

## **CJ Series EtherNet/IP™ Connection Guide**

**Yamaha Motor Co., Ltd.  
RCX Series Robot Controller**

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## 1. Related Manuals

The table below lists the manuals related to this document.

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

| Cat. No. | Model   | Manual name  |
|----------|---|--|
| W472     | CJ2M-CPU[ ]<br>CJ2H-CPU6[ ]<br>CJ2H-CPU6[ ]-EIP | CJ-series CJ2 CPU Unit Hardware User's Manual          |
| W473     | CJ2M-CPU[ ]<br>CJ2H-CPU6[ ]<br>CJ2H-CPU6[ ]-EIP | CJ-series CJ2 CPU Unit Software User's Manual          |
| W465     | CJ1W-EIP21<br>CJ2H-CPU6[ ]-EIP<br>CJ2M-CPU3[ ]  | EtherNet/IP™ Units Operation Manual                    |
| W446     | -   | CX-Programmer Operation Manual                         |
| E123     | RCX240  | YAMAHA 4-AXIS ROBOT CONTROLLER<br>RCX240 User's Manual |
| E122     | RCX240  | YAMAHA NETWORK BOARD<br>EtherNet/IP User's Manual      |

## 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. The 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, the EtherNet/IP recognizes this device as two nodes.</p> <p>The EtherNet/IP achieves the communications between controllers or the communications between controllers and devices by exchanging data between these nodes connected to the network.</p> |
| Tag                     | <p>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.</p>   |
| Tag set                 | <p>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.</p>  |
| Tag data link           | <p>In the EtherNet/IP, the tag and tag set can be exchanged cyclically between nodes without using the user program. This standard feature on the EtherNet/IP is called a tag data link.</p>  |
| 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>   |
| 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 opening the connection is called an "originator", and the node that receives the request is called a "target".</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>   |
| EDS file                | <p>A file that describes the number of I/O points for the EtherNet/IP device and the parameters that can be set via EtherNet/IP.</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, always read and heed the information provided in all Safety Precautions, Precautions for Safe Use, and Precaution for Correct Use of manuals for each device used in the system.
- (3) The user is encouraged to confirm the standards and regulations that the system must conform to.
- (4) It is prohibited to copy, to reproduce, and to distribute a part or the whole of this document without the permission of OMRON Corporation.
- (5) The information contained in this document is current as of June 2014. It is subject to change without notice for improvement.

The following notation is used in this document.



### Caution

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



### Precautions for Correct Use

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



### Additional Information

Additional information to read as required.

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

### Symbol



The triangle symbol indicates precautions (including warnings).  
The specific operation is shown in the triangle and explained in text.  
This example indicates a general precaution.

## 4. Overview

This document describes the procedure for connecting Robot Controller (RCX series) (hereinafter referred to as Robot Controller) of Yamaha Motor Co., Ltd. (hereinafter referred to as YAMAHA MOTOR) to CJ-series Programmable Controller + EtherNet/IP Unit (hereinafter referred to as PLC) of OMRON Corporation (hereinafter referred to as OMRON), and the procedure to check their connection.

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

In this document, CJ-series EtherNet/IP Unit and the built-in EtherNet/IP port of CJ-series CJ2 CPU Unit are collectively called as the "EtherNet/IP Unit".

## 5. Applicable Devices and Device Configuration

### 5.1. Applicable Devices

The applicable devices are as follows:

| Manufacturer    | Name   | Model  |
|-----------------|--|--|
| OMRON           | CJ2 CPU Unit   | CJ2[]-CPU[[]]  |
| OMRON           | EtherNet/IP Unit   | CJ1W-EIP21<br>CJ2H-CPU6[]-EIP<br>CJ2M-CPU3[]   |
| YAMAHA<br>MOTOR | Robot Controller<br>(4-axis Controller)  | RCX240<br>RCX240S  |
| YAMAHA<br>MOTOR | Robots:<br>Single-axis robot<br>Linear single-axis robot<br>Cartesian robot<br>SCARA robot<br>Pick & place robot | <ul style="list-style-type: none"> <li>• FLIP-X series</li> <li>• PHASER series</li> <li>• XY-X series</li> <li>• YK-XG series</li> <li>• YP-X series</li> </ul> |



#### Precautions for Correct Use

As applicable devices above, the devices with the models and versions listed in *Section 5.2* are actually used in this document to describe the procedure for connecting devices and checking the connection.

