



Machine Automation Controller NJ-series

# EtherNet/IP™ Connection Guide

## OMRON Corporation

Vision System  
(FH Series)

Network  
Connection  
Guide

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## 1. Related Manuals

To ensure system safety, make sure to always read and heed the information provided in all Safety Precautions and Precautions for Safe Use of manuals for each device which is used in the system.

The table below lists the manuals of OMRON Corporation (hereinafter referred to as OMRON) related to this document.

| Manufacturer | Cat. No.  | Model                            | Manual name   |
|--------------|-----------|----------------------------------|---|
| OMRON        | W500      | NJ501-□□□□<br>NJ301-□□□□         | NJ-series CPU Unit<br>Hardware User's Manual  |
| OMRON        | W501      | NJ501-□□□□<br>NJ301-□□□□         | NJ-series CPU Unit<br>Software User's Manual  |
| OMRON        | W506      | NJ501-□□□□<br>NJ301-□□□□         | NJ Series<br>CPU Unit Built-in EtherNet/IP™ Port<br>User's Manual                         |
| OMRON        | W504      | SYSMAC-SE2□□□                    | Sysmac Studio Version 1 Operation<br>Manual   |
| OMRON        | 0969584-7 | W4S1-05□<br>W4S1-03B             | Switching Hub W4S1-series Users<br>Manual   |
| OMRON        | 2285550-0 | FH-1050/3050<br>FH-1050/3050-□□0 | Image Processing System<br>INSTRUCTION SHEET  |
| OMRON        | Z340      | FH-1050/3050<br>FH-1050/3050-□□0 | Vision Sensor FH/FZ5 Series<br>Vision System User's Manual                                |
| OMRON        | Z341      | FH-1050/3050<br>FH-1050/3050-□□0 | Vision Sensor FH/FZ5 Series<br>Vision System Processing Item Function<br>Reference Manual |
| OMRON        | Z342      | FH-1050/3050<br>FH-1050/3050-□□0 | Vision Sensor FH/FZ5 Series<br>Vision System User's Manual for<br>Communications Settings |
| OMRON        | Z343      | FH-1050/3050<br>FH-1050/3050-□□0 | Vision Sensor FH/FZ5 Series<br>Vision System Operation Manual<br>for Sysmac Studio        |
| OMRON        | 1636843-6 | FZ-M08                           | LCD monitor INSTRUCTION SHEET   |

## 2. Terms and Definitions



| Term            | Explanation and Definition   |
|-----------------|--|
| Node            | <p>Controllers and devices are connected to the EtherNet/IP network via the EtherNet/IP ports. EtherNet/IP recognizes each EtherNet/IP port connected to the network as one node.</p> <p>When a device with two EtherNet/IP ports is connected to the EtherNet/IP network, EtherNet/IP recognizes this device as two nodes. EtherNet/IP achieves the communications between controllers or the communications between controllers and devices by exchanging data between these nodes connected to the network.</p>   |
| 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 EtherNet/IP, the tag and tag set can be exchanged cyclically between nodes without using the user program. This standard feature on EtherNet/IP is called a tag data link.  |
| Connection      | <p>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.</p> <p>Specifying the tag set name (tag name) and specifying the instance number of Assembly Object are given as methods to specify the connection. In Sysmac Studio, the connection is set by specifying the instance number.</p> |
| Connection type | There are two kinds of connection types for the tag data link connection, one is a multi-cast connection and the other is a unicast (point-to-point) connection. The multi-cast connection sends an output tag set in one packet to multiple nodes. The unicast connection separately sends one output tag set to each node. Therefore, multi-cast connections can decrease the communications load if one output tag set is sent to multiple nodes.   |

| Term                    | Explanation and Definition   |
|-------------------------|--|
| Originator and Target   | <p>To perform tag data links, one node requests the opening of a communications line called a "connection".</p> <p>The node that requests to open the connection is called an "originator", and the node that receives the request is called a "target".</p> <p>Each data for communications is called an "originator variable" and a "target variable".</p> <p>In Sysmac Studio, the instance number is specified in the target variable.</p> |
| Tag data link parameter | <p>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.</p>  |
| RPI                     | <p>An abbreviation for Requested Packet Interval.</p> <p>RPI indicates the data I/O refresh cycle that is set for each connection between the originator and the target.</p>   |

## 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, make sure to always read and heed the information provided in all Safety Precautions and Precautions for Safe Use of manuals for each device which is used in the system.
- (3) The user is encouraged to confirm the standards and regulations that the system must conform to.
- (4) It is prohibited to copy, to reproduce, and to distribute a part or the whole of this document without the permission of OMRON Corporation.
- (5) The information contained in this document is current as of April 2015. It is subject to change without notice for improvement.

The following notation is used in this document.

|  |  |
|--|--|
|  <b>WARNING</b>   | 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. |
|  <b>Caution</b> | Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage.  |



### Precautions for Correct Use

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



### Additional Information

Additional information to read as required.

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

### Symbol



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

## 4. Overview

This document describes the procedure for connecting Vision System (FH series) of OMRON to NJ-series Machine Automation Controller (hereinafter referred to as Controller) via EtherNet/IP and provides the procedure for checking their connection.

Hereinafter, the device connected via EtherNet/IP in Vision System is referred to as "FH Sensor Controller".

Refer to *Section 6. EtherNet/IP Settings* and *Section 7. EtherNet/IP Connection Procedure* to understand the setting method and key points to perform the tag data links for EtherNet/IP.



### Additional Information

Settings which are described in *7.3. Setting up Controller* are set in advance into the Sysmac Studio compact project file (hereinafter referred to as project file). Refer to *Section 9.*

*Appendix Procedure Using the Project File* for usage method of the project file. Obtain the latest project file from OMRON.

| Name   | File name               | Version  |
|--|-------------------------|----------|
| Sysmac Studio compact project file (Extension: csm2) | OMRON_FH_EIP_EV200.csm2 | Ver.2.00 |



## 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        | FH Sensor Controller   | FH-1050/3050<br>FH-1050/3050-□0  |
| OMRON        | 12 Megapixel High-Speed Camera<br>4 Megapixel High-Speed Camera<br>2 Megapixel High-Speed Camera<br>0.3 Megapixel High-Speed Camera<br><br>5 Megapixel Digital Camera<br>2 Megapixel Digital Camera<br>0.3 Megapixel Digital Camera<br>0.3 Megapixel High-Speed Camera<br>0.3 Megapixel Small Digital Camera<br>0.3 Megapixel Small Digital<br>Pen-Shaped Camera<br>Intelligent Compact Camera | FH-SC12/SM12<br>FH-SC04/SM04<br>FH-SC02/SM02<br>FH-SC/SM<br><br>FZ-SC5M2/S5M2<br>FZ-SC2M/S2M<br>FZ-SC/S<br>FZ-SHC/SH<br>FZ-SFC/SF<br>FZ-SPC/SP<br>FZ-SQ010F/SQ050F<br>FZ-SQ100F/SQ100N |



#### Precautions for Correct Use

As applicable devices above, the devices with the models and versions listed in 5.2. *Device Configuration* 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 5.2. To use the above devices with models not listed in 5.2. or versions higher than those listed in 5.2., check the differences in the specifications by referring to the manuals before operating the devices.

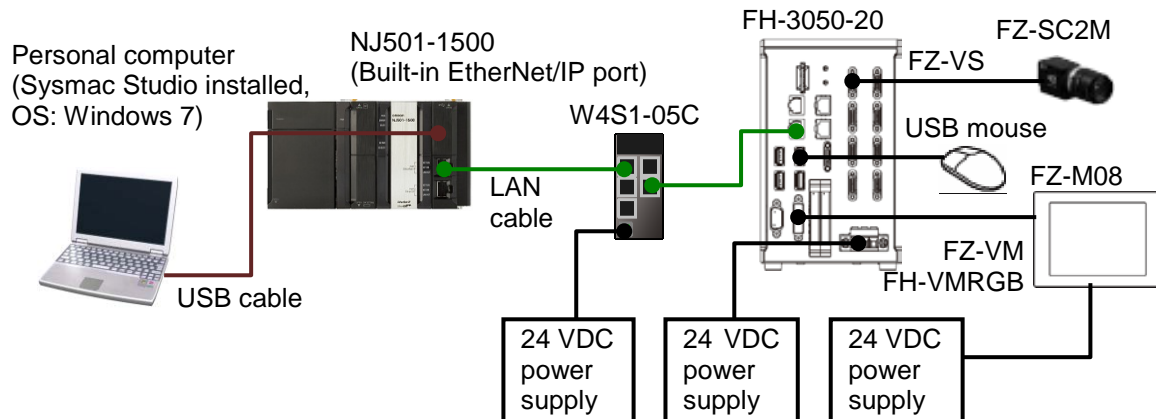


#### Additional Information

This document describes the procedure to establish the network connection. It does not provide information on operation, installation or wiring method which is not related to the connection procedure. It also does not describe the functionality or operation of the devices. Refer to the manuals or contact the device manufacturer.

## 5.2. Device Configuration

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



| Manufacturer | Name  | expression    | Version  |
|--------------|---|---------------|----------|
| OMRON        | NJ-series CPU Unit<br>(Built-in EtherNet/IP port)                                     | NJ501-1500    | Ver.1.09 |
| OMRON        | Power Supply Unit   | NJ-PA3001     |          |
| OMRON        | Switching hub   | W4S1-05C      | Ver.1.00 |
| -            | 24 VDC power supply<br>(For Switching hub)  | -             |          |
| OMRON        | Sysmac Studio   | SYSMAC-SE2□□□ | Ver.1.10 |
| -            | Personal computer<br>(OS: Windows 7)  | -             |          |
| -            | USB cable<br>(USB 2.0 type B connector)   | -             |          |
| -            | LAN cable (STP (shielded,<br>twisted-pair) cable of Ethernet<br>category 5 or higher) | -             |          |
| OMRON        | FH Sensor Controller  | FH-3050-20    | Ver.5.32 |
| OMRON        | Camera  | FZ-SC2M       |          |
| OMRON        | Camera cable  | FZ-VS[]       |          |
| OMRON        | Monitor (analog RGB monitor)  | FZ-M08        |          |
| OMRON        | Monitor cable   | FZ-VM         |          |
| OMRON        | Monitor conversion connector  | FH-VMRGB      |          |
| -            | USB mouse   | -             |          |
| -            | 24 VDC power supply<br>(For FH Sensor Controller)                                     | -             |          |
| -            | 24 VDC power supply<br>(For Monitor)  | -             |          |



### Precautions for Correct Use

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Update Sysmac Studio to the version specified in this clause or higher version.

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

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### Additional Information

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For specifications of 24 VDC power supply available for Switching hub, refer to the *Switching Hub W4S1-series Users Manual* (Cat. No. 0969584-7).

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### Additional Information

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For specifications of 24 VDC power supply available for FH Sensor Controller, refer to the *Image Processing System INSTRUCTION SHEET* (Cat. No. 2285550-0).

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### Additional Information

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For specifications of 24 VDC power supply available for Monitor, refer to the *LCD monitor INSTRUCTION SHEET* (Cat. No. 1636843-6).

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### Additional Information

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The system configuration in this document uses USB for the connection to 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).

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## 6. EtherNet/IP Settings

This section describes the specifications of parameters, global variables, tag sets, and a tag data link table that are all defined in this document.

Hereinafter, FH Sensor Controller is referred to as "Destination Device" in some descriptions.

### 6.1. Parameters

This clause describes the parameters that are set in this document.

#### 6.1.1. EtherNet/IP Communications Settings

The parameters required for connecting Controller and Destination Device via EtherNet/IP are given below.

| Item        | Controller    | FH Sensor Controller |
|-------------|---------------|----------------------|
| IP address  | 192.168.250.1 | 192.168.250.2        |
| Subnet mask | 255.255.255.0 | 255.255.255.0        |

#### 6.1.2. Setting up FH Sensor Controller

The parameters for FH Sensor Controller are given below.

| Item           | Set value             |
|----------------|-----------------------|
| Fieldbus       | EtherNet/IP           |
| Output control | Handshaking (Default) |
| Timeout [s]    | 10.0 (Default)        |



#### Precautions for Correct Use

In order to prevent a phenomenon that a change in the status of each signal cannot be detected by the target device, it is recommended that you set the Output control setting for FH Sensor Controller to Handshaking.

When the Output control of FH Sensor Controller is set to None, the originator device may not correctly detect a change in the status of a signal from FH Sensor Controller if RPI is longer than the output time (ON/OFF) on FH Sensor Controller.

For details, refer to *EtherNet/IP Communications Cycle (RPI)* in *Data Exchange with EtherNet/IP* in *Communicating with EtherNet/IP* in *Section 2. Methods for Connecting and Communicating with External Devices* of the *Vision Sensor FH/FZ5 Series Vision System User's Manual for Communications Settings* (Cat. No. Z342).

## 6.2. Data Types for Tag Data Links

The following data types are used for the data in the tag data links of Destination Device.

### ■ Definition of the data type to access the signals (Unions)

This data type is 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 (Structures)

This data type is 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<br>(CMD-PARAM) |
| CommandParam2  | DINT      |                                  |
| CommandParam3  | DINT      |                                  |

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

This data type is 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    | DWORD     | Response code (RES-CODE)         |
| ResponseData    | DINT      | Response data (RES-DATA)         |
| OutputData      | DINT[8]   | Output data 0 to 7 (DATA 0 to 7) |



### Additional Information

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

### 6.3. Global Variables

The Controller treats the data in tag data links as global variables. The settings of the global variables are the following.

| Name      | Data type   | Network publish | Destination Device allocation | Data size (byte) |
|-----------|-------------|-----------------|-------------------------------|------------------|
| EIPOutput | S_EIPOutput | Output          | Command code                  | 20               |
| EIPInput  | S_EIPInput  | Input           | Response code                 | 48               |

#### ■EIPOutput Configuration

| Destination Device data       | Variable name             | Data type |
|-------------------------------|---------------------------|-----------|
| Control signal (32 bits)      |                           | U_EIPFlag |
|                               | EIPOutput.ControlFlag.F*1 | BOOL[32]  |
|                               | EIPOutput.ControlFlag.W   | DWORD     |
| Command code (CMD-CODE)       | EIPOutput.CommandCode     | DWORD     |
| Command parameter (CMD-PARAM) | EIPOutput.CommandParam1   | DINT      |
|                               | EIPOutput.CommandParam2   | DINT      |
|                               | EIPOutput.CommandParam3   | DINT      |

\*1: Details on allocation of control signal

Allocation of EIPOutput.ControlFlag.F variable

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

|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|
| 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16  |
|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | DSA |

EXE: Command Execution Bit: Turns ON to execute a command.

STEP: Measure Bit: Turns ON to execute a measurement.

XEXE: Flow Command Request Bit: Turns ON to request execution of a command during execution of fieldbus flow control.

ERCLR: Error Clear Bit: Turns ON to clear the ERR signal.

DSA: Data Output Request Bit: Turns ON to request the next data output.

