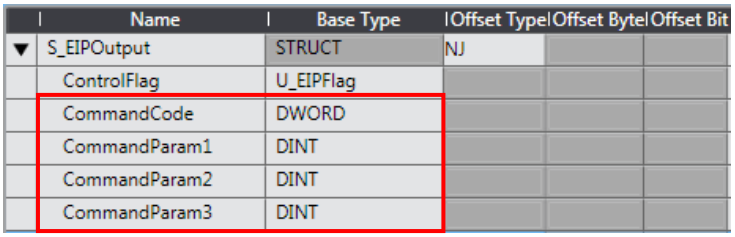



8 The **Down Arrow** Button is displayed, allowing you to enter a new member.

In the same way as step 4, enter the following data in the new columns.
- Name: *ControlFlag*
  Base Type: *U_EIPFlag*

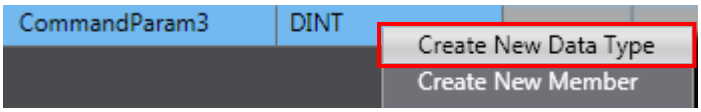



9 In the same way as steps 7 and 8, enter the following data in the new member columns.
- Name: *CommandCode*
  Base Type: *DWORD*
- Name: *CommandParam1*
  Base Type: *DINT*
- Name: *CommandParam2*
  Base Type: *DINT*
- Name: *CommandParam3*
  Base Type: *DINT*

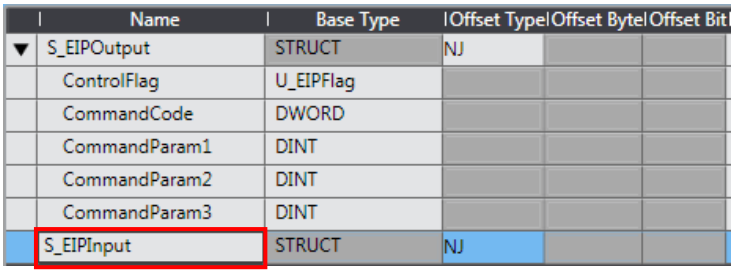



* Make sure that members are displayed in order of the offsets listed in *Section 9.2.*

10 Right-click and select ***Create New Data Type*** from the menu.

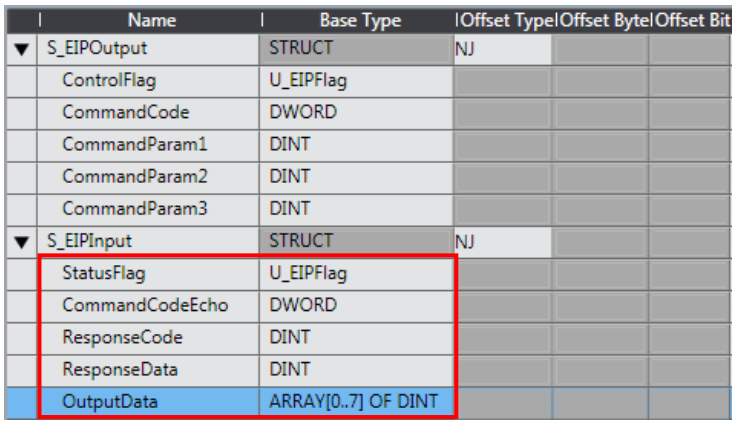



11 Enter *S_EIPInput* in the *Name* Column.



**12** In the same way as steps 7 and 8, enter the following data in the new member columns.

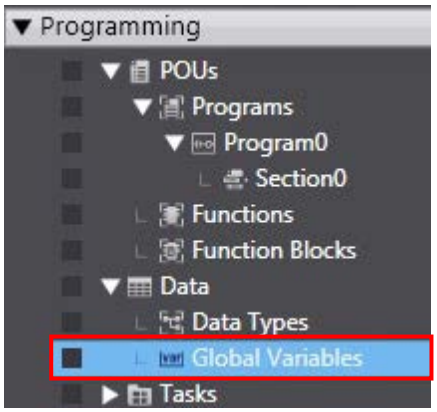
- Name: *StatusFlag*
  Base Type: *U_EIPFlag*
- Name: *CommandCodeEcho*
  Base Type: *DWORD*
- Name: *ResponseCode*
  Base Type: *DINT*
- Name: *ResponseData*
  Base Type: *DINT*
- Name: *OutputData*
  Base Type: *DINT [8]*



| Name | Base Type | Offset Type | Offset Byte | Offset Bit |
|---|---|---|---|---|
| S_EIPOutput | STRUCT | NJ | | |
| ControlFlag | U_EIPFlag | | | |
| CommandCode | DWORD | | | |
| CommandParam1 | DINT | | | |
| CommandParam2 | DINT | | | |
| CommandParam3 | DINT | | | |
| S_EIPInput | STRUCT | NJ | | |
| StatusFlag | U_EIPFlag | | | |
| CommandCodeEcho | DWORD | | | |
| ResponseCode | DINT | | | |
| ResponseData | DINT | | | |
| OutputData | ARRAY[0..7] OF DINT | | | |

* Make sure that members are displayed in order of the offsets listed in *Section 9.2.*

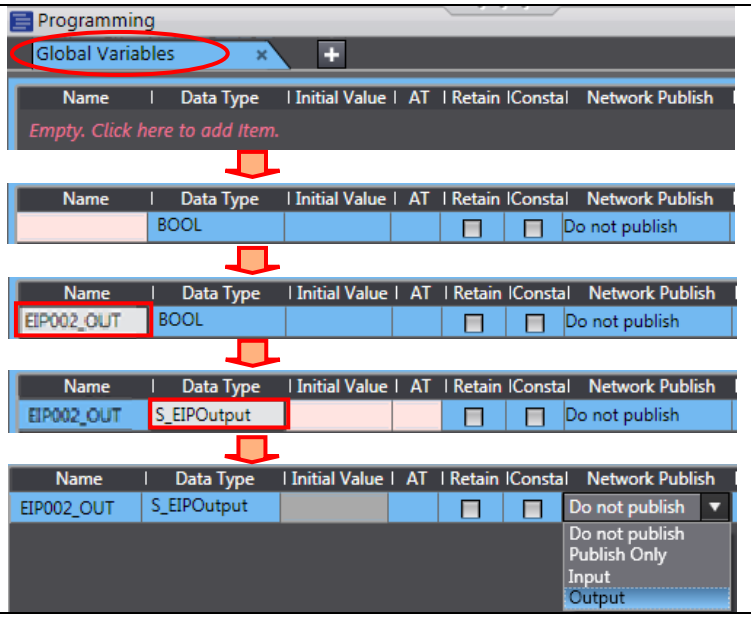
**13** Double-click **Global Variables** under **Programming** - **Data** in the Multiview Explorer.



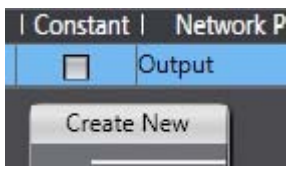

**14** The Global Variables Tab Page is displayed in the Edit Pane. Click a column under the *Name* Column to enter a new variable. Enter *EIP002_OUT* in the *Name* Column.