You cannot use devices with versions lower than the versions listed in *Section 5.2*.

To use the above devices with versions not listed in *Section 5.2* or versions higher than those listed in *Section 5.2*, check the differences in the specifications by referring to the manuals before operating the devices.



#### Additional Information

This document describes the procedure to establish the network connection.

Except for the connection procedure, it does not provide information on operation, installation or wiring method. It also does not describe the functionality or operation of the devices.

Refer to the manuals or contact the device manufacturer.

(Yamaha Motor Co., Ltd. <http://global.yamaha-motor.com/business/robot/>)

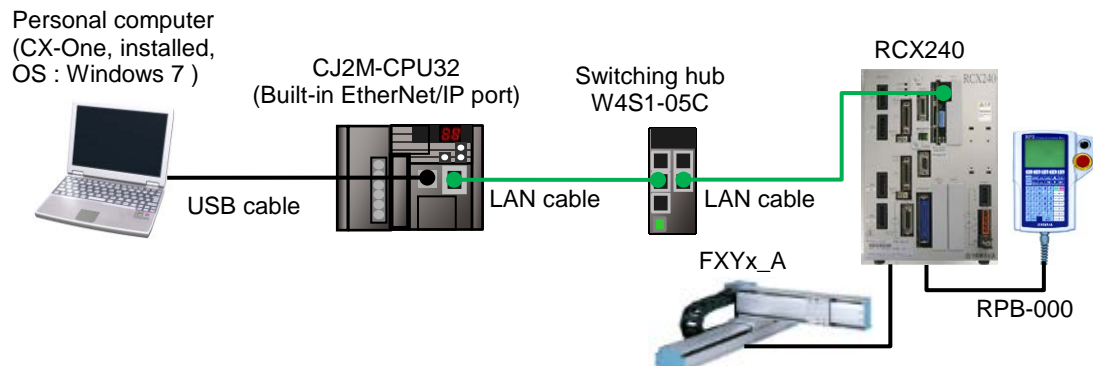
This URL is the latest address at the time of this document creation.

Contact each device manufacturer for the latest information.



## 5.2. Device Configuration

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



| Manufacturer    | Name  | Model                     | Version               |
|-----------------|---|---------------------------|-----------------------|
| OMRON           | CPU Unit<br>(Built-in EtherNet/IP port)   | CJ2M-CPU32                | Ver.2.0<br>(Ver.2.12) |
| OMRON           | Power Supply Unit   | CJ1W-PA202                | /                     |
| OMRON           | Switching hub   | W4S1-05C                  | Ver.1.00              |
| OMRON           | CX-One  | CXONE-AL[C-V4<br>/AL[D-V4 | Ver.4.[]              |
| OMRON           | CX-Programmer   | (Included in CX-One)      | Ver.9.51              |
| OMRON           | Network Configurator  | (Included in CX-One)      | Ver.3.56              |
| -               | Personal computer (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) | -                         | /                     |
| YAMAHA<br>MOTOR | Robot Controller<br>(EtherNet/IP Compatible Module<br>mounted)                        | RCX240                    | Ver.10.72             |
| YAMAHA<br>MOTOR | Programming box   | RPB-000                   | Ver.5.13              |
| YAMAHA<br>MOTOR | Robot   | FXYx_A                    | /                     |
| YAMAHA<br>MOTOR | EDS file  | YAMAHA RCX EIP.eds        | Ver.1.1               |



### Precautions for Correct Use

Prepare the corresponding EDS file beforehand.

The latest EDS file can be downloaded from the YAMAHA MOTOR website.

(<http://global.yamaha-motor.com/business/robot/0002.html>)

Contact YAMAHA MOTOR if the file is not available.