## ■ EIPInput Configuration

| Destination Device data  | Variable name                       | Data type |
|--------------------------|-------------------------------------|-----------|
| Control output (32 bits) |                                     | U_EIPFlag |
|                          | EIPInput.StatusFlag.F※ <sup>1</sup> | BOOL[32]  |
|                          | EIPInput.StatusFlag.W               | DWORD     |
| Command code (CMD-CODE)  | EIPInput.CommandCodeEcho            | DWORD     |
| Response code (RES-CODE) | EIPInput.ResponseCode               | DWORD     |
| Response data (RES-DATA) | EIPInput.ResponseData               | DINT      |
| Output data 0 (DATA0)    | EIPInput.OutputData                 | DINT[8]   |
| Output data 1 (DATA1)    |                                     |           |
| Output data 2 (DATA2)    |                                     |           |
| Output data 3 (DATA3)    |                                     |           |
| Output data 4 (DATA4)    |                                     |           |
| Output data 5 (DATA5)    |                                     |           |
| Output data 6 (DATA6)    |                                     |           |
| Output data 7 (DATA7)    |                                     |           |

\*1: Details on allocation of control signal

Allocation of EIPInput.StatusFlag.F variable

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

|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |      |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|------|
| 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16   |
|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | GATE |

FLG: Command Completion Bit: Turns ON when command execution is completed.

BUSY: Command Busy Bit: Turns ON when command execution is in progress.

OR: Overall Judgement: Turns ON when the overall judgement is NG.

RUN: Run Mode: Turns ON while FH Sensor Controller is in Run Mode.

XFLG: Flow Command Completion Bit: Turns 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: Turns ON when execution of a command that was input during execution of fieldbus flow control is in progress.

XWAIT: Flow Command Wait Bit: Turns ON when a command can be input during the execution of fieldbus flow control.

ERR: Error signal: Turns ON when FH Sensor Controller detects an error signal.

GATE: Data Output Completion Bit: Turns ON when data output is completed.

**Precautions for Correct Use**

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

---

**Additional Information**

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For details on command codes and response codes, refer to *Command Details for PLC Link, EtherNet/IP, and EtherCAT* in *Command Control* in *Section 3. Appendices* of the *Vision Sensor FH/FZ5 Series Vision System User's Manual for Communications Settings* (Cat.No. Z342).

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**Additional Information**

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With 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)BOOL[16] / (2)ARRAY[0..15] OF BOOL

In this document, the data type is simplified by displaying BOOL[16].

(The example above means a BOOL data type with sixteen array elements.)

---



## 6.4. Tag Sets

This clause provides the detailed settings of the tag sets to execute the processing for the tag data links. Data in the tag sets are allocated in the following OUT No. and IN No.

### ■ Output area (from Controller to FH Sensor Controller)

| Originator variable (tag set name) |                                 | Data size (byte) |
|------------------------------------|---------------------------------|------------------|
| EIP002_OUT                         |                                 | 20               |
| OUT No.                            | Global variable name (tag name) | Data size (byte) |
| 1                                  | EIPOutput                       | 20               |

### ■ Input area (from FH Sensor Controller to Controller)

| Originator variable (tag set name) |                                 | Data size (byte) |
|------------------------------------|---------------------------------|------------------|
| EIP002_IN                          |                                 | 48               |
| IN No.                             | Global variable name (tag name) | Data size (byte) |
| 1                                  | EIPInput                        | 48               |

## 6.5. Tag Data Link Table

This clause describes the detailed settings of the tag data link table (connection settings).

On FH Sensor Controller, set the connection type to **Point to Point** for both input and output. Set the timeout value so that it is longer than FH Sensor Controller's measurement processing time.

When the measurement interval is short, the measurement processing load is high, or command processing for operations such as scene group changing is time-consuming, FH Sensor Controller prioritizes measurement and control processing over communication processing. As a result, communication between an external device and FH Sensor Controller may be temporarily interrupted, and a communication error may occur. In this case, set the communication error timeout time longer than FH Sensor Controller's processing time. The values in a red frame are taken from the values in EDS file of Destination Device.

| Connection Name | Connection I/O Type               | RPI (ms) | Timeout Value |
|-----------------|-----------------------------------|----------|---------------|
| default_001     | Consume Data From/Produce Data To | 50.0     | RPI x 4       |

| Connection I/O Type               | Input/Output | Target Variable (Set value of Destination Device: instance number) | Size (byte) | Originator Variable (tag set name) | Size (byte) | Connection Type           |
|-----------------------------------|--------------|--|-------------|------------------------------------|-------------|---------------------------|
| Consume Data From/Produce Data To | Input        | 101  | 48          | EIP002_IN                          | 48          | Point to Point connection |
|                                   | Output       | 100  | 20          | EIP002_OUT                         | 20          | Point to Point connection |

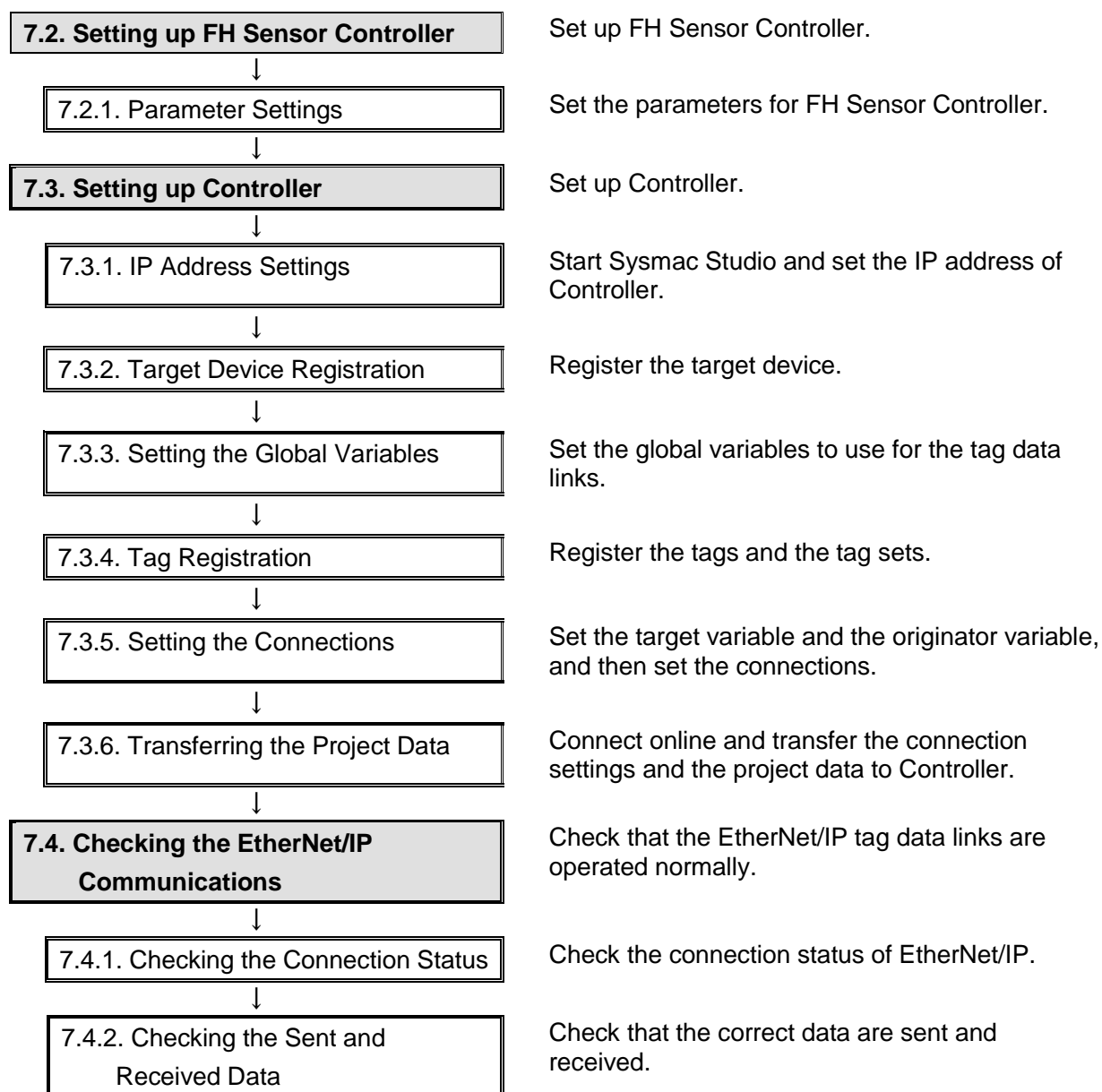
## 7. EtherNet/IP Connection Procedure

This section describes the procedure for connecting FH Sensor Controller and Controller on the EtherNet/IP network.

This document explains the procedures for setting up Controller and FH Sensor Controller based on the factory default setting. For the initialization, refer to *Section 8. Initialization Method*.

### 7.1. Work Flow

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



## 7.2. Setting up FH Sensor Controller

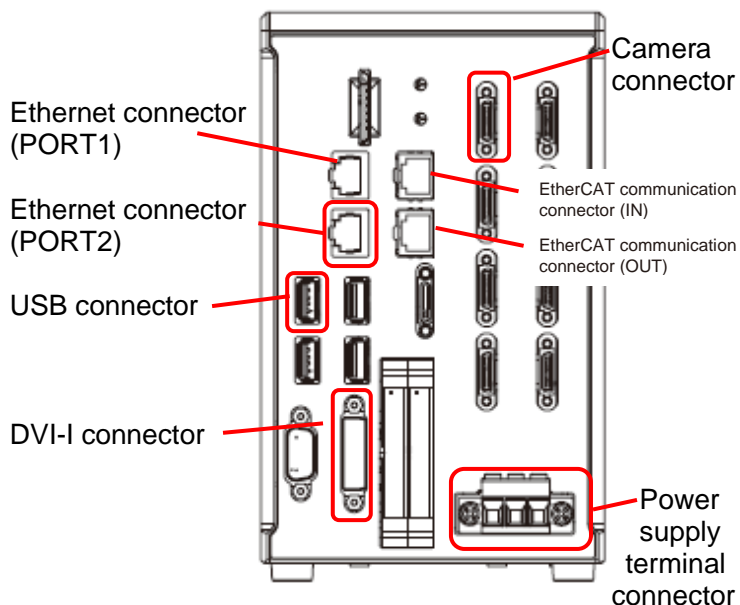
Set up FH Sensor Controller.

### 7.2.1. Parameter Settings

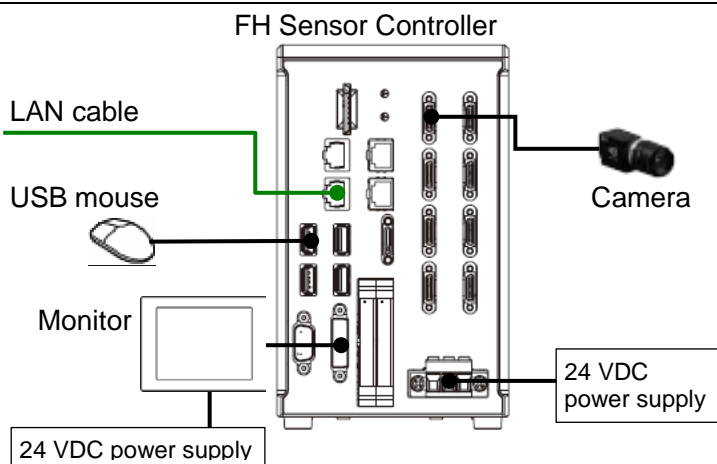
Set the parameters for FH Sensor Controller.

- 1 Check the positions of the connectors on FH Sensor Controller by referring to the right figure.

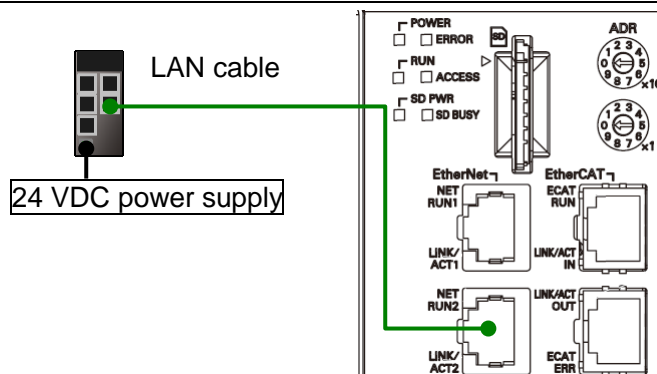
\*In the Ethernet connectors, only PORT2 (lower port) can be used for EtherNet/IP communications. PORT1 (upper port) and the EtherCAT communication connector cannot be used for EtherNet/IP.



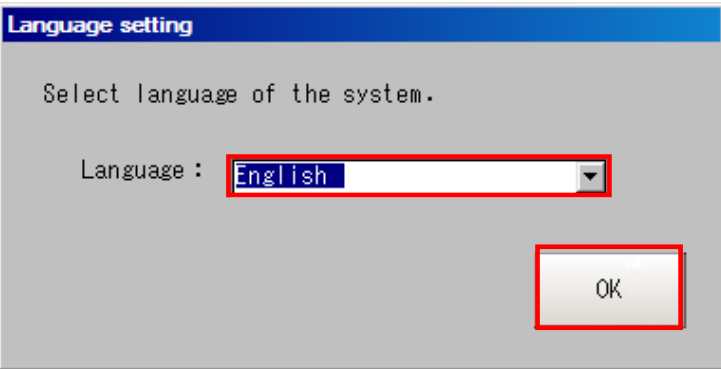
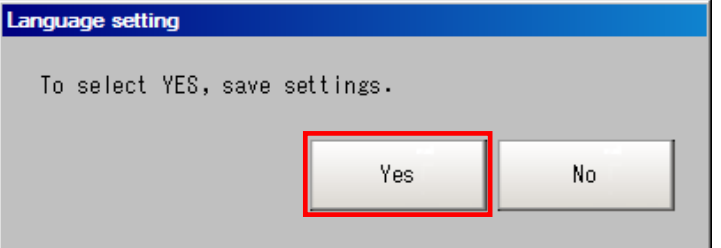

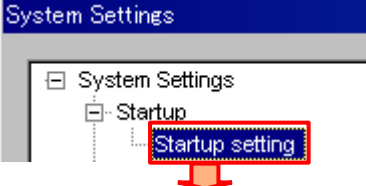
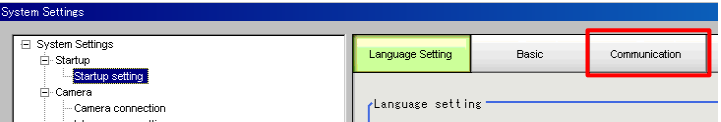
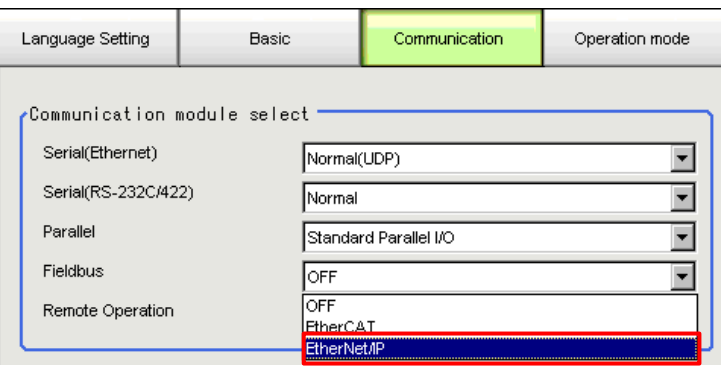
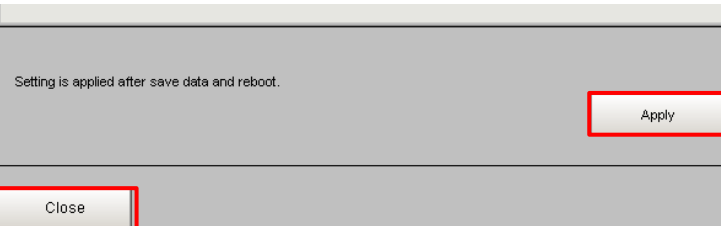
- 2 As shown in 5.2. *Device Configuration*, connect Camera, Monitor, USB mouse, and 24 VDC power supply (For FH Sensor Controller) to FH Sensor Controller. Connect LAN cable to PORT2 (lower port) of Ethernet connector. Connect 24 VDC power supply (For Monitor) to Monitor.