Enter *S_EIPOutput* in the *Data Type* Column.

Select ***Output*** from the Network Publish Menu.

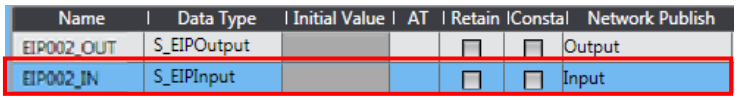



**15** After entering, right-click and select ***Create New*** from the menu.

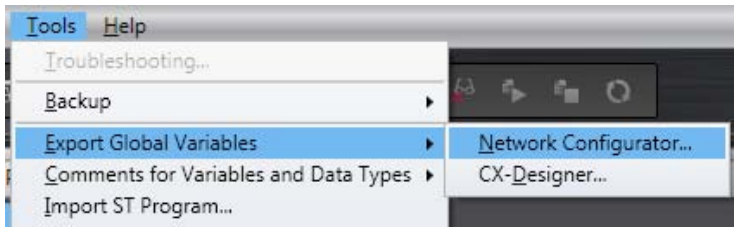


16 In the same way as step 14, enter the following data in the new columns.

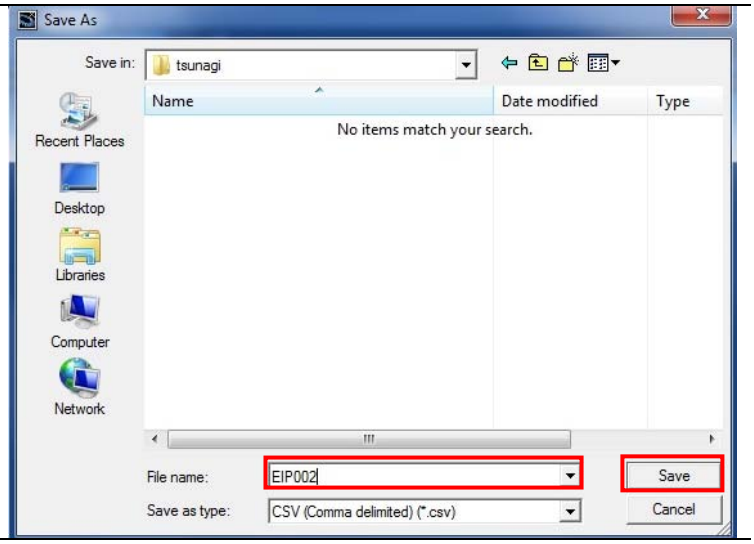
- Name: *EIP002_IN*
  Data Type: *S_EIPInput*
  Network Publish: *Input*



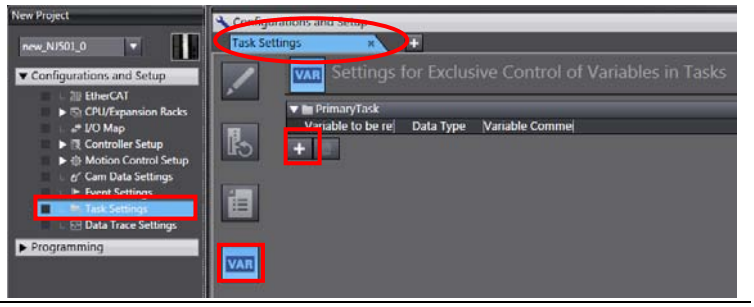

17 Select ***Export Global Variables - Network Configurator*** from the Tools Menu.



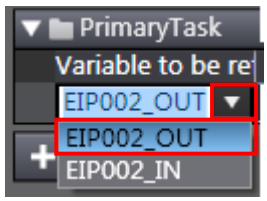

18 The Save As Dialog Box is displayed. Enter *EIP002* in the *File name* Field.
Click the **Save** Button.



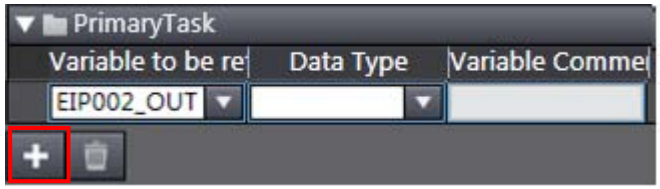

19 Double-click **Task Settings** under **Configurations and Setup** in the Multiview Explorer. The Task Settings Tab Page is displayed in the Edit Pane. Click the **VAR** Button.
Click the **+** Button.

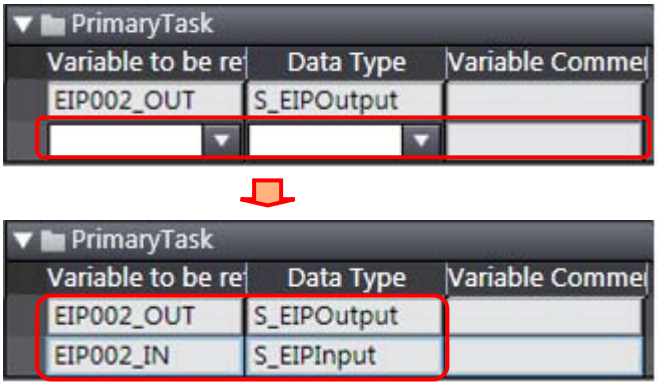



20 Click the **Down Arrow** Button of the *Variable to be refreshed* Field. The variables set in steps 14 to 16 are displayed.
Select ***EIP002_OUT***.




21 Click the **+** Button.



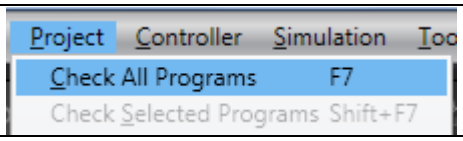
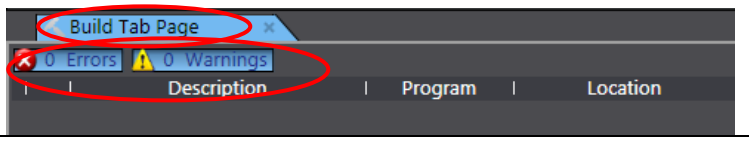
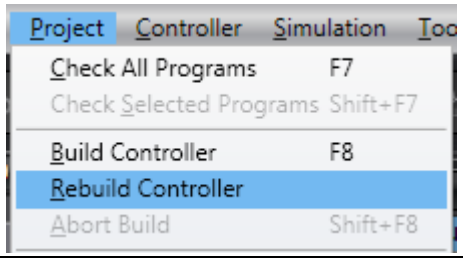
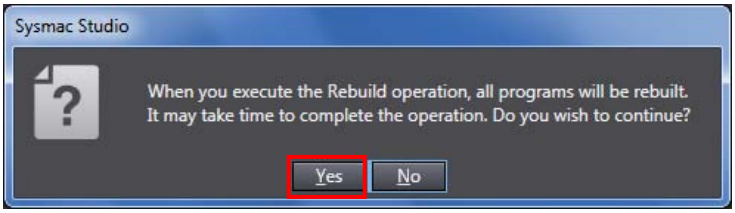
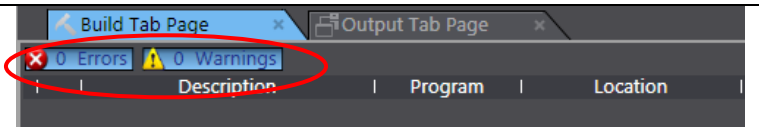
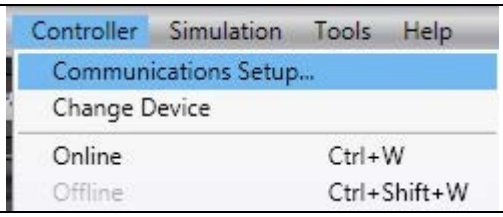
| | | |
|---|---|---|
| 22 | New columns appear. In the same way as step 20, add the same variable as you set in step 16 to the *Variable to be refreshed* Field.<br><br>* Since the data types are displayed automatically, you do not have to set them.<br><br>Confirm that all variables set in steps 14 to 16 as shown on the right are displayed. |  |