### **Precautions for Correct Use**

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Update the CX-Programmer and Network Configurator to the versions specified in this section or higher versions using the auto update function.

If a version not specified in this section is used, the procedures described in *Section 7* and subsequent sections may not be applicable. In that case, use the equivalent procedures described in the *CX-Programmer Operation Manual* (Cat. No. W446) and Network Configurator Online Help.

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### **Additional Information**

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The system configuration in this document uses USB for the connection between the Personal computer and PLC. For information on how to install the USB driver, refer to A-5 *Installing the USB Driver* of the *CJ-series CJ2 CPU Unit Hardware User's Manual* (Cat. No. W472).

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## 6. EtherNet/IP Settings

This section describes specifications such as the communications parameter setting and the tag data link allocation that are set in this document.

### 6.1. Communications Parameter Settings

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

| Setting item | PLC (EtherNet/IP Unit)<br>(node 1) | Robot Controller<br>(EtherNet/IP Compatible Module)<br>(node 2) |
|--------------|------------------------------------|---|
| Unit number  | 0                                  | -   |
| Node address | 1                                  | 2   |
| IP address   | 192.168.250.1                      | 192.168.250.2   |
| Subnet mask  | 255.255.255.0                      | 255.255.255.0   |

### 6.2. Allocating the Tag Data Links

With the PLC, tag data links are allocated for the Robot Controller as shown below.

#### Output area

(PLC to Robot Controller: 48 bytes)

|                        |   |
|------------------------|---|
| D10000<br>to<br>D10001 | Word input (Dedicated input)<br>SIW(0) to SIW(1)<br>(n to n+3)              |
| D10002<br>to<br>D10015 | Word input (General-purpose<br>input)<br>SIW(2) to SIW(15)<br>(n+4 to n+31) |
| D10016                 | Bit input (* see the next page)<br>SI(00) to SI(17)<br>(n+32 to n+33)       |
| D10017<br>to<br>D10022 | Bit input (General-purpose<br>input)<br>SI(20) to SI(157)<br>(n+34 to n+45) |
| D10023                 | Bit input (Reserved)<br>(n+46 to n+47)                                      |

#### Input area

(Robot Controller to PLC: 48 bytes)

|                        |   |
|------------------------|---|
| D10100<br>to<br>D10101 | Word output (Dedicated output)<br>SOW(0) to SOW(1)<br>(m to m+3)              |
| D10102<br>to<br>D10115 | Word output (General-purpose<br>output)<br>SOW(2) to SOW(15)<br>(m+4 to m+31) |
| D10116                 | Bit output (* see the next page)<br>SO(00) to SO(17)<br>(m+32 to m+33)        |
| D10117<br>to<br>D10122 | Bit output (General-purpose<br>output)<br>SO(20) to SO(157)<br>(m+34 to m+45) |
| D10123                 | Bit output (Reserved)<br>(m+46 to m+47)                                       |

\* The following table shows detailed allocation of bit inputs (SI(00) to SI(17)) as well as bit outputs (SO(00) to SO(17)) for the Robot Controller.

| Master → Slave |     |             |  | Slave → Master |     |             |  |
|----------------|-----|-------------|--|----------------|-----|-------------|--|
| Address        | Bit | Signal name |  | Address        | Bit | Signal name |  |
| n+32           | 0   | SI(00)      | Emergency stop input                       | m+32           | 0   | SO(00)      | Emergency stop input status output       |
|                | 1   | SI(01)      | Servo ON input                             |                | 1   | SO(01)      | CPU_OK status output                     |
|                | 2   | SI(02)      | Service mode input                         |                | 2   | SO(02)      | Servo ON status output                   |
|                | 3   |             | Reserved.                                  |                | 3   | SO(03)      | Alarm status output                      |
|                | 4   |             | Reserved.                                  |                | 4   |             | Reserved.                                |
|                | 5   | SI(05)      | I/O command execution trigger input        |                | 5   |             | Reserved.                                |
|                | 6   |             | Reserved.                                  |                | 6   |             | Reserved.                                |
|                | 7   |             | Reserved.                                  |                | 7   |             | Reserved.                                |
| n+33           | 0   | SI(10)      | Sequence control input                     | m+33           | 0   | SO(10)      | AUTO mode status output                  |
|                | 1   | SI(11)      | Interlock input                            |                | 1   | SO(11)      | Return-to-origin complete status output  |
|                | 2   | SI(12)      | Start input                                |                | 2   | SO(12)      | Sequence program execution status output |
|                | 3   | SI(13)      | AUTO mode input                            |                | 3   | SO(13)      | Robot program execution status output    |
|                | 4   | SI(14)      | Return-to-origin input                     |                | 4   | SO(14)      | Program reset status output              |
|                | 5   | SI(15)      | Program reset input                        |                | 5   |             | Reserved.                                |
|                | 6   | SI(16)      | MANUAL mode input                          |                | 6   | SO(16)      | I/O command execution judgment output    |
|                | 7   | SI(17)      | Absolute reset / Return-to-origin input *1 |                | 7   | SO(17)      | Output during I/O command execution      |