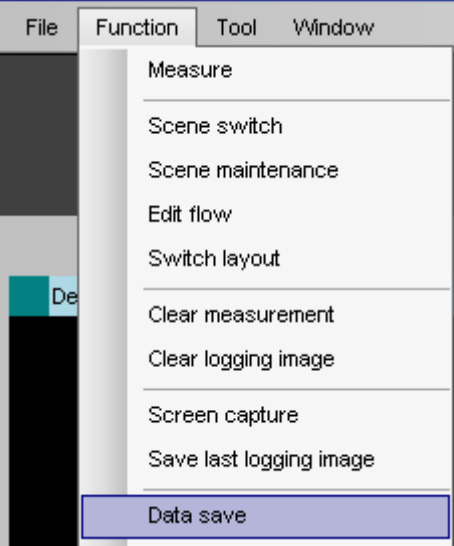
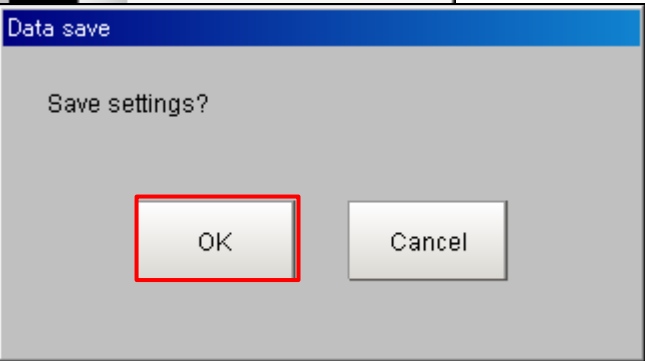
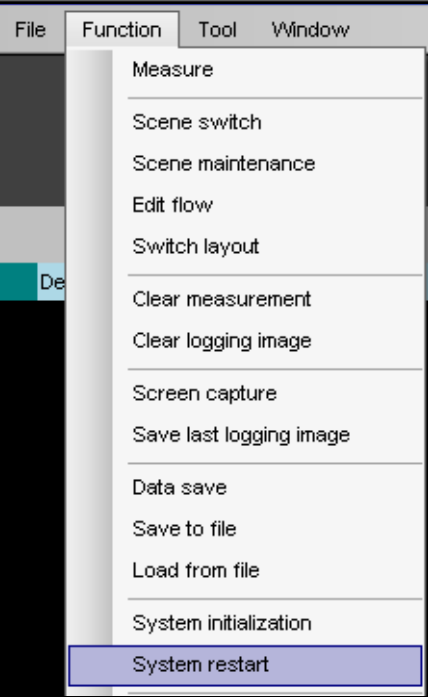
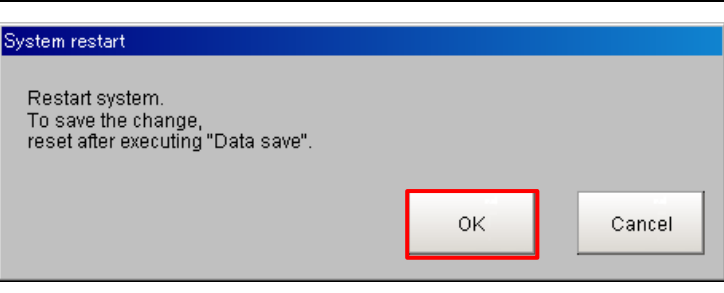


- 3 Connect FH Sensor Controller to Switching hub with LAN cable. Connect 24 VDC power supply (For Switching hub) to Switching hub.



- 4 Turn ON the power supply to FH Sensor Controller and Monitor.

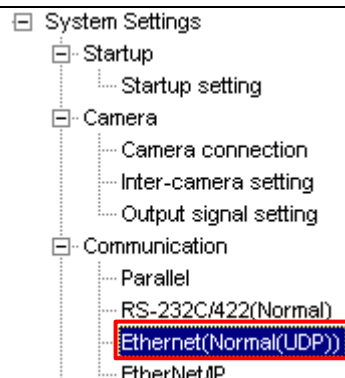
|   |   |
|---|---|
| <p>5 The Language setting Dialog Box is displayed on Monitor connected to FH Sensor Controller only at the initial start. Select <b>English</b> and click <b>OK</b>.</p> <p>Check that your desired Language is selected and click <b>Yes</b>.</p>  |       |
| <p>6 Select <b>System Settings</b> from the Tool Menu on the FZ-PanDA Dialog Box that is shown on Monitor connected to FH Sensor Controller.</p>  |   |
| <p>7 Select <b>System Settings – Startup - Startup setting</b> from the tree.</p> <p>Select the <b>Communication</b> Tab in the right figure.</p>   |   |
| <p>8 The <i>Communication module select</i> Field is displayed. Select <b>EtherNet/IP</b> from the Fieldbus pull-down list.</p> <p>Then, click <b>Apply</b> in the lower part of the displayed screen.</p> <p>Click <b>Close</b> to close the System Settings Dialog Box.</p> <p>*After the data set in the System Settings Window are saved and then FH Sensor Controller is restarted as shown on the right, the settings become enabled.</p> |   |

|   |   |
|---|---|
| <p>9 Select <b>Data save</b> from the Function Menu.</p>                                      |  <p>The screenshot shows the 'Function' menu open. The menu items are: Measure, Scene switch, Scene maintenance, Edit flow, Switch layout, Clear measurement, Clear logging image, Screen capture, Save last logging image, and Data save. The 'Data save' option at the bottom is highlighted with a blue selection bar.</p>   |
| <p>10 The Data save Dialog Box is displayed. Click <b>OK</b>.</p>                             |  <p>The screenshot shows the 'Data save' dialog box. It has a title bar 'Data save' and a message 'Save settings?'. There are two buttons: 'OK' and 'Cancel'. The 'OK' button is highlighted with a red rectangular box.</p>   |
| <p>11 Select <b>System restart</b> from the Function Menu.</p>                                |  <p>The screenshot shows the 'Function' menu open. The menu items are: Measure, Scene switch, Scene maintenance, Edit flow, Switch layout, Clear measurement, Clear logging image, Screen capture, Save last logging image, Data save, Save to file, Load from file, System initialization, and System restart. The 'System restart' option at the bottom is highlighted with a blue selection bar.</p> |
| <p>12 The System restart Dialog Box is displayed. Check the contents and click <b>OK</b>.</p> |  <p>The screenshot shows the 'System restart' dialog box. It has a title bar 'System restart' and a message: 'Restart system. To save the change, reset after executing "Data save".' There are two buttons: 'OK' and 'Cancel'. The 'OK' button is highlighted with a red rectangular box.</p>  |

- 13 After restarting, select **System Settings** from the Tool Menu.



- 14 Select **System Settings - Communication - Ethernet(Normal(UDP))** from the tree.




- 15 The dialog box on the right is displayed. Select *Use the following IP address* in the *Address setting 2* Field and enter the following values.

- IP address: 192.168.250.2
- Subnet mask: 255.255.255.0

\*Even if you use FH Sensor Controller with only one Ethernet port as typified by FH-1050 etc., always set the *Address setting 2* Field.

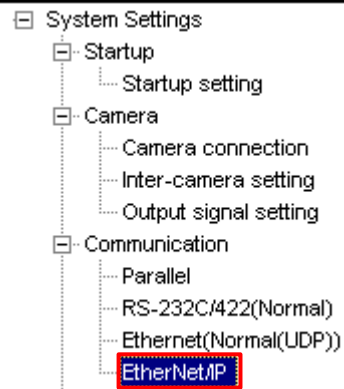
After setting, click **Apply**.

\*To change a value, click the  Button which is in the right of each octet of IP address. The numeric keyboard is displayed. Enter values using the mouse. After entering the values, click **OK** on the numeric keyboard.

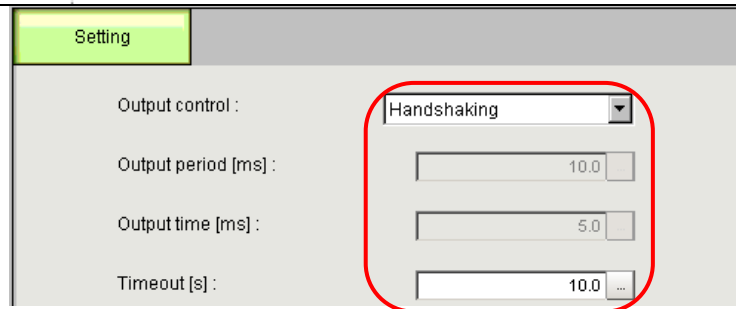
\*How to change values



- 16 Select **System Settings - Communication - Ethernet/IP** from the tree.



- 17 The Setting Tab Page is displayed. Check the following values.  
 Output control: *Handshaking*  
 Timeout [s]: *10.0*



Click **Close** to close the System Settings Window.



- 18 In the same way as steps 9 and 10, select **Data save** from the Function Menu.

- 19 In the same way as steps 11 and 12, select **System restart** from the Function Menu.

### 7.3. Setting up Controller

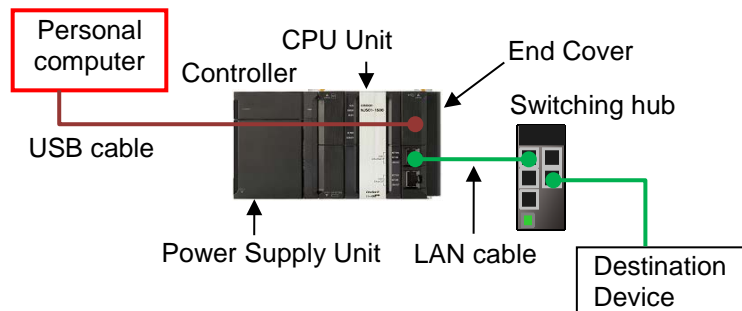
Set up Controller.

#### 7.3.1. IP Address Settings

Start Sysmac Studio and set the IP address of Controller.

Install Sysmac Studio and USB driver in Personal computer beforehand.

- 1 Connect LAN cable to the Built-in EtherNet/IP port (PORT1) of Controller, and connect USB cable to the peripheral (USB) port. As shown in 5.2. *Device Configuration*, connect Personal computer and Switching hub to Controller.

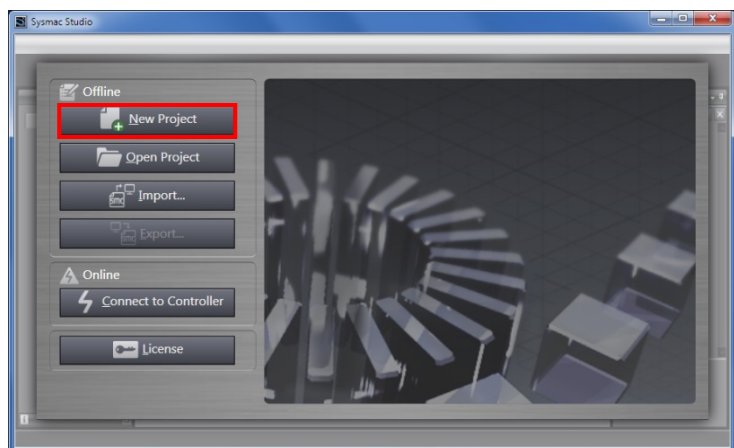


- 2 Start Sysmac Studio.

\*If a confirmation dialog for an access right is displayed at start, execute a selection to start.



- 3 Sysmac Studio starts. Click **New Project**.





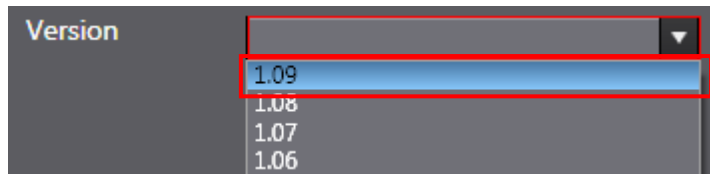
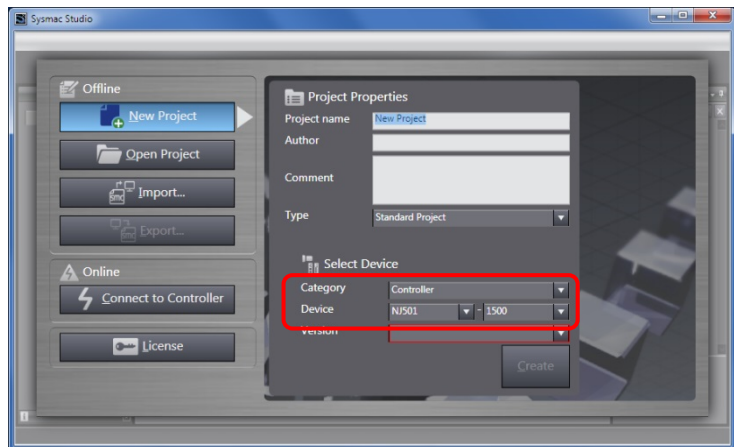
- 4 Project Properties Dialog Box is displayed.

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

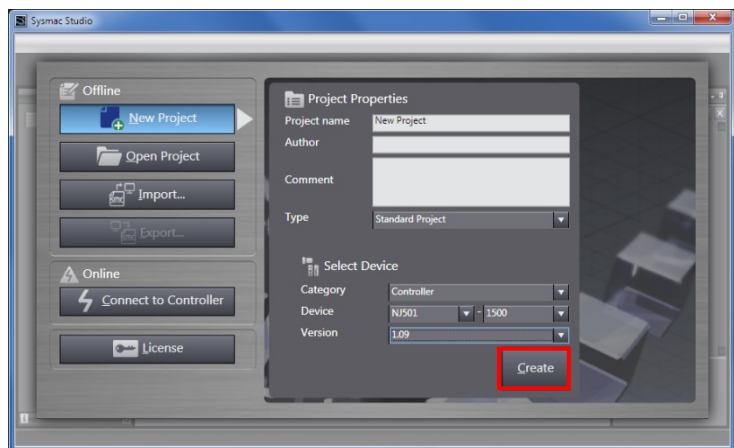
Check that the device used is shown in the *Category* and the *Device* Fields of Select Device.

Select an applicable version from the pull-down list of Version.

\*Although 1.09 is selected in this document for example, select the version you actually use.



- 5 Click **Create**.



- 6 The New Project is displayed.

The following panes are displayed in this window.