### 10.3.3. Connecting Online and Transferring the Project Data

Connect online with the Sysmac Studio and transfer the project data to the Controller.

**⚠ WARNING**

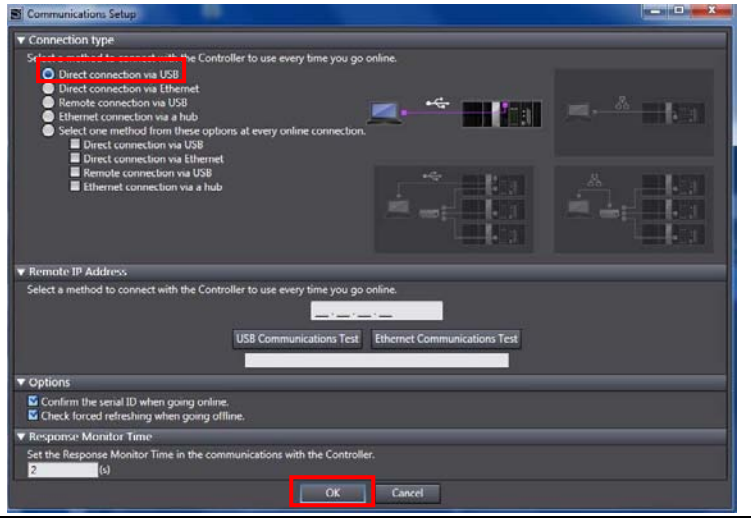
Always confirm safety at the Destination Device before you transfer a user program, configuration data, setup data, device variables, or values in memory used for CJ-series Units from the Sysmac Studio.
The devices or machines may perform unexpected operation regardless of the operating mode of the CPU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

| | | |
|---|---|---|
| 1 | Select ***Check All Programs*** from the Project Menu. |  |
| 2 | The Build Tab Page is displayed on the Edit Pane.<br>Confirm that "0 Errors" and "0 Warnings" are displayed. |  |
| 3 | Select ***Rebuild Controller*** from the Project Menu. |  |
| 4 | A confirmation dialog box is displayed. Check the contents and click the **Yes** Button. |  |
| 5 | Confirm that "0 Errors" and "0 Warnings" are displayed in the Build Tab Page. |  |
| 6 | Select ***Communications Setup*** from the Controller Menu. |  |

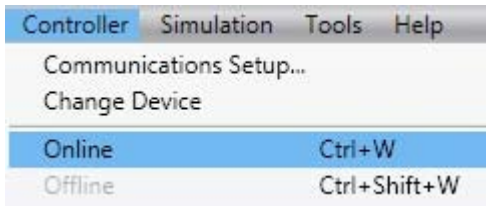
7 The Communications Setup Dialog Box is displayed.

Confirm that the *Direct connection via USB* Option is selected for Connection type.

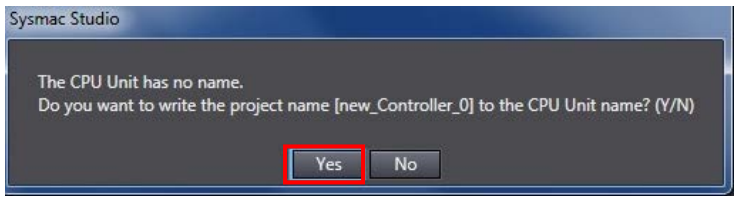
Click the **OK** Button.




8 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. Check the contents and click the **Yes** Button to proceed with the processing.

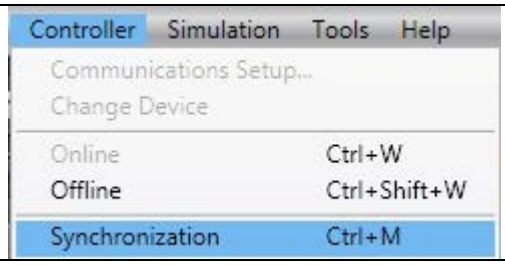



9 When an online connection is established, a yellow bar is displayed on the top of the Edit Pane.


**Additional Information**

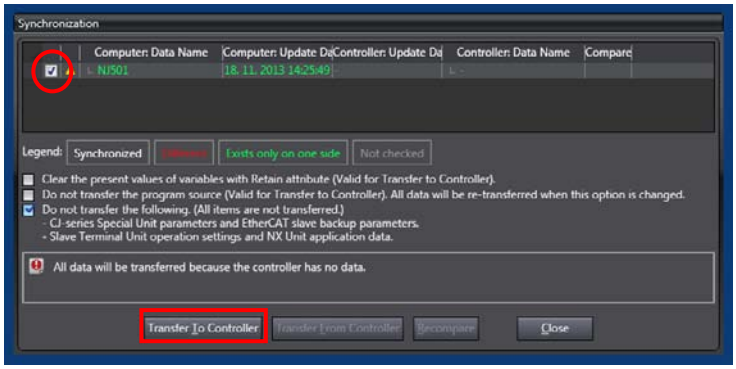
For details on online connections to a Controller, refer to *Section 5 Online Connections to a Controller* of the *Sysmac Studio Version 1 Operation Manual* (Cat. No. W504).

10 Select ***Synchronization*** from the Controller Menu.



11 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 is compared.