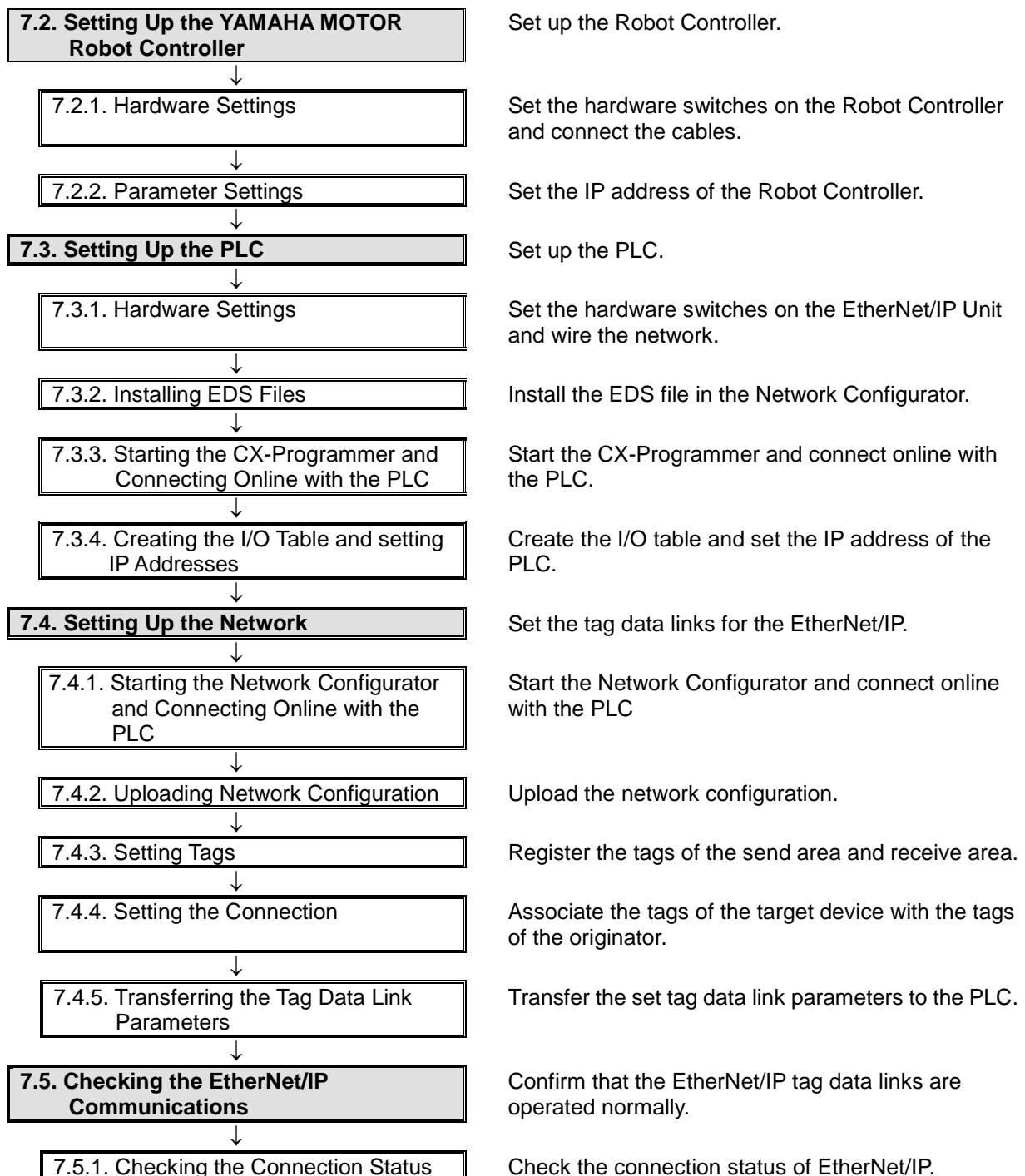
## 7. EtherNet/IP Connection Procedure

This section describes the procedure for connecting the Robot Controller to the PLC via EtherNet/IP.

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

### 7.1. Work Flow

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





7.5.2 Checking the Data that are Sent and Received

Confirm that the correct data are sent and received.

## 7.2. Setting Up the YAMAHA MOTOR Robot Controller

Set up the Robot Controller.

### 7.2.1. Hardware Settings

Set the hardware switches on the Robot Controller and connect the cables.

It is assumed that the EtherNet/IP Compatible Module is already mounted on the optional port "OP.1" at the time of shipment.