Left: Multiview Explorer

Top right: Toolbox

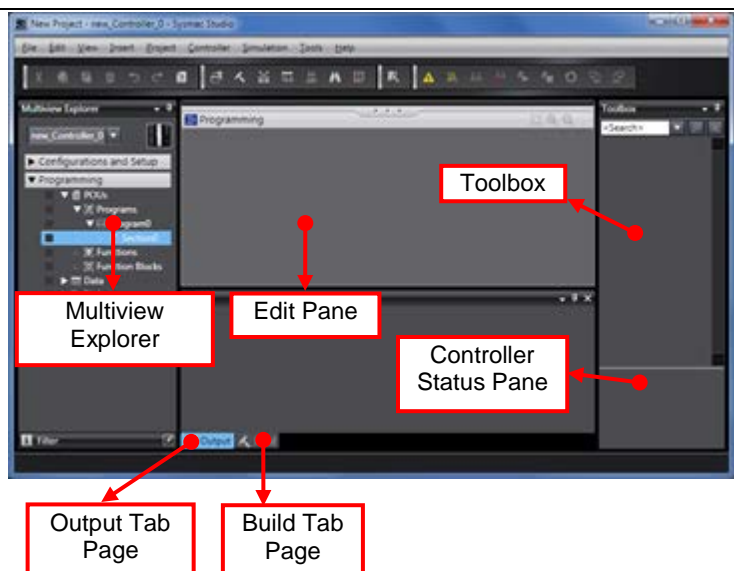
Bottom right: Controller Status Pane

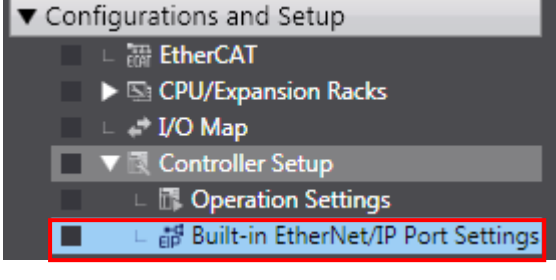
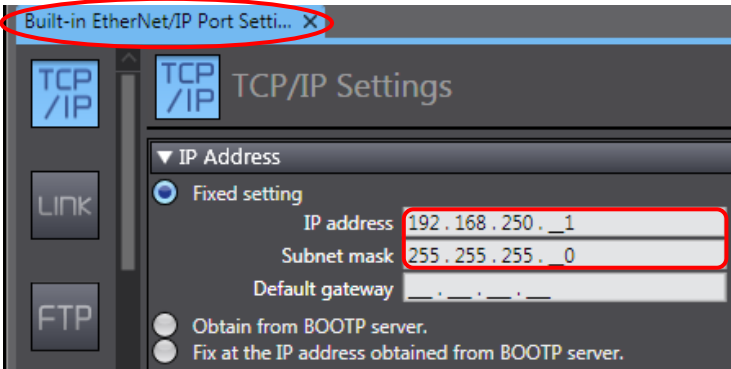
Middle top: Edit Pane

The following tab pages are displayed at the middle bottom of the window.

Output Tab Page

Build Tab Page

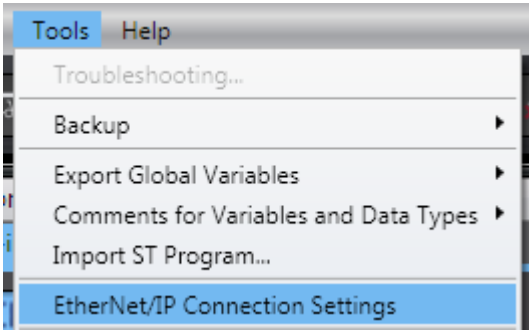


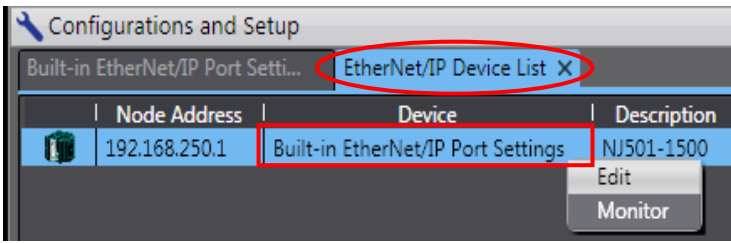
|   |   |  |
|---|---|--|
| 7 | <p>Double-click <b>Built-in EtherNet/IP Port Settings</b> under <b>Configurations and Setup - Controller Setup</b> in the Multiview Explorer.</p>   |  |
| 8 | <p>The Built-in EtherNet/IP Port Settings Tab Page is displayed in the Edit Pane.</p> <p>Check that the following settings are made in the <i>IP Address</i> Field.</p> <p>IP address: 192.168.250.1<br/>Subnet mask: 255.255.255.0</p> |  |

## 7.3.2. Target Device Registration

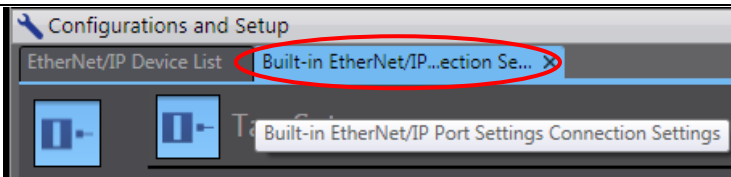
Register the target device.

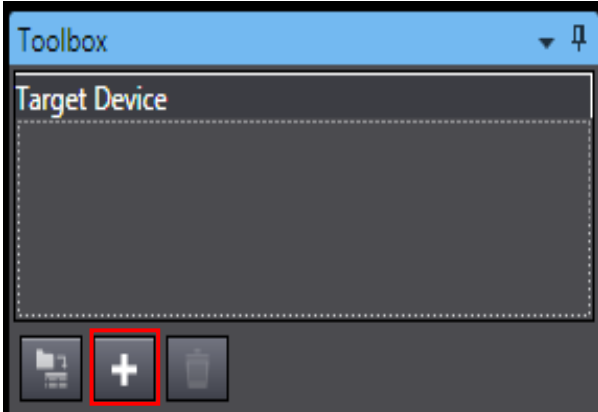
- 1 Select **EtherNet/IP Connection Settings** from the Tools Menu.

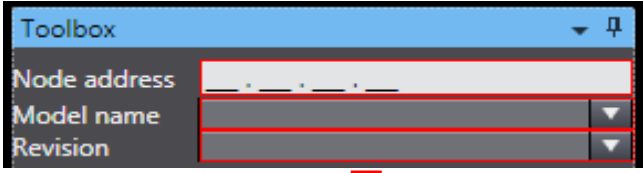
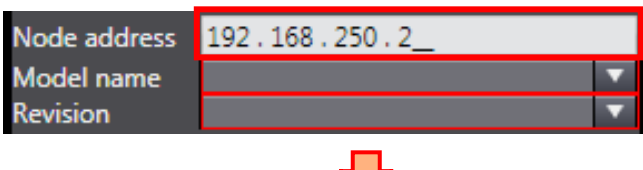
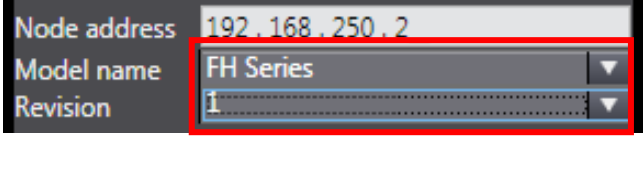
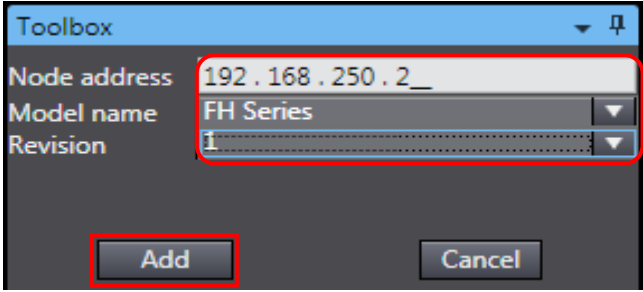


- 2 The EtherNet/IP Device List Tab Page is displayed in the Edit Pane.  
While the Built-in EtherNet/IP Port Settings is being selected, right-click and select **Edit** from the menu.



| Node Address  | Device                             | Description |
|---------------|------------------------------------|-------------|
| 192.168.250.1 | Built-in EtherNet/IP Port Settings | NJ501-1500  |
- 3 The Built-in EtherNet/IP Port Settings Connection Settings Tab Page is displayed in the Edit Pane.


- 4 Click the + Button in Toolbox.

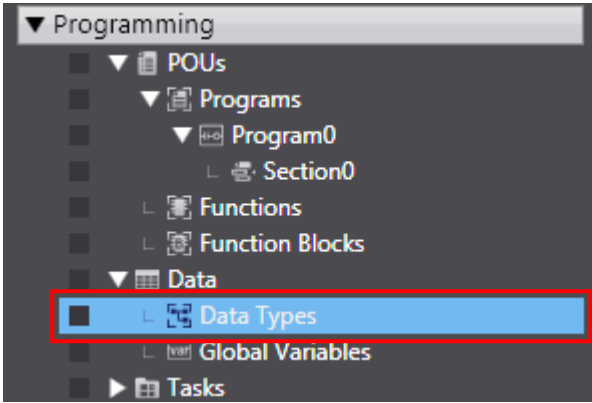


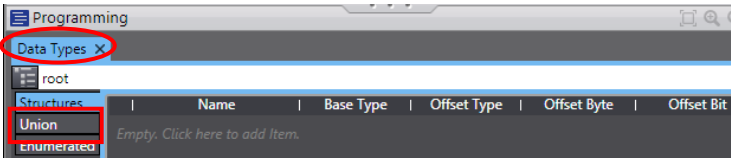
|              |   |  |
|--------------|---|--|
| <div>5</div> | <p>Data fields of the target device registration are displayed.</p> <p>Enter <i>192.168.250.2</i> in the <i>Node address</i> Field.</p> <p>Select the following values from the pull-down lists of Model name and Revision.</p> <p>Model name: <b><i>FH Series</i></b></p> <p>Revision: <b><i>1</i></b></p> |    |
| <div>6</div> | <p>Check the settings and click <b>Add</b>.</p>   |   |
| <div>7</div> | <p>192.168.250.2 is registered in Target Device of Toolbox.</p>   |    |

### 7.3.3. Setting the Global Variables

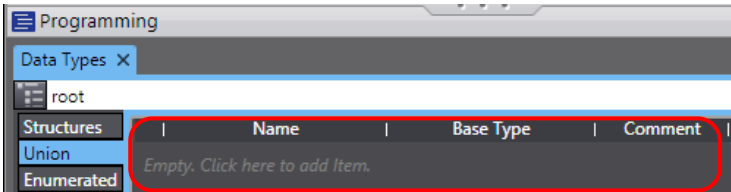
Set the global variables to use for the tag data links.

- 1 Double-click **Data Types** under **Programming - Data** in the Multiview Explorer.

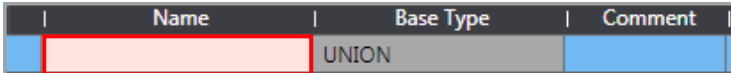

- 2 The Data Types Tab Page is displayed.  
Click the **Union** Side Tab.



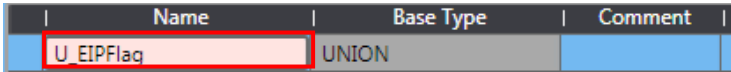
The Union Data Type Editor is displayed.

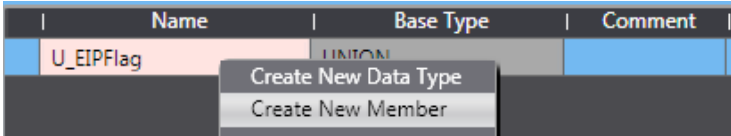


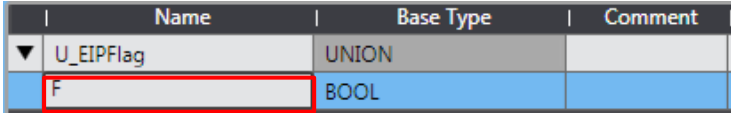
Click a column under the *Name* Column to enter a new data type.



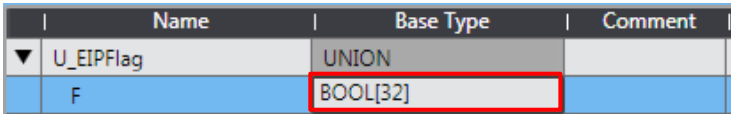
Enter *U\_EIPFlag* in the *Name* Column.


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

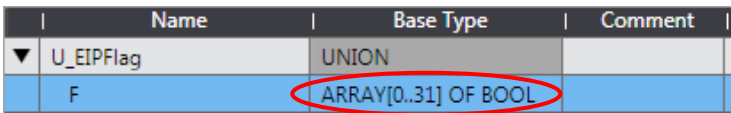

- 4 Enter *F* in the *Name* Column.

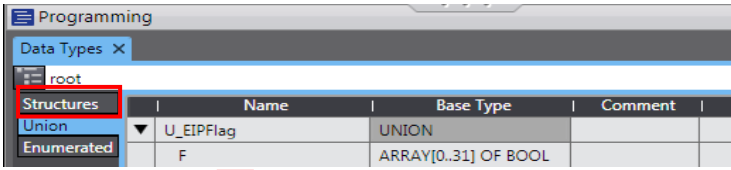
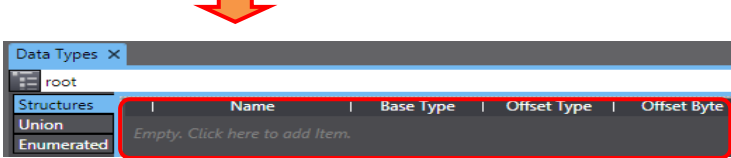
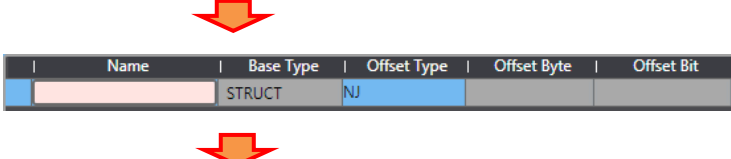

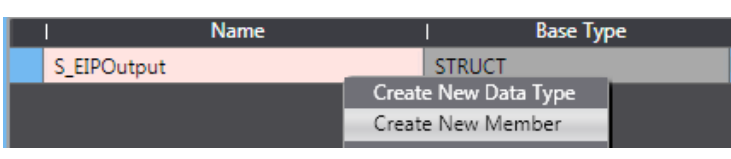
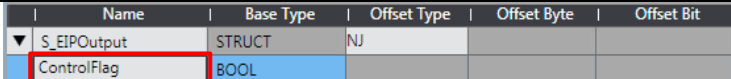
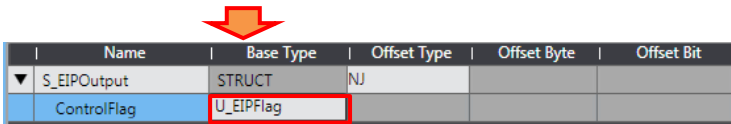
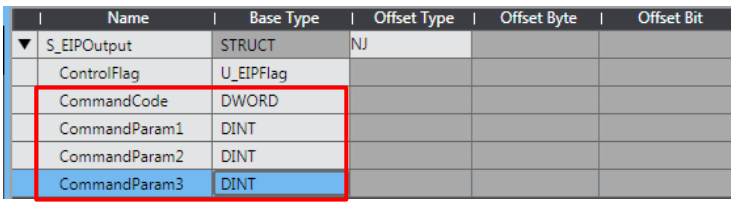


Enter *BOOL[32]* in the *Base Type* Column.