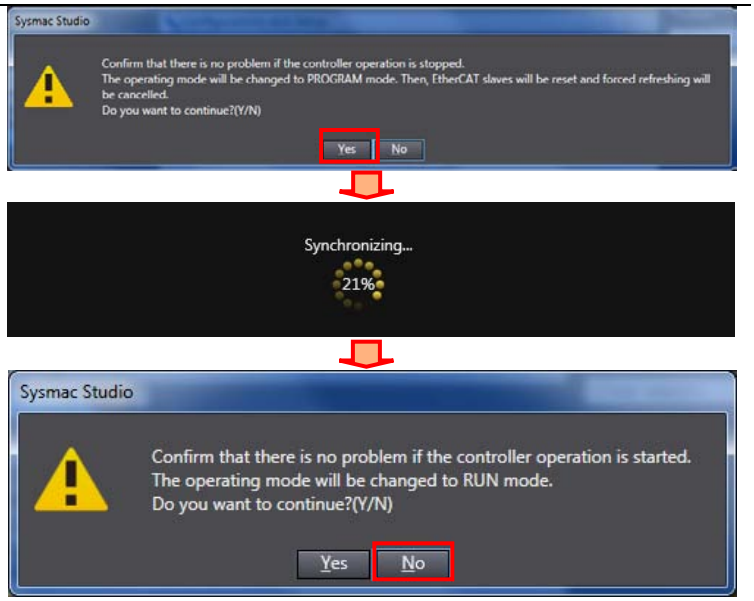



12 A confirmation dialog box is displayed. Confirm that there is no problem and click the **Yes** Button.

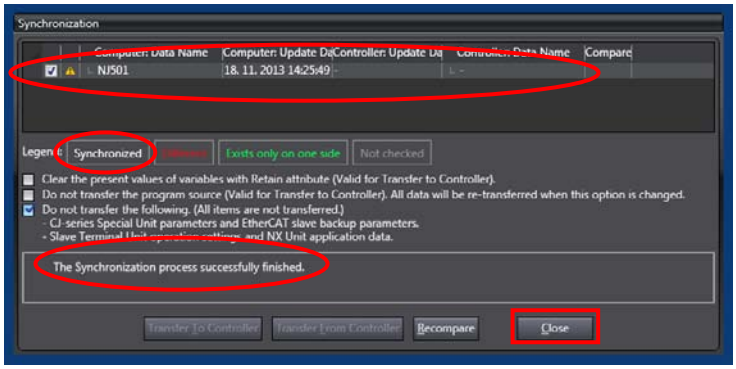
A screen stating "Synchronizing" is displayed.

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

* Do not return it to RUN mode.



13 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".



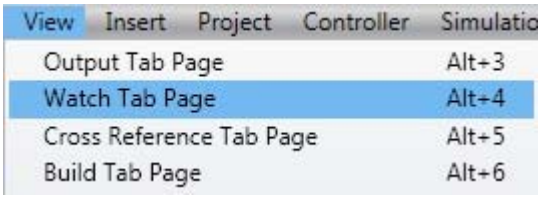
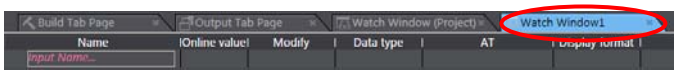
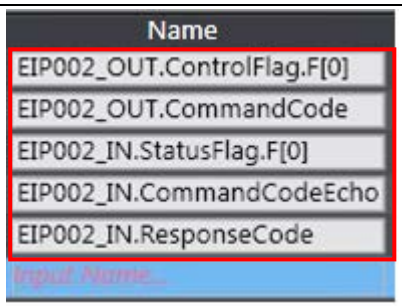

If there is no problem, click the **Close** Button.

* 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.

### 10.3.4. Settings in the Watch Window Tab Page

Make settings in the Watch Window Tab Page to check the data that is sent and received.

| | | |
|---|---|---|
| 1 | Select ***Watch Tab Page*** from the View Menu. |  |
| 2 | The Watch Window1 Tab Page is displayed in the lower section of the Edit Pane. |  |
| 3 | Enter the following names in the Watch Window1 Tab Page for monitoring.<br>Click a column under the *Name* Column to enter a new name.<br><br>*EIP002_OUT.ControlFlag.F[0]*<br>*EIP002_OUT.CommandCode*<br>*EIP002_IN.StatusFlag.F[0]*<br>*EIP002_IN.CommandCodeEcho*<br>*EIP002_IN.ResponseCode*<br><br>* You will use the settings in *7.5.2. Checking the Data That are Sent and Received*. |  |

## 10.4. Setting Up the Network Using the Software

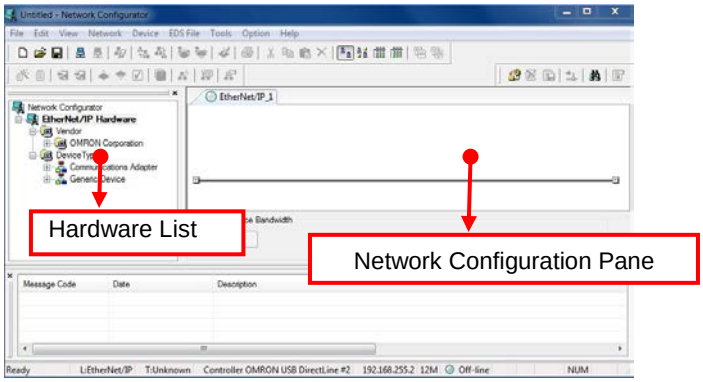
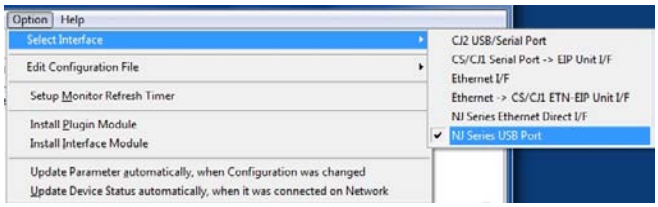
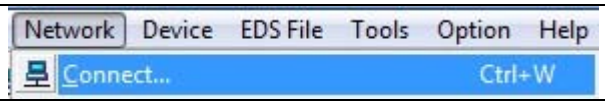
Set the tag data links for EtherNet/IP using the software.

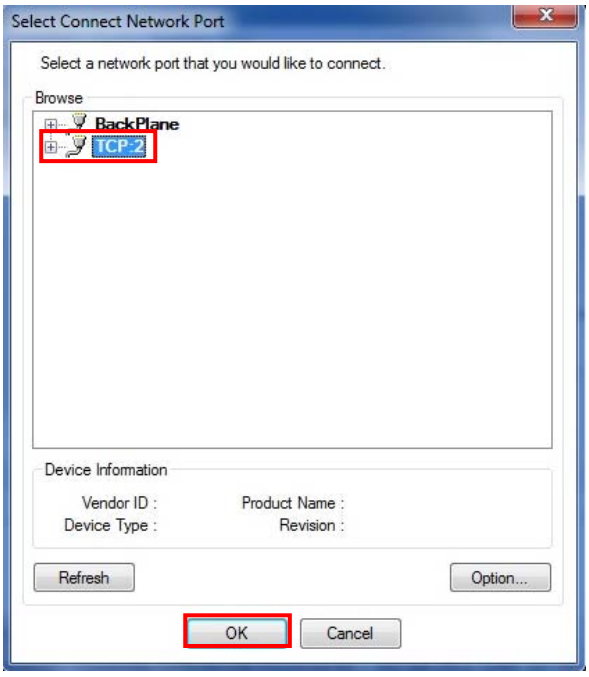
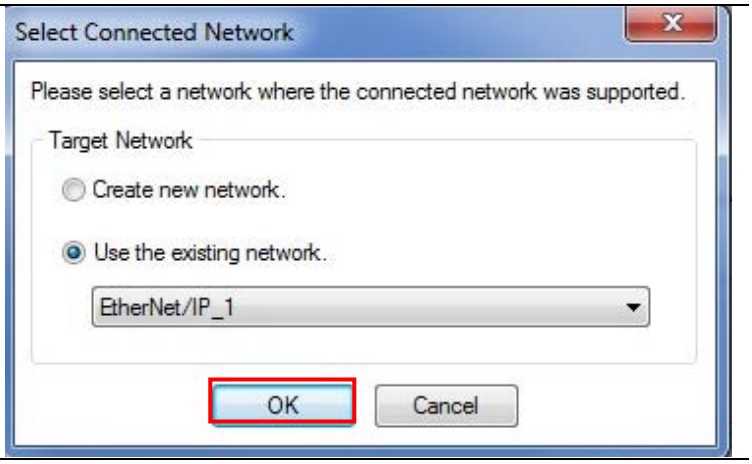
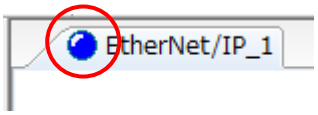
### 10.4.1. Starting the Network Configurator and Uploading the Configuration