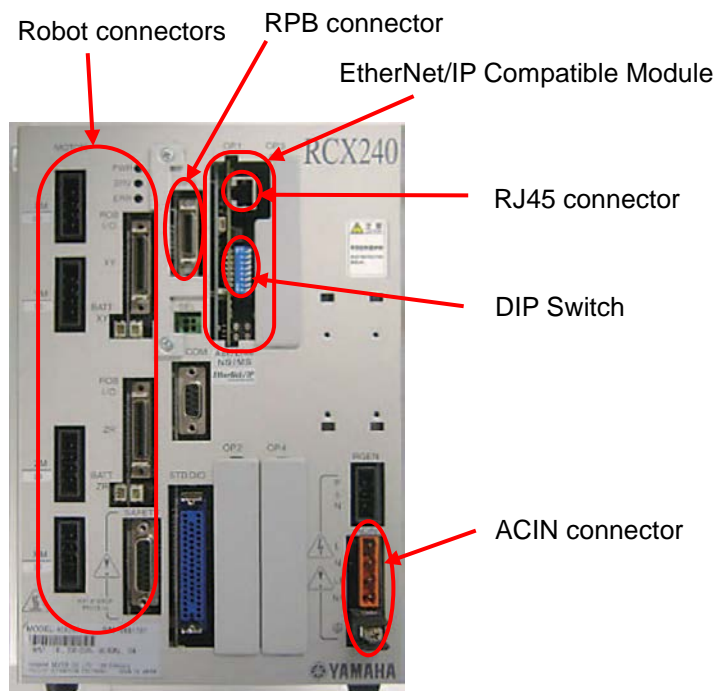
#### Precautions for Correct Use

Make sure that the power supply is OFF when you perform the setting up.

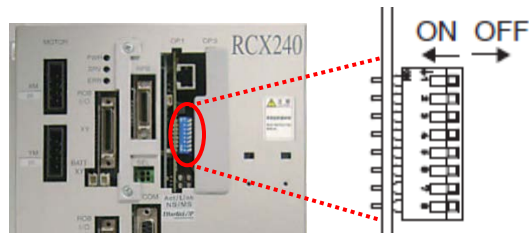
- 1 Make sure that the power supply to the Robot Controller is OFF.

\*If the power supply is turned ON, settings may not be applicable as described in the following procedures.

- 2 Check the position of the switches and the connectors by referring to the right figure.



- 3 Since DIP switches on the EtherNet/IP Compatible Module are not used, confirm that all the DIP switches are turned OFF.



\*For information on EtherNet/IP Compatible Module, refer to the *YAMAHA NETWORK BOARD EtherNet/IP User's Manual* (Cat. No. E122).