\*After entering, the value changes to *ARRAY[0..31] OF BOOL* as shown on the right.



| 5         | <p>In the same way as steps 3 and 4, enter the following data in the new columns.</p> <p>Name: <i>W</i></p> <p>Base Type: <i>DWORD</i></p>   | <table border="1"> <thead> <tr> <th>Name</th><th>Base Type</th><th>Comment</th></tr> </thead> <tbody> <tr> <td>U_EIPFlag</td><td>UNION</td><td></td></tr> <tr> <td>F</td><td>ARRAY[0..31] OF BOOL</td><td></td></tr> <tr> <td>W</td><td>DWORD</td><td></td></tr> </tbody> </table>  | Name | Base Type | Comment | U_EIPFlag | UNION |  | F | ARRAY[0..31] OF BOOL |  | W | DWORD |  |
|-----------|--|---|------|-----------|---------|-----------|-------|--|---|----------------------|--|---|-------|--|
| Name      | Base Type  | Comment   |      |           |         |           |       |  |   |                      |  |   |       |  |
| U_EIPFlag | UNION  |   |      |           |         |           |       |  |   |                      |  |   |       |  |
| F         | ARRAY[0..31] OF BOOL   |   |      |           |         |           |       |  |   |                      |  |   |       |  |
| W         | DWORD  |   |      |           |         |           |       |  |   |                      |  |   |       |  |
| 6         | <p>Click the <b>Structures</b> Side Tab in the Edit Pane.</p> <p>The Structure Data Type Editor is displayed.</p> <p>Click a column under the <i>Name</i> Column to enter a new data type.</p> <p>Enter <i>S_EIPOutput</i> in the <i>Name</i> Column.</p>  |     |      |           |         |           |       |  |   |                      |  |   |       |  |
| 7         | <p>After entering, right-click and select <b>Create New Member</b> from the menu.</p>  |    |      |           |         |           |       |  |   |                      |  |   |       |  |
| 8         | <p>Enter <i>ControlFlag</i> in the <i>Name</i> Column.</p> <p>Enter <i>U_EIPFlag</i> in the <i>Base Type</i> Column.</p>   |     |      |           |         |           |       |  |   |                      |  |   |       |  |
| 9         | <p>In the same way as steps 7 and 8, enter the following data in the new member columns.</p> <ul style="list-style-type: none"> <li>Name: <i>CommandCode</i><br/>Base Type: <i>DWORD</i></li> <li>Name: <i>CommandParam1</i><br/>Base Type: <i>DINT</i></li> <li>Name: <i>CommandParam2</i><br/>Base Type: <i>DINT</i></li> <li>Name: <i>CommandParam3</i><br/>Base Type: <i>DINT</i></li> </ul> <p>*The members are entered in order of the structures listed in 6.2. <i>Data Types for Tag Data Links</i>.</p> |   |      |           |         |           |       |  |   |                      |  |   |       |  |

- 10 After entering, right-click and select **Create New Data Type** from the menu.

Enter *S\_EIPInput* in the *Name* Column.

| Name                 | Base Type | Offset Type | Offset Byte | Offset Bit |
|----------------------|-----------|-------------|-------------|------------|
| ▼ S_EIPOutput        | STRUCT    | NJ          |             |            |
| ControlFlag          | U_EIPFlag |             |             |            |
| CommandCode          | DWORD     |             |             |            |
| CommandParam1        | DINT      |             |             |            |
| CommandParam2        | DINT      |             |             |            |
| CommandParam3        | DINT      |             |             |            |
| Create New Data Type |           |             |             |            |
| Create New Member    |           |             |             |            |



| 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          |             |            |

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

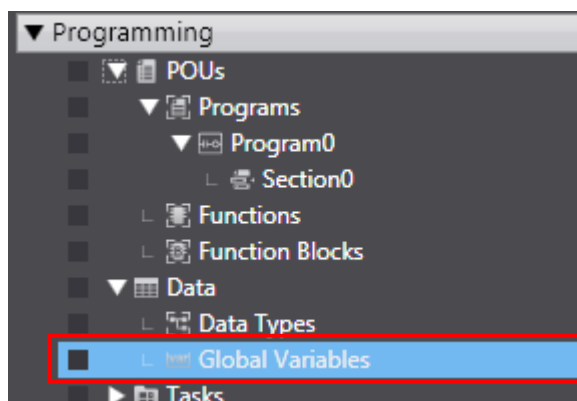
- Name: *StatusFlag*  
Base Type: *U\_EIPFlag*
- Name: *CommandCodeEcho*  
Base Type: *DWORD*
- Name: *ResponseCode*  
Base Type: *DWORD*
- Name: *ResponseData*  
Base Type: *DINT*
- Name: *OutputData*  
Base Type: *DINT[8]*

| 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    | DWORD               |             |             |            |
| ResponseData    | DINT                |             |             |            |
| OutputData      | ARRAY[0..7] OF DINT |             |             |            |

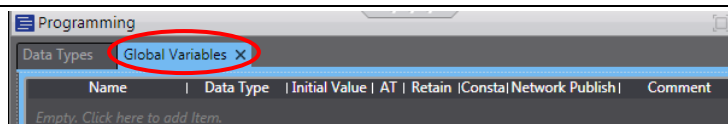
\*The members are entered in order of the structures listed in 6.2. *Data Types for Tag Data Links*.

\*After entering, the value changes to ARRAY[0..7] OF DINT as shown on the right.

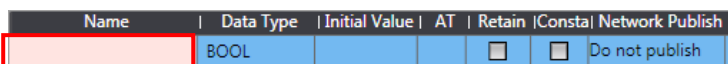
- 12 Double-click **Global Variables** under **Programming - Data** in the Multiview Explorer.



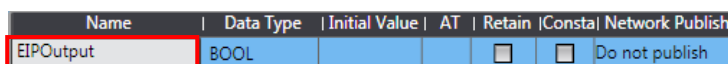
- 13 The Global Variables Tab Page is displayed in the Edit Pane.



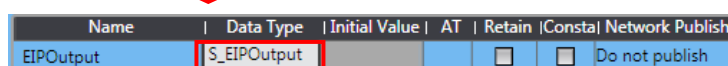
Click a column under the *Name* Column to enter a new variable.



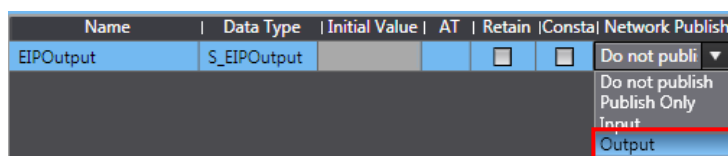
Enter *EIOutput* in the *Name* Column.



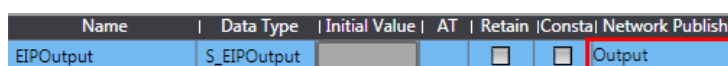
Enter *S\_EIOutput* in the *Data Type* Column.



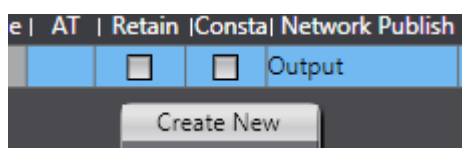
Select **Output** from the Network Publish Menu.



Check that Output is selected in the *Network Publish* Column.

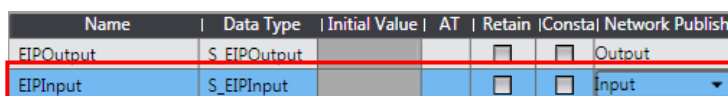


- 14 After entering, right-click and select **Create New** from the menu.

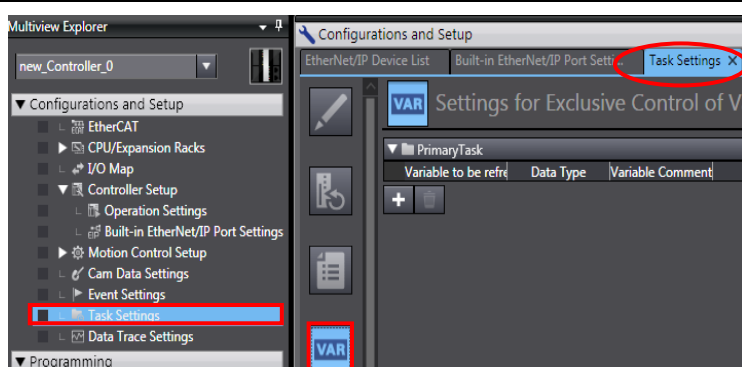


- 15 In the same way as steps 2 and 3, enter the following data in the new columns.

- Name: *EIInput*
- Data Type: *S\_EIInput*
- Network Publish: *Input*

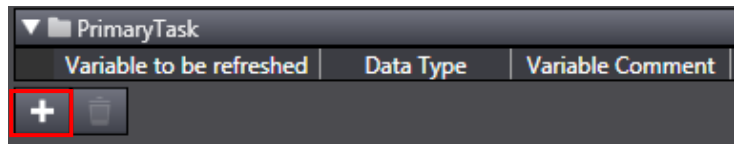


- 16 Double-click **Task Settings** under **Configurations and Setup** in the Multiview Explorer. The Task Settings Tab Page is displayed in the Edit Pane. Click **VAR**.



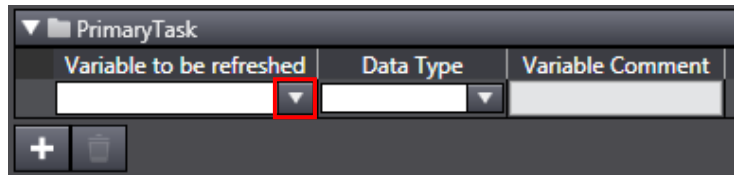


17 Click the + Button.

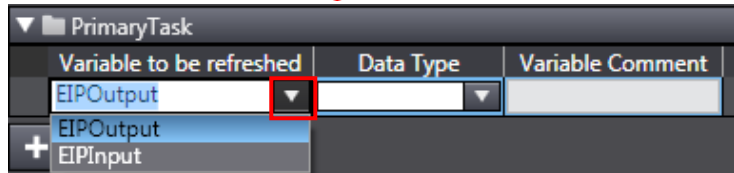


A new column is added.

Click the **Down Arrow** Button of the *Variable to be refreshed* Field (on the left side).

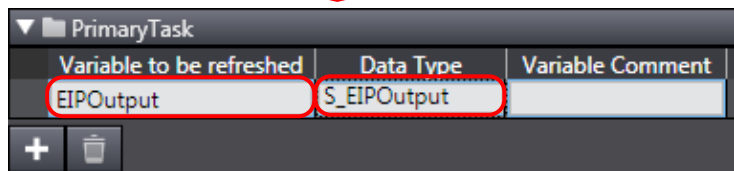


The variables set in this sub-clause are displayed. Select *EIOutput*.

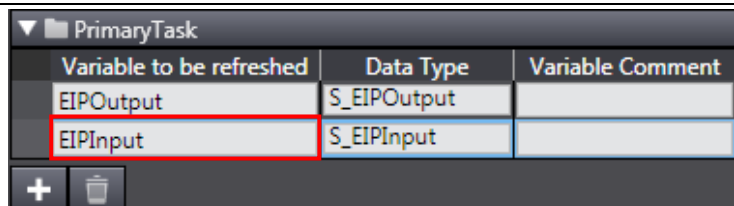


EIOutput is added.

\*The data types are displayed automatically, so no need to be set.



18 In the same way as step 17, add the all variables set in this sub-clause to the *Variable to be refreshed* Field (on the left side).

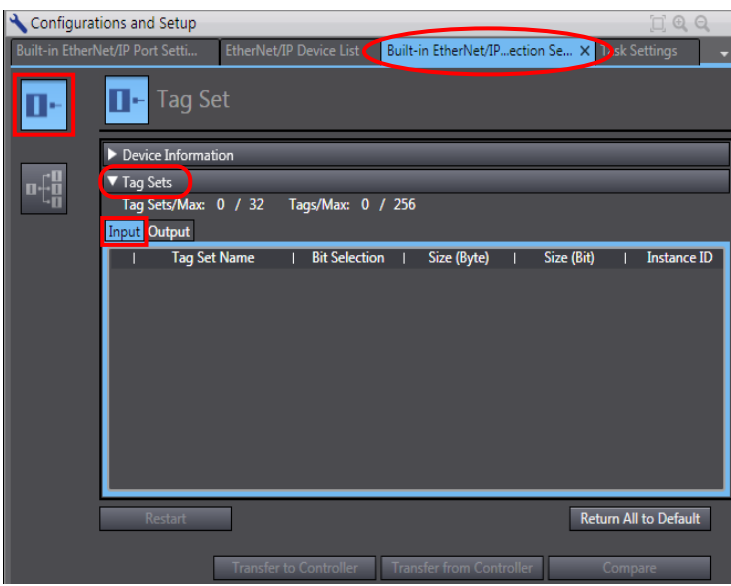


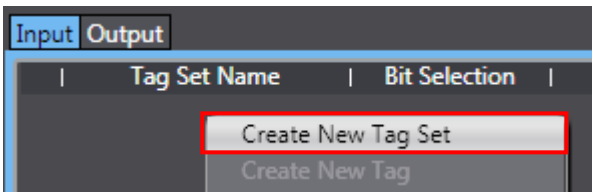
\*The data types are displayed automatically, so no need to be set.

## 7.3.4. Tag Registration

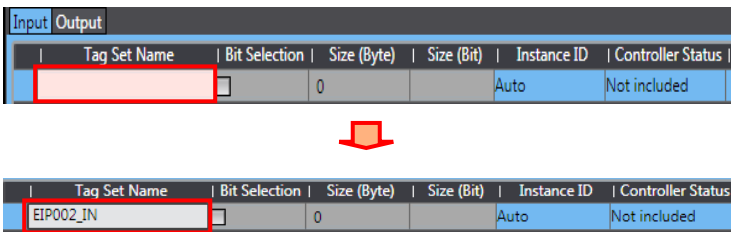
Register the tags and the tag sets.

- 1 Click the **Tag Set** Button in the Built-in EtherNet/IP Port Settings Connection Settings Tab Page. Select the **Input** Tab in Tag Sets.


- 2 Right-click any open space in the Input Tab Page and select **Create New Tag Set** from the menu.


- 3 A new name in the *Tag Set Name* Column can be entered. Select the column newly added.

Enter *EIP002\_IN*.