Start the Network Configurator and upload the network configuration.

**Precautions for Correct Use**

Confirm that the LAN cable is connected before taking the following procedure.
When it is not connected, turn OFF the power supply to each device and then connect the LAN cable.

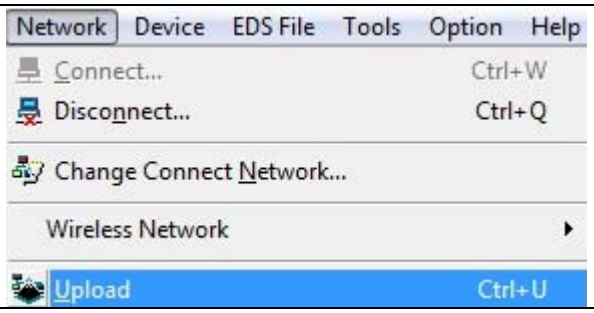
| | | |
|---|---|---|
| 1 | Start the Network Configurator. |  |
| 2 | Select ***Select Interface*** - ***NJ Series USB Port*** from the Option Menu. |  |
| 3 | Select ***Connect*** from the Network Menu. |  |

| | | |
|---|---|---|
| 4 | The Select Connect Network Port Dialog Box is displayed. Select *TCP:2*.<br><br>Click the **OK** Button. |  |
| 5 | The Select Connected Network Dialog Box is displayed. Check the contents and click the **OK** Button. |  |
| 6 | When an online connection is established normally, the color of the icon on the right figure changes to blue. |  |

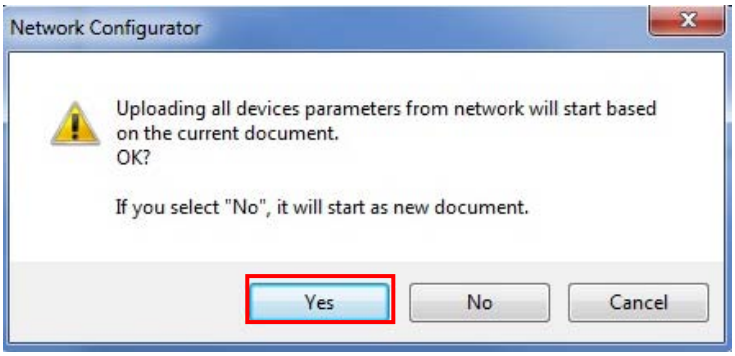
**Additional Information**

If an online connection cannot be made to the Controller, check the cable connection. Or, return to step 1, check the settings and repeat each step.
For details, refer to *7-2-8 Connecting the Network Configurator to the Network* in *Section 7 Tag Data Link Functions* of the *NJ-series CPU Unit Built-in EtherNet/IP™ Port User's Manual* (Cat. No. W506).

7 Select ***Upload*** from the Network Menu to upload the device information on the network.




8 The dialog box on the right is displayed. Confirm that there is no problem and click the **Yes** Button.

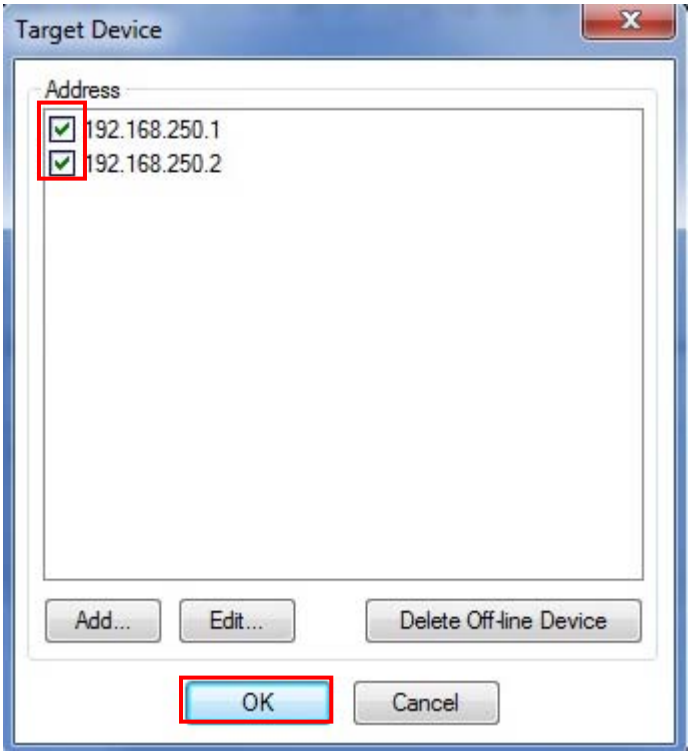



9 The Target Device Dialog Box is displayed. Select the *192.168.250.1* Check Box and the *192.168.250.2* Check Box.

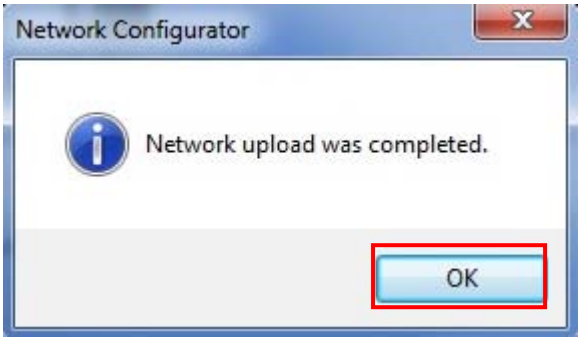
Click the **OK** Button.

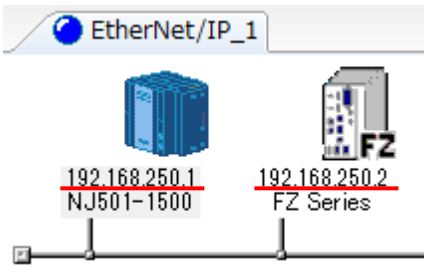
* If 192.168.250.1 and 192.168.250.2 are not displayed on the dialog box, click the **Add** Button to add the address.