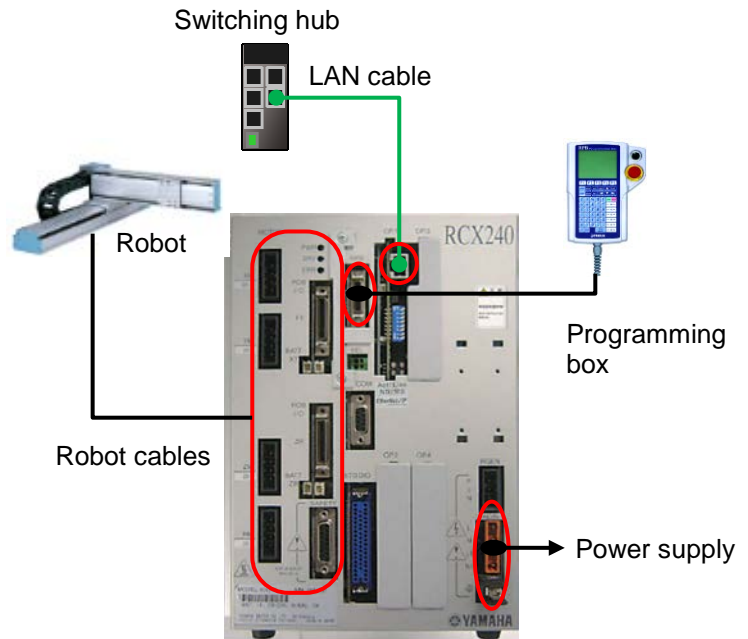
- 4 Connect the RJ45 connector on the EtherNet/IP Compatible Module to the Switching hub with a LAN cable.

Connect the Power supply cable to the ACIN connector.

Connect the Programming box (RPB-000) to the RPB connector.

Connect the Robot cables to the Robot connectors.

\*For information on how to connect the cables, refer to *Chapter 3 Installation of the YAMAHA 4-AXIS ROBOT CONTROLLER RCX240 User's Manual* (Cat. No. E123).

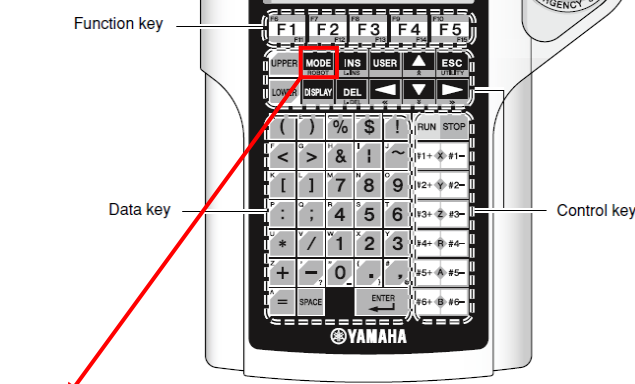
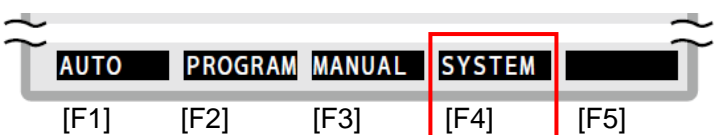
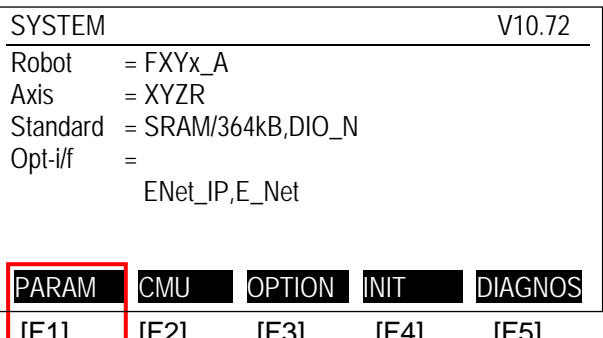
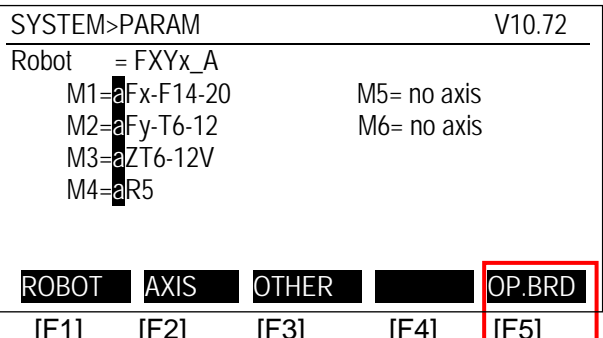
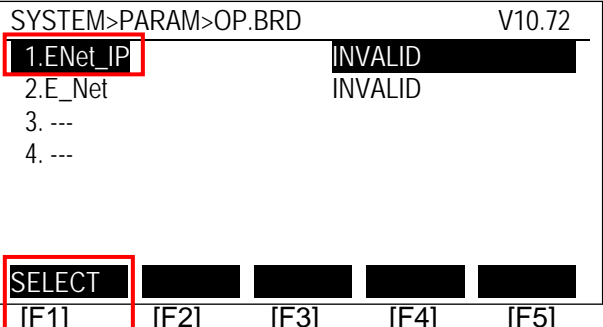