- 4 While the EIP002\_IN is being selected, right-click and select **Create New Tag** from the menu.
- A new tag name can be entered in the EIP002\_IN. Select the column newly added.
- Set the global variable of IN No.1 listed in 6.4. *Tag Sets* as a tag.
- \*When the first character of the set variable is entered, the list that starts with the character entered is displayed.
- 5 Select **Output** Tab. Right-click any open space in the Output Tab Page and select **Create New Tag Set** from the menu.
- 6 A new name in the *Tag Set Name* Column can be entered. In the same way as step 3, enter *EIP002\_OUT*.
- 7 In the same way as step 4, set the global variable of OUT No.1 listed in 6.4. *Tag Sets* as a tag.
- 8 Check that Tag Sets shows 2 and that the value of Tags shows the same as the number of the global variables set.

| Tag Set Name | Bit Selection            | Size (Byte) | Size (Bit) |
|--------------|--------------------------|-------------|------------|
| EIP002_IN    | <input type="checkbox"/> | 0           |            |

Create New Tag Set  
Create New Tag



| Tag Set Name | Bit Selection            | Size (Byte) | Size (Bit) |
|--------------|--------------------------|-------------|------------|
| ▼ EIP002_IN  | <input type="checkbox"/> | 2           |            |
|              | <input type="checkbox"/> | 2           | 0          |



| Tag Set Name | Bit Selection            | Size (Byte) | Size (Bit) |
|--------------|--------------------------|-------------|------------|
| ▼ EIP002_IN  | <input type="checkbox"/> | 2           |            |
| E            | <input type="checkbox"/> | 2           | 0          |
| EIPInput     |                          |             |            |



| Tag Set Name | Bit Selection            | Size (Byte) | Size (Bit) |
|--------------|--------------------------|-------------|------------|
| ▼ EIP002_IN  | <input type="checkbox"/> | 48          |            |
| EIPInput     | <input type="checkbox"/> | 48          | 0          |

| Input              | Output        |             |            |
|--------------------|---------------|-------------|------------|
| Tag Set Name       | Bit Selection | Size (Byte) | Size (Bit) |
| Create New Tag Set |               |             |            |
| Create New Tag     |               |             |            |

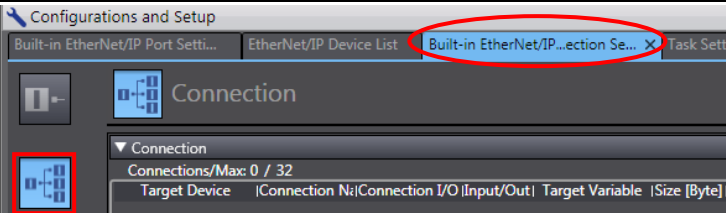
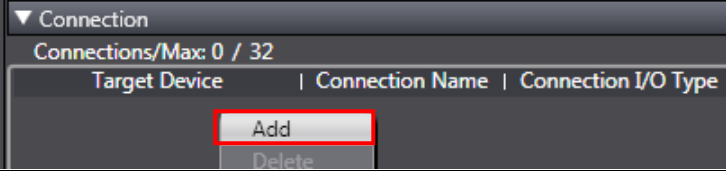
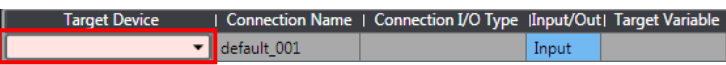
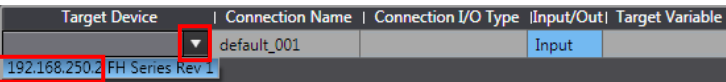
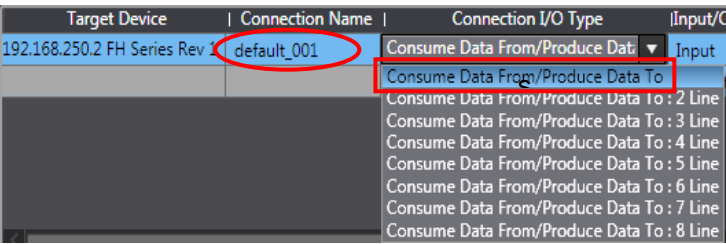
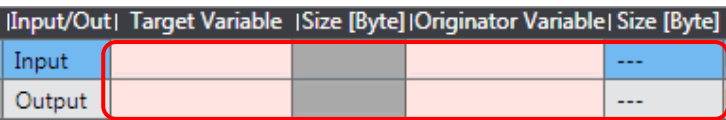
| Input        |                          | Output      |            |             |                   |
|--------------|--------------------------|-------------|------------|-------------|-------------------|
| Tag Set Name | Bit Selection            | Size (Byte) | Size (Bit) | Instance ID | Controller Status |
| EIP002_OUT   | <input type="checkbox"/> | 0           |            | Auto        | Not included      |

| Tag Set Name | Bit Selection            | Size (Byte) | Size (Bit) | Instance ID | Controller Status |
|--------------|--------------------------|-------------|------------|-------------|-------------------|
| ▼ EIP002_OUT | <input type="checkbox"/> | 20          |            | Auto        | Not included      |
| EIPOutput    | <input type="checkbox"/> | 20          | 0          |             |                   |

|   |
|---|
| ▼ Tag Sets                                |
| Tag Sets/Max: 2 / 32    Tags/Max: 2 / 256 |

### 7.3.5. Setting the Connections

Set the target variable (that receives the open request) and the originator variable (that requests opening), and set the connections (tag data link table).

|   |   |  |
|---|---|--|
| 1 | Click the <b>Connection</b> Button in the Built-in EtherNet/IP Port Settings Connection Settings Tab Page.  |    |
| 2 | Right-click any open space in Connection and select <b>Add</b> from the menu.   |    |
| 3 | A new connection can be entered. Select the column newly added.<br><br>Select <b>192.168.250.2</b> from the pull-down list under the <i>Target Device</i> Column. | <br> |
| 4 | The default_001 is created in the <i>Connection Name</i> Column. Select <b>Consume Data From/Produce Data To</b> from the Connection I/O Type pull-down list.     |    |
| 5 | The target variable and the originator variable can be set.   |    |

- 6 Click a column in *Target Variable* of Input.
- When you press **Ctrl + Space** on the keyboard, an applicable instance number appears.
- \*The instance number also appears even when the first character of the instance number "1" is entered.
- Select the instance number.
- In the same way, set the target variable of Output.
- 7 Click a column in *Originator Variable* of Input.
- The pull-down list is displayed.
- Select the tag set name to use.
- In the same way, set the originator variable of Output.
- 8 Select **Point to Point connection** from the Connection Type pull-down list.
- \*On FH Sensor Controller, set the connection type to **Point to Point** connection for both input and output.
- 9 Set the RPI[ms], and the timeout value as required.
- \*In this document, the default values are used for these settings.

| Input/Out | Target Variable | Size [Byte] | Originator Variable | Size [Byte] |
|-----------|-----------------|-------------|---------------------|-------------|
| Input     |                 |             |                     | ---         |
| Output    |                 |             |                     | ---         |



| Input/Out | Target Variable | Size [Byte] | Originator Variable | Size [Byte] |
|-----------|-----------------|-------------|---------------------|-------------|
| Input     |                 | 48          |                     | ---         |
| Output    |                 |             |                     | ---         |
|           | 101             |             |                     |             |
|           | 103             |             |                     |             |
|           | 105             |             |                     |             |
|           | 107             |             |                     |             |
|           | 109             |             |                     |             |
|           | 111             |             |                     |             |
|           | 113             |             |                     |             |
|           | 115             |             |                     |             |



| Input/Out | Target Variable | Size [Byte] | Originator Variable | Size [Byte] |
|-----------|-----------------|-------------|---------------------|-------------|
| Input     | 101             | 48          |                     | ---         |
| Output    |                 |             |                     | ---         |



| Input/Out | Target Variable | Size [Byte] | Originator Variable | Size [Byte] |
|-----------|-----------------|-------------|---------------------|-------------|
| Input     | 101             | 48          |                     | ---         |
| Output    | 100             | 20          |                     | ---         |



| Input/Out | Target Variable | Size [Byte] | Originator Variable | Size [Byte] |
|-----------|-----------------|-------------|---------------------|-------------|
| Input     | 101             | 48          |                     | ---         |
| Output    | 100             | 20          | EIP002_IN           | ---         |



| Input/Out | Target Variable | Size [Byte] | Originator Variable | Size [Byte] |
|-----------|-----------------|-------------|---------------------|-------------|
| Input     | 101             | 48          | EIP002_IN           | 48          |
| Output    | 100             | 20          | EIP002_OUT          | 20          |



| Input/Out | Target Variable | Size [Byte] | Originator Variable | Size [Byte] | Connection Type       |
|-----------|-----------------|-------------|---------------------|-------------|-----------------------|
| Input     | 101             | 48          | EIP002_IN           | 48          | Multi-cast connection |
| Output    | 100             | 20          | EIP002_OUT          | 20          | Multi-cast connection |



| Input/Out | Target Variable | Size [Byte] | Originator Variable | Size [Byte] | Connection Type           |
|-----------|-----------------|-------------|---------------------|-------------|---------------------------|
| Input     | 101             | 48          | EIP002_IN           | 48          | Point to Point connection |
| Output    | 100             | 20          | EIP002_OUT          | 20          | Point to Point connection |



| Originator Variable | Size [Byte] | Connection Type           | RPI [ms] | Timeout V |
|---------------------|-------------|---------------------------|----------|-----------|
| EIP002_IN           | 48          | Point to Point connection | 50.0     | RPI x 4   |
| EIP002_OUT          | 20          | Point to Point connection |          |           |



### Precautions for Correct Use

Set RPI to 4 ms or longer on FH Sensor Controller.



### Precautions for Correct Use

When the measurement interval is short, the measurement processing load is high, or command processing for operations such as scene group changing is time-consuming, FH Sensor Controller prioritizes measurement and control processing over communication processing. As a result, communication between an external device and FH Sensor Controller may be temporarily interrupted, and a communication error may occur.

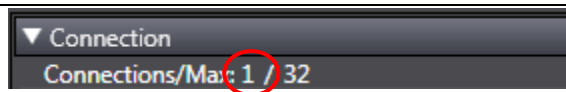
In this case, set the timeout value as shown below.

Packet Interval (RPI value) X Timeout value > FH Sensor Controller's Processing Time

For details on the timeout value of FH Sensor Controller, refer to *EtherNet/IP*

*Communications* in *Communicating with EtherNet/IP* in *Section 2. Methods for Connecting and Communicating with External Devices* of the *Vision Sensor FH/FZ5 Series Vision System User's Manual for Communications Settings* (Cat. No. Z342).

- 10 Check that Connections shows  
1.



### 7.3.6. Transferring the Project Data

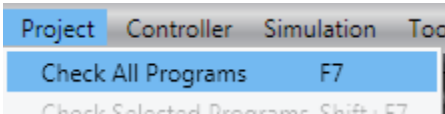
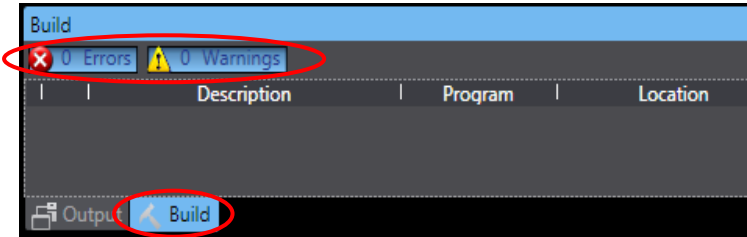
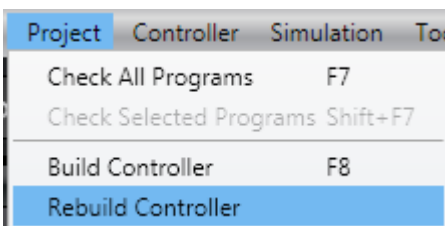
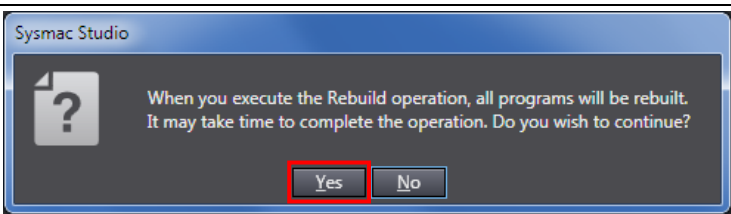
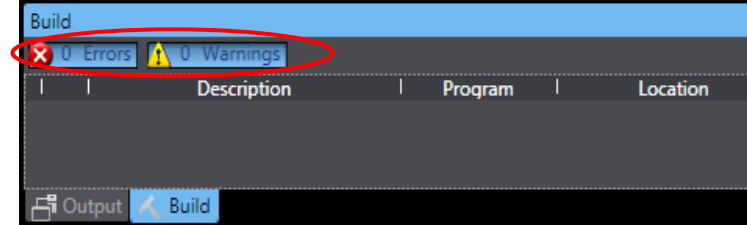
Connect online and transfer the connection settings and the project data to Controller.

## ⚠ WARNING

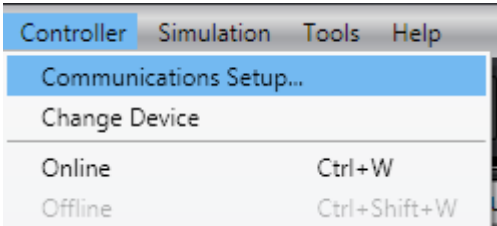
When you transfer a user program, configuration data, setup data, device variables, or values in memory used for CJ-series Units from Sysmac Studio, the devices or machines may perform unexpected operation regardless of the operating mode of CPU Unit.

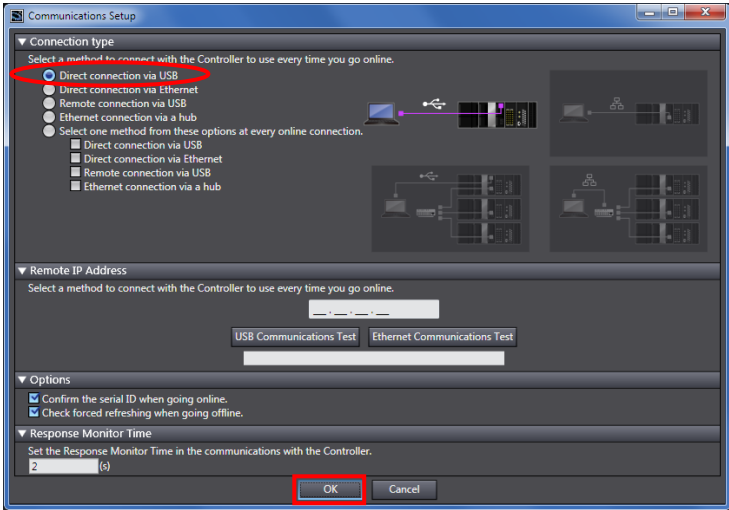
Always confirm safety at the destination node before you transfer the project data.



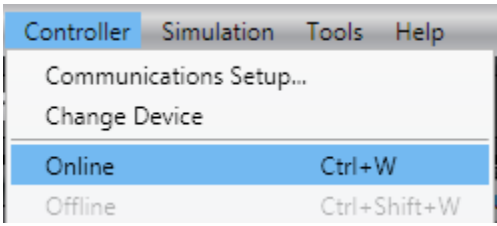
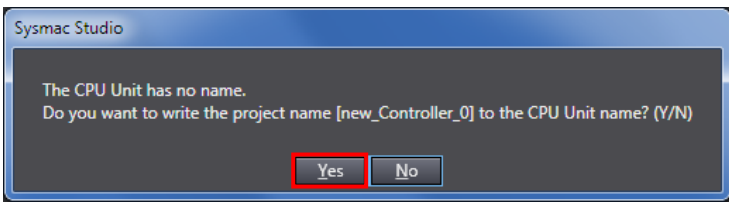
- 1 Turn ON the power supply to Controller and Switching hub.
- 2 Select **Check All Programs** from the Project Menu.
 
- 3 The Build Tab Page is displayed. Check that "0 Errors" and "0 Warnings" are displayed.
 
- 4 Select **Rebuild Controller** from the Project Menu.
 
- 5 A confirmation dialog box is displayed. Check the contents and click **Yes**.
 