* The displayed addresses depend on the status of the Network Configurator.




10 The device parameters are uploaded. When uploading is completed, the dialog box on the right is displayed. Check the contents and click the **OK** Button.

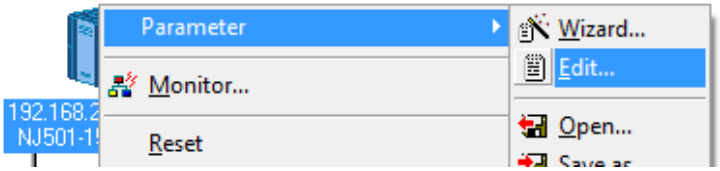
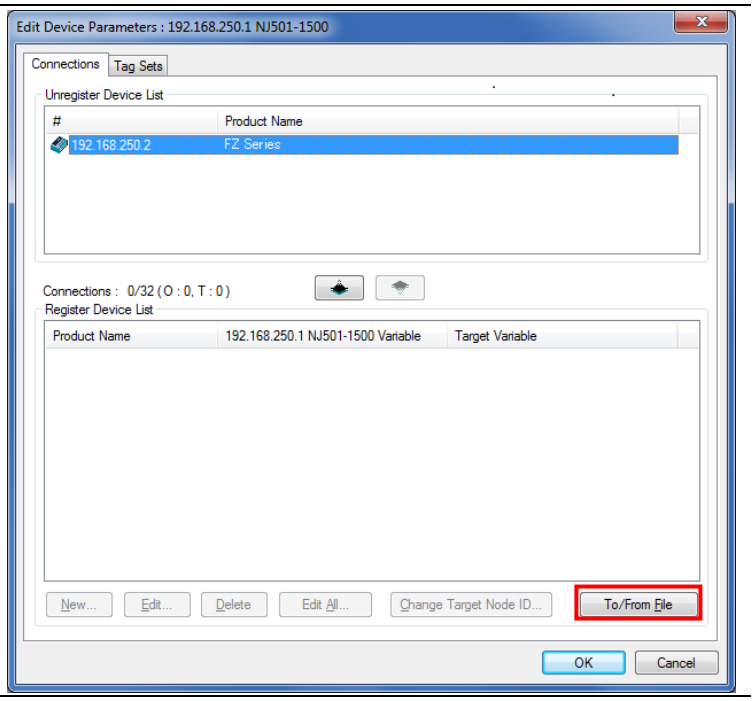
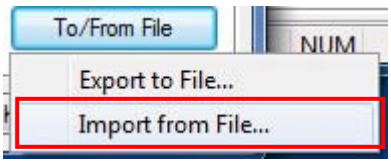
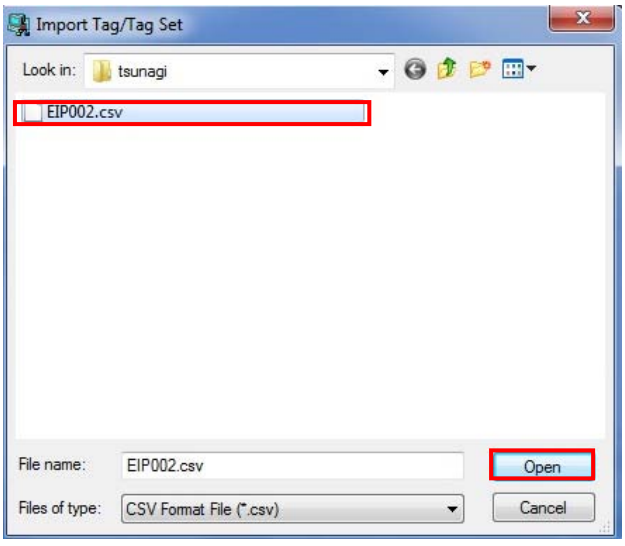


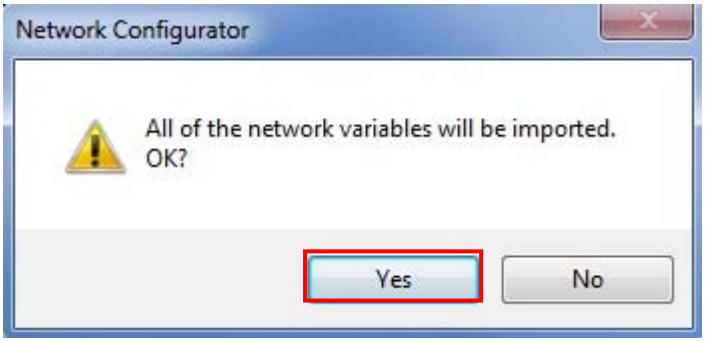
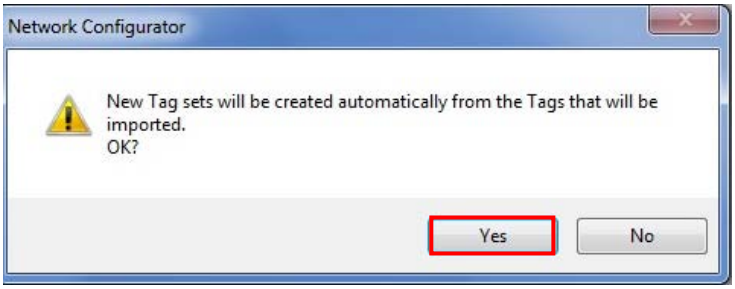
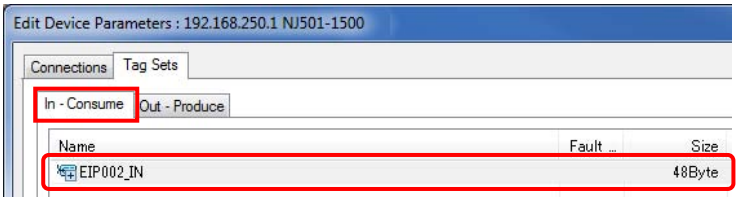
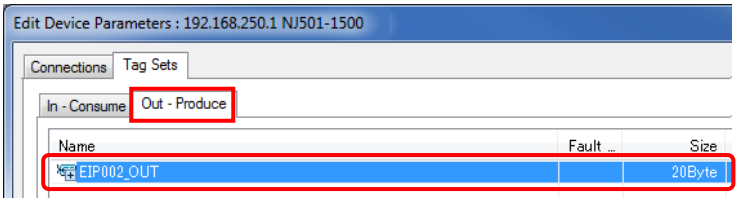
| | | |
|---|---|---|
| 11 | After uploading is completed, confirm that the IP address of each node is updated on the Network Configuration Pane as follows:<br>IP address of node 1: 192.168.250.1<br>IP address of node 2: 192.168.250.2<br><br>* The destination device icon changes to the FZ Series device. |  |

### 10.4.2. Importing the File and Registering the Tags

Import the CSV file that you saved with the Sysmac Studio, and register tags of originator's send /receive areas as well as tag sets.

This section explains the receive settings and send settings of the target node in order.