- 5 Turn ON the power supply to the Robot Controller.



### 7.2.2. Parameter Settings

Set the IP address of the Robot Controller.

|   |   |
|---|---|
| <p>1 Press <b>MODE</b> on the Programming box to switch to SYSTEM mode.</p>   |  <p><b>MODE</b> : Displays the mode menu (highest hierarchy).</p>   |
| <p>2 Press <b>F4</b> (SYSTEM).</p>  |   |
| <p>3 Press <b>F1</b> (PARAM).</p>   | <pre>SYSTEM V10.72 Robot = FXYx_A Axis = XYZR Standard = SRAM/364kB,DIO_N Opt-i/f =         ENet_IP,E_Net</pre>          |
| <p>4 Press <b>F5</b> (OP. BRD).</p>   | <pre>SYSTEM&gt;PARAM V10.72 Robot = FXYx_A M1=aFx-F14-20 M5= no axis M2=aFy-T6-12 M6= no axis M3=aZT6-12V M4=aR5</pre>  |
| <p>5 Select <i>ENet_IP</i> with the cursor (<math>\uparrow/\downarrow</math>) keys.<br/>Press <b>F1</b> (SELECT).</p> | <pre>SYSTEM&gt;PARAM&gt;OP.BRD V10.72 1.ENet_IP INVALID 2.E_Net INVALID 3. --- 4. ---</pre>                             |

- 6 Select *Board condition* with the cursor (↑/↓) keys.  
Press **F1**(EDIT).

\*The values shown on the right differ depending on the usage status of the Robot Controller.

```
SYSTEM>PARAM>OP.BRD>SELECT V10.72
1.Board condition INVALID
2.Remote_cmd SIO5 VALID
3.Output MSG SOW1 INVALID
4.IP address 192.168. 1. 10
5.Subnet mask 255.255.255. 0
6.Gateway 0. 0. 0. 0

EDIT JUMP
[F1] [F2] [F3] [F4] [F5]
```

Press **F2** (VALID).

```
INVALID VALID
[F1] [F2] [F3] [F4] [F5]
```

- Confirm that Board condition changes to VALID.  
Hold down the cursor (↓) key until the cursor moves to IP address.  
The display on the bottom line changes as shown on the right.

```
SYSTEM>PARAM>OP.BRD>SELECT V10.72
1.Board condition VALID
2.Remote_cmd SIO5 VALID
3.Output MSG SOW1 INVALID
4.IP address 192.168. 1. 10
5.Subnet mask 255.255.255. 0
6.Gateway 0. 0. 0. 0

Enter IP address <192.168. 1. 10
```

- Enter *192.168.250.002* by using the numeric keys.  
(Press **ENTER**)

```
Enter IP address >192.168.250.002
```

Press the **Esc** Key.