- 6 Check that "0 Errors" and "0 Warnings" are displayed in the Build Tab Page.
 


- 7 Select **Communications Setup** from the Controller Menu.


- 8 The Communications Setup Dialog Box is displayed. Check that the *Direct connection via USB* Option is selected for the Connection type. Click **OK**.


- 9 Select **Online** from the Controller Menu. A confirmation dialog box is displayed. Check the contents and click **Yes**.

\*The displayed dialog depends on the status of the Controller used. Check the contents and click **OK** or **Yes** to proceed with the processing.



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



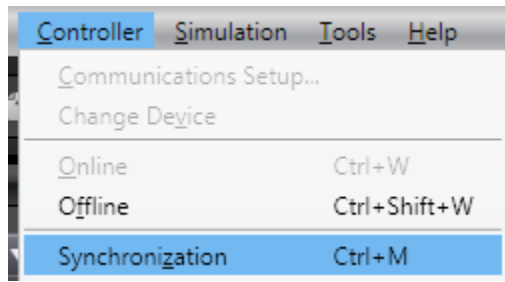


### Additional Information

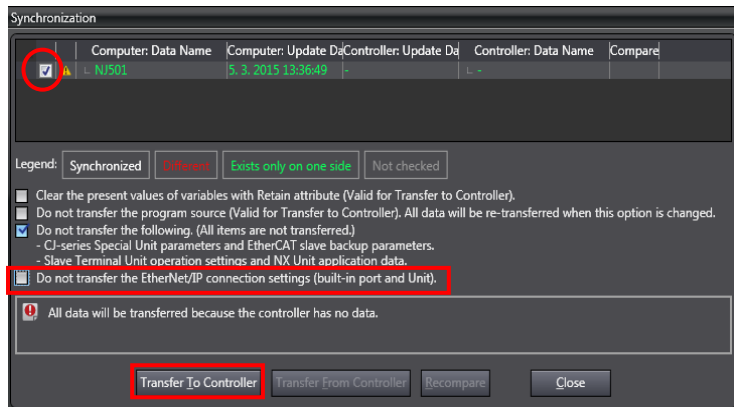
For details on online connections to Controller, refer to *Section 6. Online Connections to a Controller* of the *Sysmac Studio Version 1 Operation Manual* (Cat. No. W504).



- 11 Select **Synchronization** from the Controller Menu.

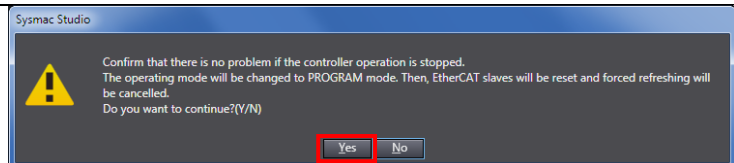


- 12 The Synchronization Dialog Box is displayed.  
Check that the data to transfer (NJ501 in the right dialog box) is selected.  
Uncheck the *Do not transfer the EtherNet/IP connection settings (built-in port and Unit)*.  
Click **Transfer To Controller**.



\*After executing Transfer To Controller, Sysmac Studio data is transferred to Controller and the data is compared.

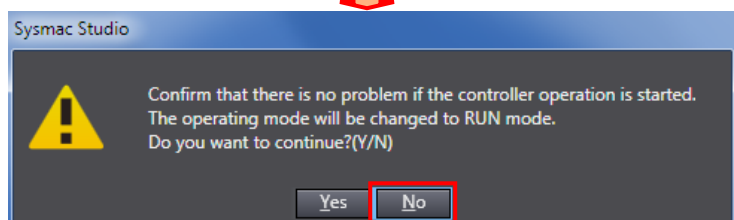
- 13 A confirmation dialog box on the right is displayed. Check that there is no problem and click **Yes**.



A screen stating "Synchronizing" is displayed.



A confirmation dialog box on the right is displayed. Check that there is no problem and click **No**.

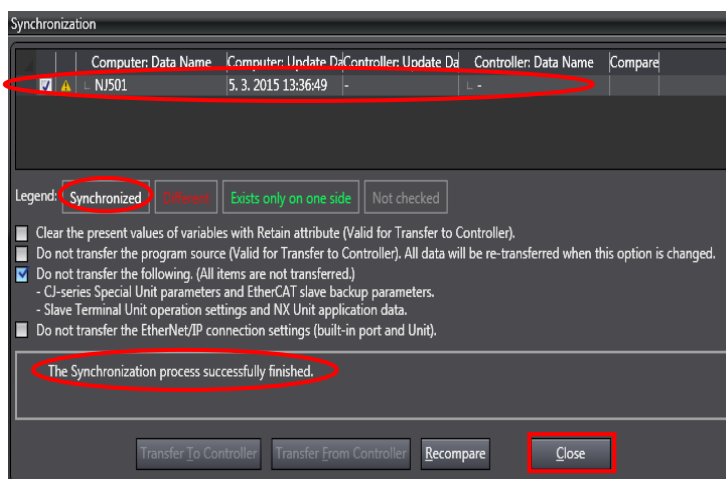


\*Do not return to RUN mode.

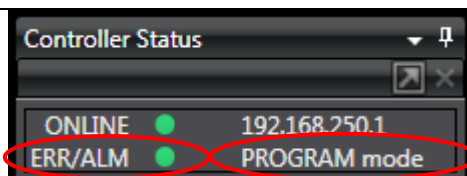
- 14 Check that the synchronized data is displayed with the color specified by "Synchronized", and that a message is displayed stating "The synchronization process successfully finished". If there is no problem, click **Close**.

\*A message stating "The synchronization process successfully finished" is displayed if the Sysmac Studio project data coincides with the Controller data.

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



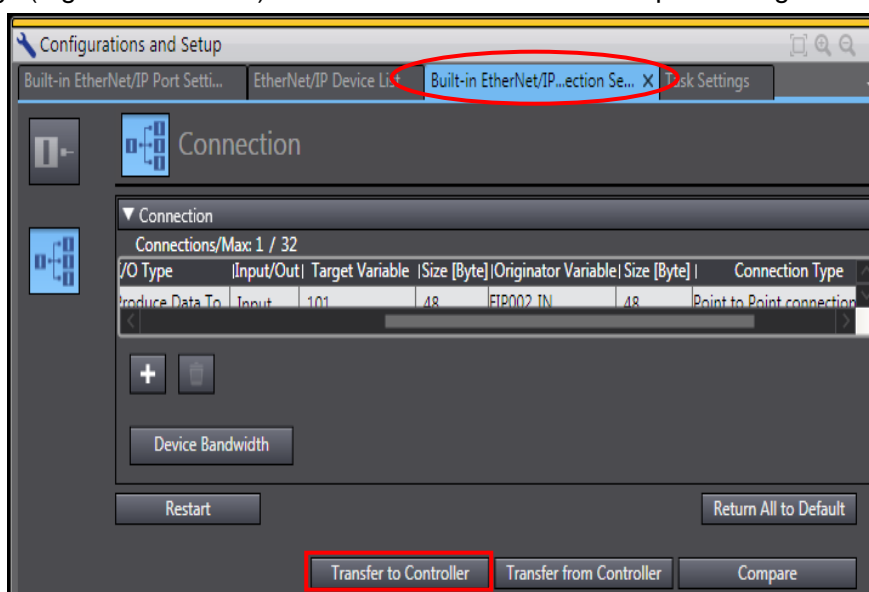
- 15 Check that ERR/ALM indicator in the Controller Status Pane changes to green color and that PROGRAM mode is displayed.



### Precautions for Correct Use

If changing the connection settings (tag data link table) after performing the synchronization, the connection settings (tag data link table) are not transferred even when performing the synchronization again.

When transferring, click **Transfer to Controller** in the Built-in EtherNet/IP Port Settings Connection Settings Tab Page to transfer.



## 7.4. Checking the EtherNet/IP Communications

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

### 7.4.1. Checking the Connection Status

Check the connection status of EtherNet/IP.

- 1 Check that the tag data links are performed normally by checking the LED indicators on Controller.

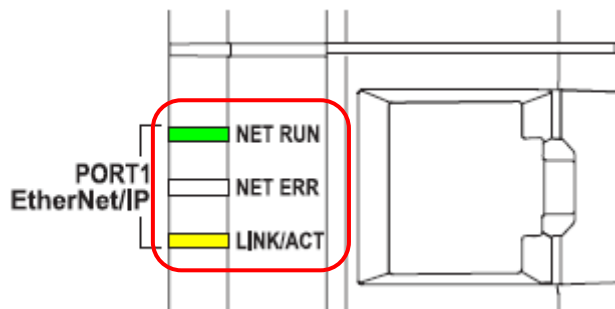
The LED indicators in normal status are as follows:

NET RUN: Green lit

NET ERR: Not lit

LINK/ACT: Yellow flashing

(Flashing while packets are being sent and received)



- 2 Check the LED indicators on FH Sensor Controller.

The LED indicators in normal status are as follows:

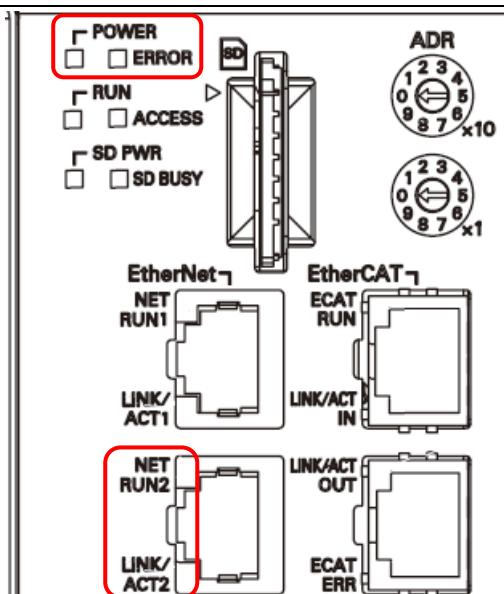
POWER: Green lit

ERROR: Not lit

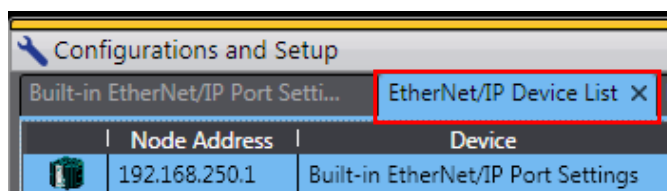
NET RUN2: Green lit

LINK/ACT2: Orange flashing

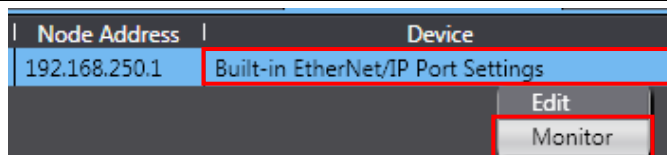
(Flashing while packets are being sent and received)



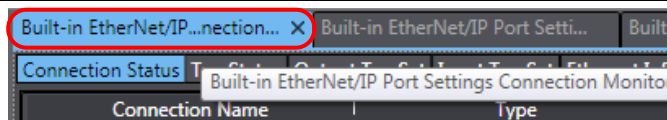
- 3 Select the **EtherNet/IP Device List** Tab.



- 4 While the Built-in EtherNet/IP Port Settings is being selected, right-click and select **Monitor** from the menu.



- 5 The Built-in EtherNet/IP Port Settings Connection Monitor Tab Page is displayed.



- 6 Select the **Connection Status** Tab.  
Check that a blue circle is displayed next to the applicable connection listed in the *Connection Name* Column.  
Check that the Status is 00:0000.

| Connection Status         | Tag Status | Output Tag Set | Input Tag Set | Ethernet Information |
|---------------------------|------------|----------------|---------------|----------------------|
| Connection Name           | Type       | Status         |               |                      |
| 192.168.250.2 default_001 | Out/In     | 00:0000        |               |                      |

- 7 Select the **Tag Status** Tab.  
Check that all tags in the *Tag Name* Column are displayed and that green circles are displayed next to them. Check that the statuses for all tags are normally resolved.

| Connection Status | Tag Status   | Output Tag Set    | Input Tag Set | Ethernet Information |
|-------------------|--------------|-------------------|---------------|----------------------|
| Tag Name          | Input/Output | Status            |               |                      |
| ● EIPInput        | Input        | Normally resolved |               |                      |
| ● EIPOutput       | Output       | Normally resolved |               |                      |

## 7.4.2. Checking the Sent and Received Data

Check that the correct data are sent and received.

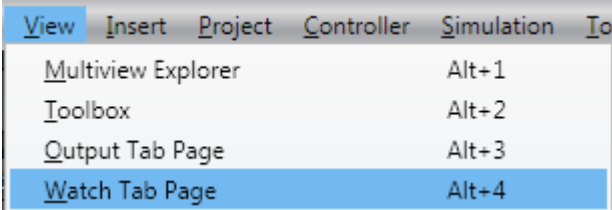
## ⚠ Caution

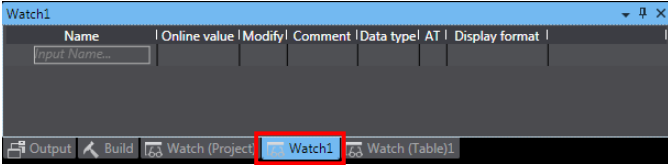
If you change the values of variables on a Watch Tab Page in the online state, the connected devices to the output unit may operate regardless of the operating mode of CPU Unit.

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

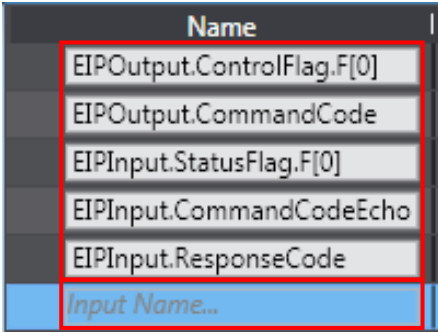


- 1 Select **Watch Tab Page** from the View Menu.


- 2 Select the **Watch1** Tab.


- 3 Click *Input Name*, and enter the name of the variables for monitoring.  
When setting a new variable name, enter the following variable names.