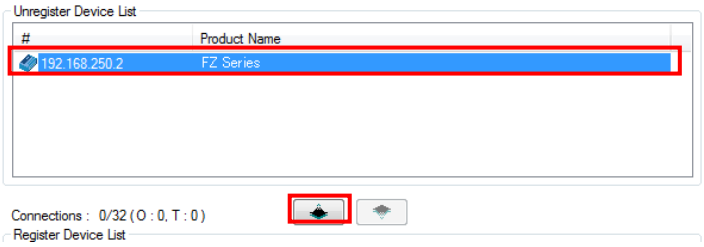
| | | |
|---|---|---|
| 1 | On the Network Configuration Pane of the Network Configurator, right-click the node 1 device and select ***Parameter*** - ***Edit***. |  |
| 2 | The Edit Device Parameters Dialog Box is displayed. Click the **To/From File** Button. |  |
| 3 | Select ***Import from File***. |  |
| 4 | The Import Tag/Tag Set Dialog Box is displayed. Select *EIP002.csv* and click the **Open** Button.<br><br>* In the *Look in* Field, specify the folder in which the file was saved in *Section 10.3.3 Exporting the Global Variables*. |  |

| | | |
|---|---|---|
| 5 | The right dialog boxes may not be displayed depending on the status of the Controller and software used. In such a case, proceed to the next step.<br><br>The right dialog box is displayed. Confirm that there is no problem and click the **Yes** Button.<br><br>The right dialog box is displayed. Confirm that there is no problem and click the **Yes** Button. |  <br>  |
| 6 | The Edit Device Parameters Dialog Box is displayed again. Click the **Tag Sets** Tab. |  |
| 7 | Select the **In-Consume** Tab. EIP002_IN and 48 Byte are displayed. |  |
| 8 | Select the **Out-Produce** Tab. EIP002_OUT and 20 Byte are displayed. |  |
| 9 | Select the **Connections** Tab. |  |

### 10.4.3. Setting the Connection

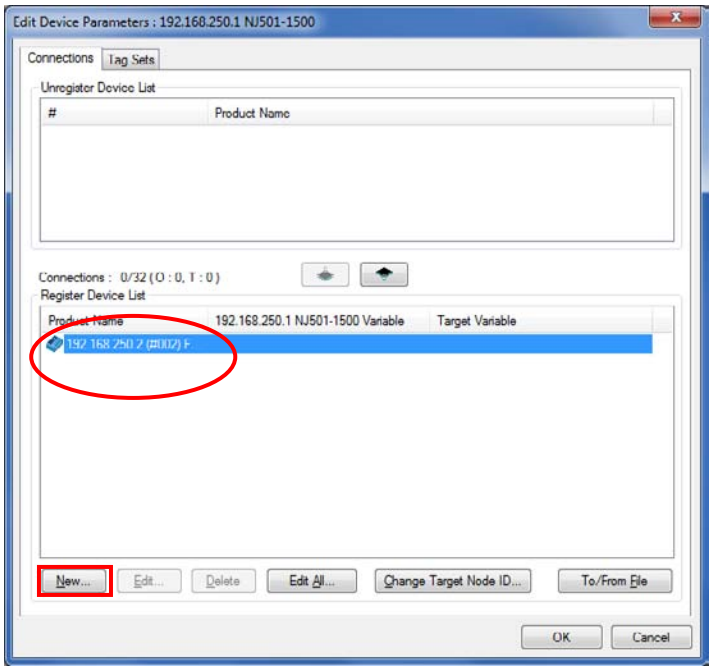
Associate the tags of the target device (that receives the open request) with the tags of the originator (that requests opening).

1 Select *192.168.250.2* in the *Unregister Device List* Field. Click the **Down Arrow** Button that is shown in the dialog box.



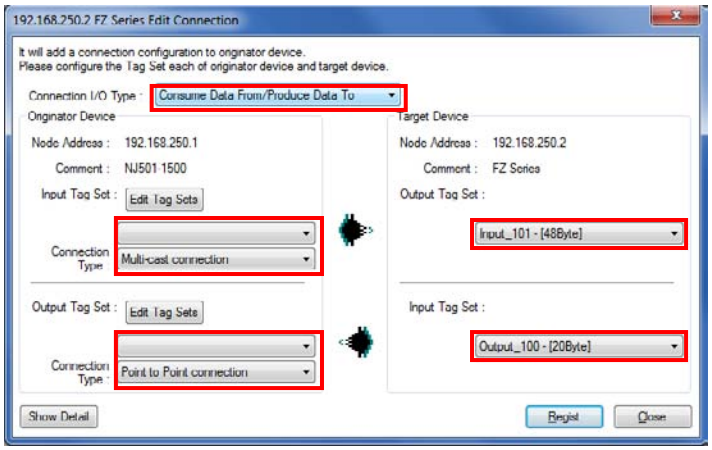

2 192.168.250.2 is registered in the *Register Device List* Field.

Select *192.168.250.2* and click the **New** Button.




3 The Edit Connection Dialog Box is displayed. Select ***Consume Data From/Produce Data To*** from the Connection I/O Type pull-down list.

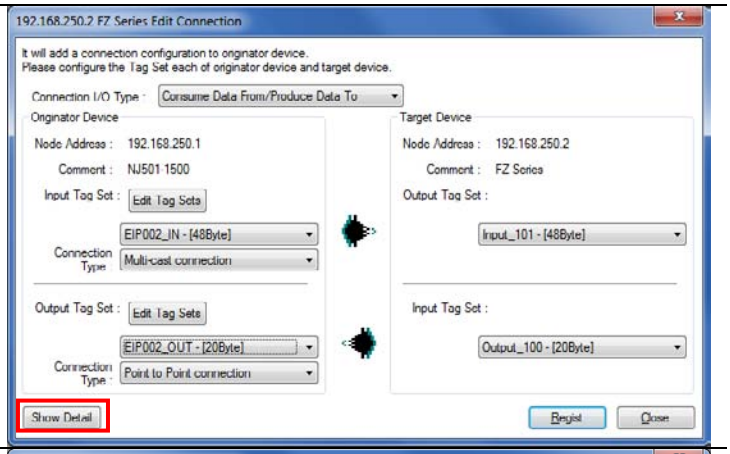
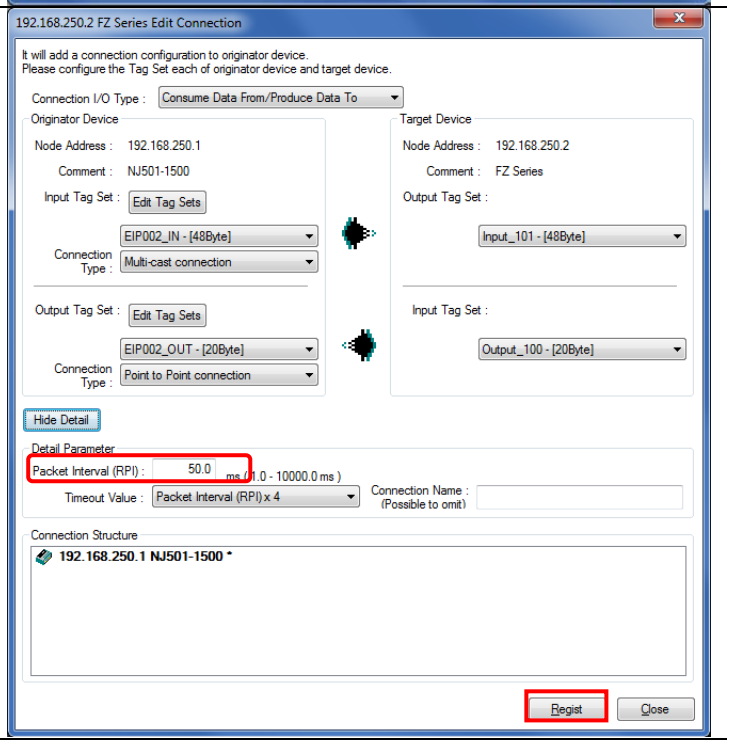
Set the values listed in the following table to the *Originator Device* Field and the *Target Device* Field.



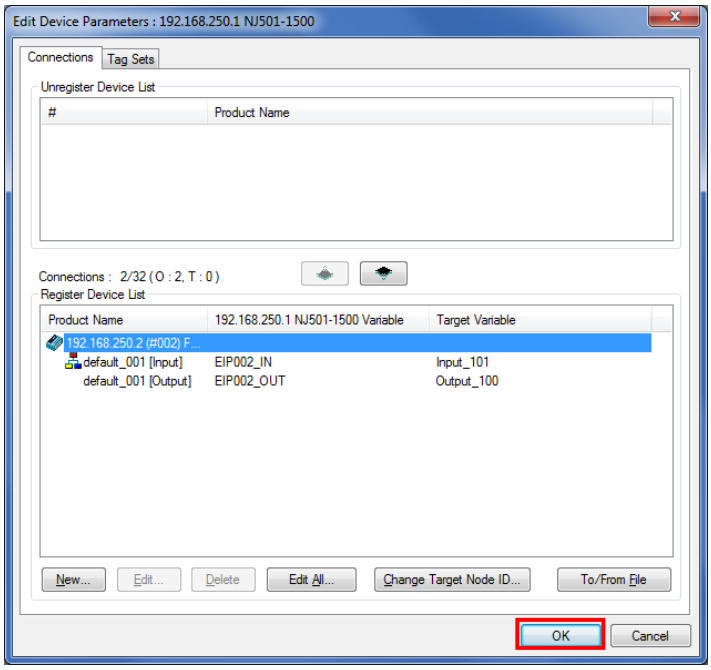

■ Settings of connection

| Connection allocation | | Setting value |
|---|---|---|
| Connection I/O type | | Consume Data From/Produce Data To |
| Originator device | Input Tag Set | EIP002_IN-[48 Byte] |
| | Connection Type | Multi-cast connection |

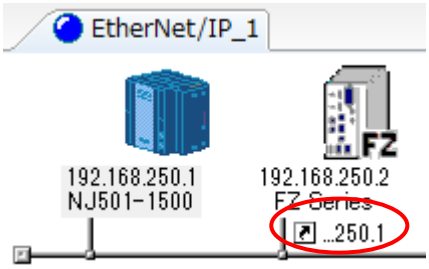
| | | |
|---|---|---|
| | Output Tag Set | EIP002_OUT-[20 Byte] |
| | Connection Type | Point to Point connection |
| Target device | Output Tag Set | Input_101-[48 Byte] |
| | Input Tag Set | Output_100-[20 Byte] |

| | | |
|---|---|---|
| 4 | Confirm that the settings are correct.<br>Click the **Show Detail** Button. |  |
| 5 | Confirm that the Packet Interval (RPI) is set to 4 ms or longer and click the **Regist** Button.<br><br>* The same dialog box as step 4 is displayed again if you click the **Hide Detail** Button. |  |
| 6 | The Edit Connection Dialog Box is displayed again. Click the **Close** Button. |  |

7 The Edit Device Parameters Dialog Box is displayed again. Click the **OK** Button.

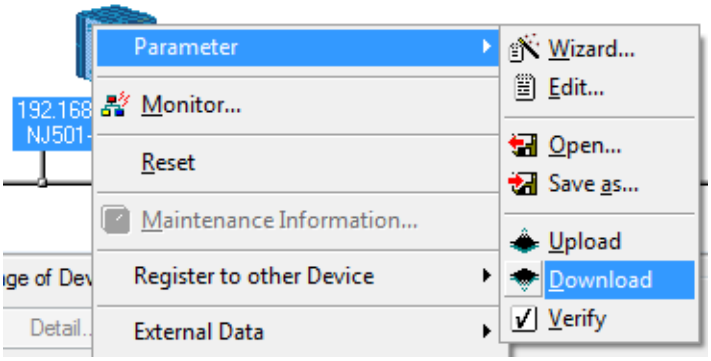
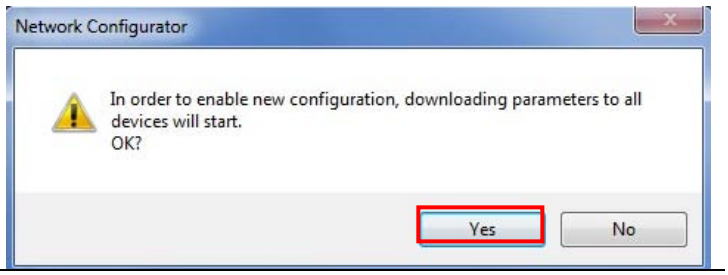
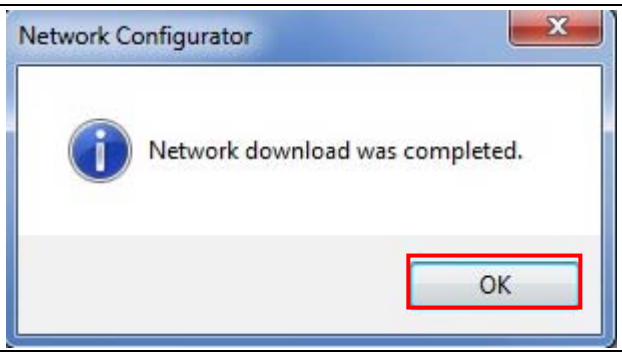



8 When the connection is completely allocated, the registered node address is displayed under the device icon of the Destination Device on the Network Configuration Pane.



### 10.4.4. Transferring the Tag Data Link Parameters

Transfer the set tag data link parameters to the Controller.

| | | |
|---|---|---|
| 1 | Right-click the device icon of node 1 on the Network Configuration Pane and select ***Parameter*** - ***Download***. |  |
| | The dialog box on the right is displayed. Confirm that there is no problem and click the **Yes** Button. |  |
| 2 | Tag data link parameters are downloaded from the Network Configurator to the Controller. |  |
| 3 | The dialog box on the right is displayed. Check the contents and click the **OK** Button. |  |

# 11. Revision History

| Revision code | Date of revision | Revision reason and revision page |
|---|---|---|
| 01 | Dec. 20, 2013 | First edition |

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