*EIOutput.ControlFlag.F[0]*  
*EIOutput.CommandCode*  
*EIInput.StatusFlag.F[0]*  
*EIInput.CommandCodeEcho*  
*EIInput.ResponseCode*


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

| Name                      | Online value | Modify     | Data type |
|---------------------------|--------------|------------|-----------|
| EIOutput.ControlFlag.F[0] | False        | TRUE FALSE | BOOL      |
| EIOutput.CommandCode      | 0000 0000    | 00101010   | DWORD     |
| EIInput.StatusFlag.F[0]   | False        | TRUE FALSE | BOOL      |
| EIInput.CommandCodeEcho   | 0000 0000    |            | DWORD     |
| EIInput.ResponseCode      | 0000 0000    |            | DWORD     |

↓

By pressing **Enter**, the value is set and the online value of *EIOutput.CommandCode* changes to 00101010.

| Name                      | Online value | Modify     | Data type |
|---------------------------|--------------|------------|-----------|
| EIOutput.ControlFlag.F[0] | False        | TRUE FALSE | BOOL      |
| EIOutput.CommandCode      | 0010 1010    | 00101010   | DWORD     |
| EIInput.StatusFlag.F[0]   | False        | TRUE FALSE | BOOL      |
| EIInput.CommandCodeEcho   | 0000 0000    |            | DWORD     |
| EIInput.ResponseCode      | 0000 0000    |            | DWORD     |

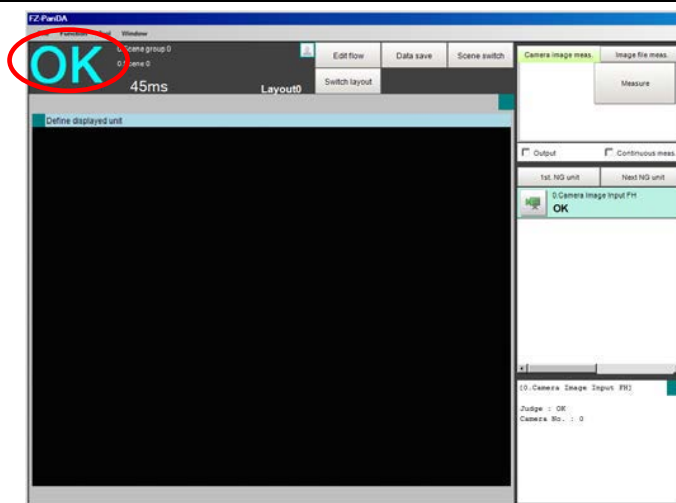
- 5 Click **TRUE** in the *Modify* Column of *EIOutput.ControlFlag.F[0]*.

| Name                      | Online value | Modify            | Data type |
|---------------------------|--------------|-------------------|-----------|
| EIOutput.ControlFlag.F[0] | False        | <b>TRUE</b> FALSE | BOOL      |
| EIOutput.CommandCode      | 0010 1010    | 00101010          | DWORD     |
| EIInput.StatusFlag.F[0]   | False        | TRUE FALSE        | BOOL      |
| EIInput.CommandCodeEcho   | 0000 0000    |                   | DWORD     |
| EIInput.ResponseCode      | 0000 0000    |                   | DWORD     |

The online value changes to True.  
(EIOutput.ControlFlag.F[0]:  
Command Execution Bit (EXE))

| Name                      | Online value | Modify     | Data type |
|---------------------------|--------------|------------|-----------|
| EIOutput.ControlFlag.F[0] | <b>True</b>  | TRUE FALSE | BOOL      |
| EIOutput.CommandCode      | 0010 1010    | 00101010   | DWORD     |
| EIInput.StatusFlag.F[0]   | True         | TRUE FALSE | BOOL      |
| EIInput.CommandCodeEcho   | 0010 1010    |            | DWORD     |
| EIInput.ResponseCode      | 0000 0000    |            | DWORD     |

- 6 After completing the measurement, OK is displayed on Monitor.



- 7 The online values of *EIInput.StatusFlag.F[0]*, *EIInput.CommandCodeEcho*, and *EIInput.ResponseCode* are as follows:

- *EIInput.StatusFlag.F[0]*: True  
(Command completed)
- *EIInput.CommandCodeEcho*:  
00101010  
(The sent command code is  
returned.)
- *EIInput.ResponseCode*:  
0000 0000  
(The execution result of the  
command 0000 0000: OK or  
FFFF FFFF: NG is reflected.)

| Name                      | Online value     | Modify     | Data type |
|---------------------------|------------------|------------|-----------|
| EIOutput.ControlFlag.F[0] | True             | TRUE FALSE | BOOL      |
| EIOutput.CommandCode      | 0010 1010        | 00101010   | DWORD     |
| EIInput.StatusFlag.F[0]   | <b>True</b>      | TRUE FALSE | BOOL      |
| EIInput.CommandCodeEcho   | <b>0010 1010</b> |            | DWORD     |
| EIInput.ResponseCode      | <b>0000 0000</b> |            | DWORD     |

## 8. Initialization Method

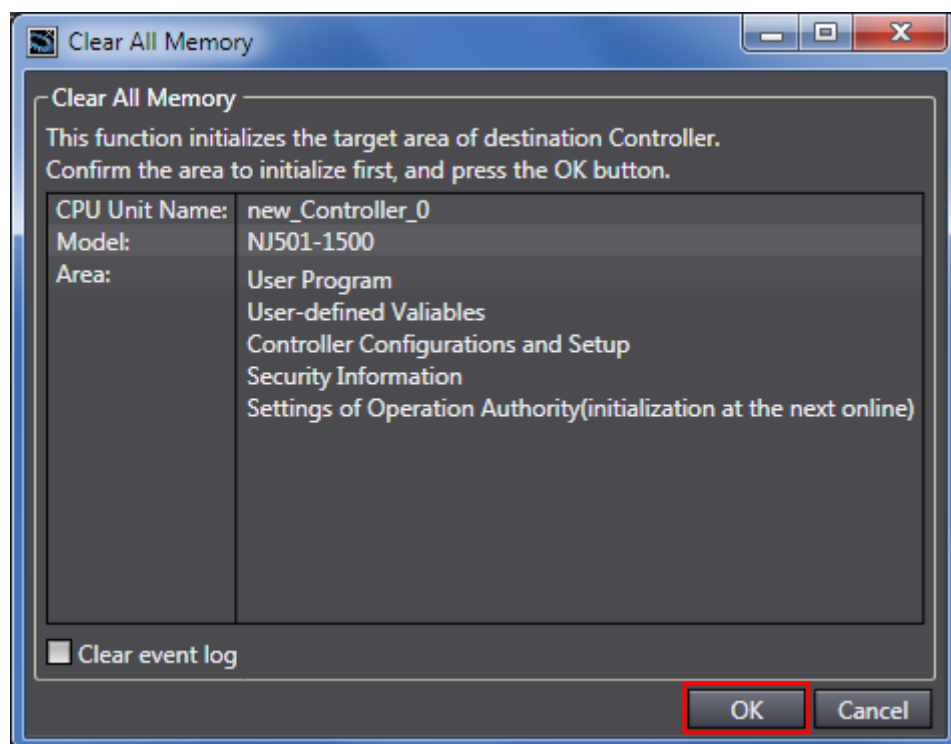
This document provides the explanation of the setting procedure based on the factory default setting.

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

### 8.1. Initializing Controller

To initialize the settings of Controller, it is necessary to initialize CPU Unit.

Change Controller to PROGRAM mode before the initialization. Select **Clear All Memory** from the Controller Menu of Sysmac Studio. The Clear All Memory Dialog Box is displayed. Check the contents and click **OK**.



### 8.2. Initializing FH Sensor Controller

For information on how to initialize FH 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 Procedure Using the Project File

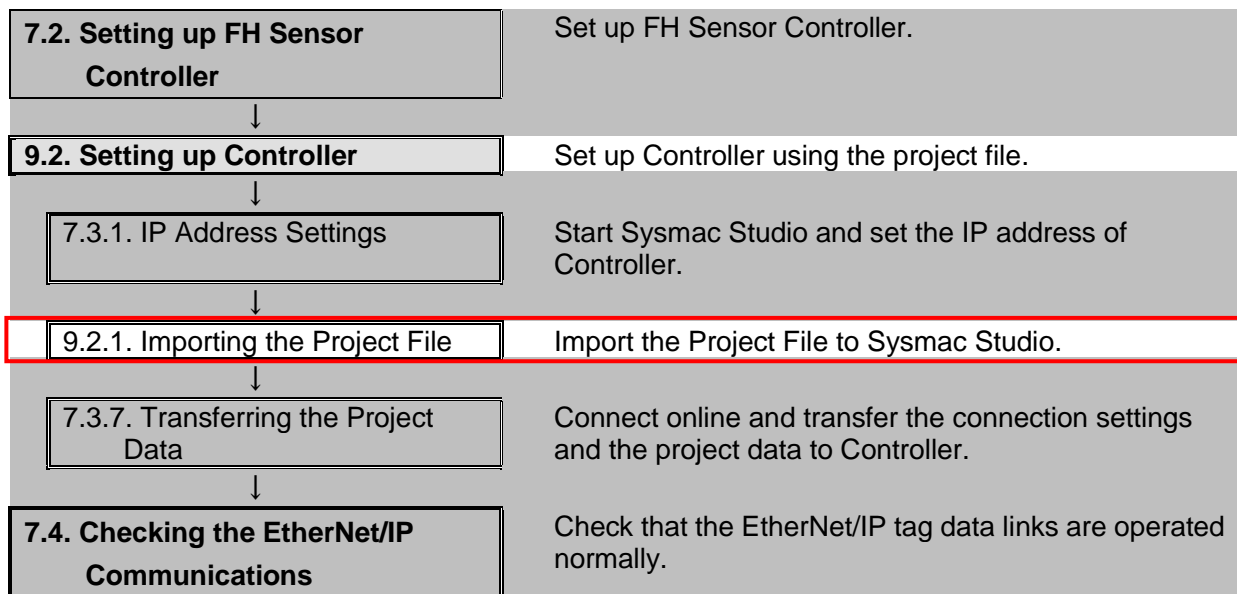
This section describes the procedure in which you use the following project file.  
The project file includes the contents that are set in 7.3. *Setting up the Controller*.  
Obtain the latest project file from OMRON.

| Name   | File name               | Version  |
|--|-------------------------|----------|
| Sysmac Studio compact project file (Extension: csm2) | OMRON_FH_EIP_EV200.csm2 | Ver.2.00 |

### 9.1. Work Flow

Take the following steps to make the tag data link settings for EtherNet/IP using the project file.

Except 9.2.1. *Importing the Project File* enclosed in red, refer to each appropriate clause and sub-clause for further information.



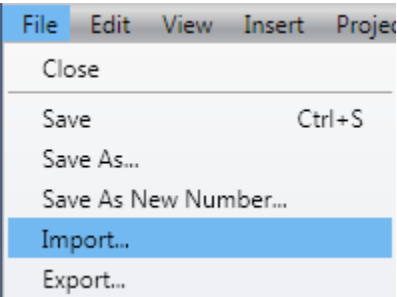
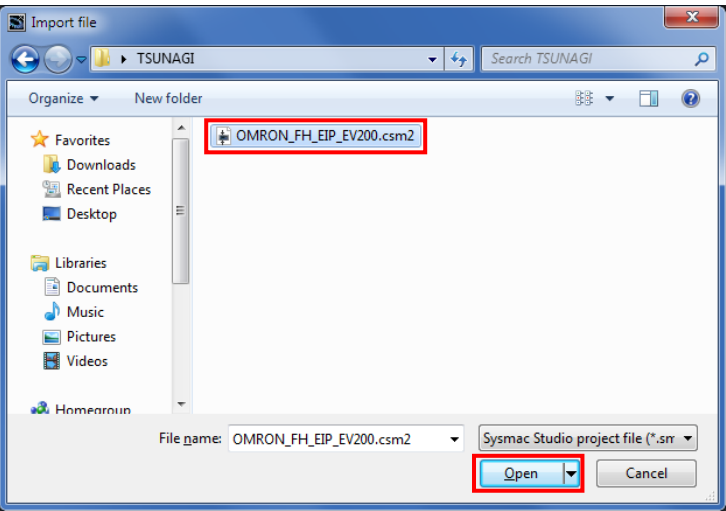
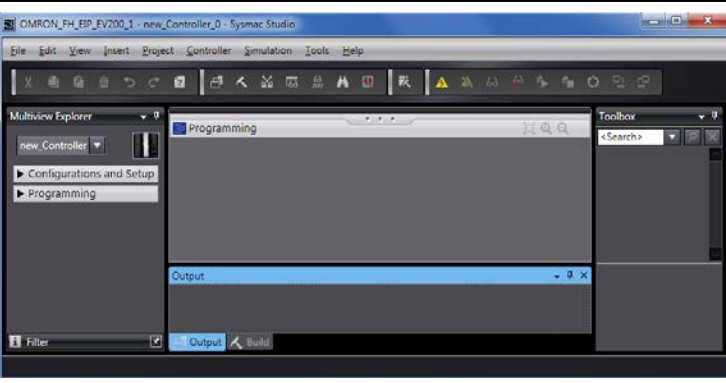
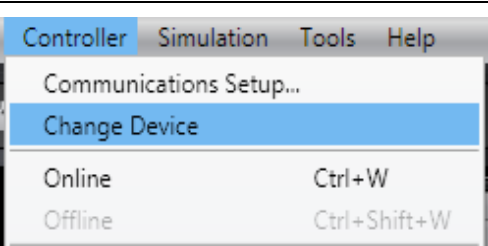


## 9.2. Setting up Controller

Set up Controller using the project file.

### 9.2.1. Importing the Project File

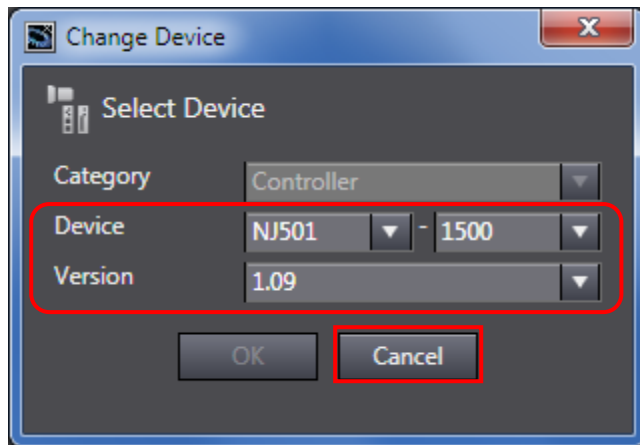
Import the Project File to Sysmac Studio.

|   |  |  |
|---|--|--|
| 1 | Select <b>Import</b> from the File Menu.   |    |
| 2 | <p>The Import file Dialog Box is displayed.</p> <p>Select <i>OMRON_FH_EIP_EV200.csm2</i> (project file) and click <b>Open</b>.</p> <p>*Obtain the project file from OMRON.</p>   |   |
| 3 | <p>The OMRON_FH_EIP_EV200 project is displayed.</p> <p>*If an error message is displayed stating "Failed to Load Descendants", change the version of Sysmac Studio to the version specified in 5.2. <i>Device Configuration</i> or higher version.</p> |  |
| 4 | Select <b>Change Device</b> from the Controller Menu.  |  |

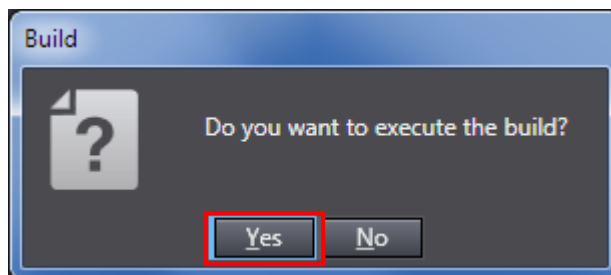
- 5 The Change Device Dialog Box is displayed.  
Check that the *Device* and the *Version* Fields are set as shown on the right.

Click **Cancel**.

\*If the settings are different, select the setting items from the pull-down list and click **OK**.



- 6 If you changed the settings in step 6, the Build Dialog Box is displayed. Check the contents and click **Yes**.



## 10. Revision History

| Revision code | Date of revision   | Revision reason and revision page  |
|---------------|--------------------|--|
| 01            | September 13, 2013 | First edition  |
| 02            | April 22, 2015     | Revisions due to upgraded versions of Controller and Sysmac Studio.<br>The procedures for EtherNet/IP connection setting changed to that by Sysmac Studio.<br>Screens changed due to upgraded version of FH Sensor Controller.<br>Point to Point connection set for input and output.<br>Handshaking set for output control confirmed. |

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**Cat. No. P576-E1-02**

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