Confirm that the settings are made as shown on the right.

```
SYSTEM>PARAM>OP.BRD>SELECT V10.72
1.Board condition VALID
2.Remote_cmd SIO5 VALID
3.Output MSG SOW1 INVALID
4.IP address 192.168.250. 2
5.Subnet mask 255.255.255. 0
6.Gateway 0. 0. 0. 0

EDIT JUMP
```

- 7 Turn the power supply to the Robot Controller OFF and then ON again.

\*The parameters you changed become valid after cycling the power supply.

### 7.3. Setting Up the PLC

Set up the PLC.

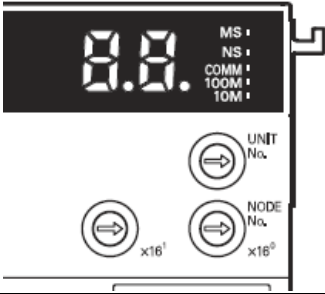


#### 7.3.1. Hardware Settings

Set the hardware switches on the EtherNet/IP Unit and wire the network.

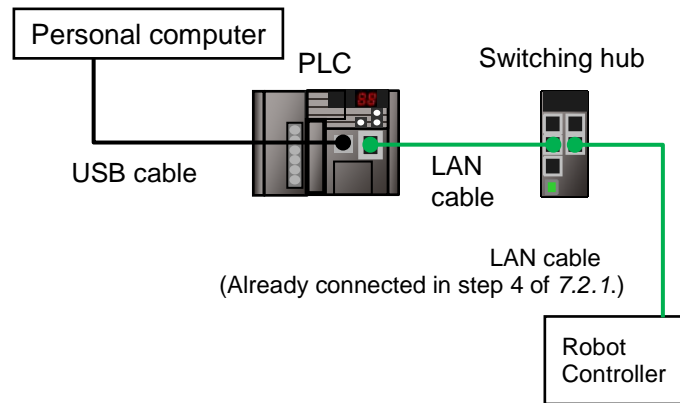


#### Precautions for Correct Use

Make sure that the power supply is OFF when you perform the setting up.

| 1                           | <p>Make sure that the power supply to the PLC is OFF.</p> <p>*If the power supply is turned ON, settings may not be applicable as described in the following procedures.</p>   |   |                |                             |
|-----------------------------|--|---|----------------|-----------------------------|
| 2                           | <p>Check the position of the hardware switches on the front panel of the EtherNet/IP Unit by referring to the right figure.</p>  |  <p>LED Indicators</p> <p>Unit number setting switch</p> <p>Node address setting switches</p>  |                |                             |
| 3                           | <p>Set the Unit number setting switch to 0.</p>  | <p>The unit number is used to identify individual CPU Bus Units when more than one CPU Bus Unit is mounted to the same PLC. Use a small screwdriver to make the setting, taking care not to damage the rotary switch. The unit number is factory-set to 0.</p>  <table border="1" style="margin-left: auto;"> <thead> <tr> <th>Setting range:</th> </tr> </thead> <tbody> <tr> <td>0 to F</td> </tr> </tbody> </table>  | Setting range: | 0 to F                      |
| Setting range:              |  |   |                |                             |
| 0 to F                      |  |   |                |                             |
| 4                           | <p>Set the Node address setting switches to the following default settings.</p> <p>[NODE No.x16<sup>1</sup>]: 0</p> <p>[NODE No.x16<sup>0</sup>]: 1</p> <p>*Set the IP address to 192.168.250.1.</p> <p>*By default, the first to third octets of the local IP address are fixed to 192.168.250. The fourth octet is the values that are set with the Node address setting switches.</p> | <p>With the FINS communications service, when there are multiple EtherNet/IP Units connected to the Ethernet network, the EtherNet/IP Units are identified by node addresses. Use the node address switches to set the node address between 01 and FE hexadecimal (1 to 254 decimal). Do not set a number that has already been set for another node on the same network.</p>  <table border="1" style="margin-left: auto;"> <thead> <tr> <th>Setting range:</th> </tr> </thead> <tbody> <tr> <td>01 to FE (1 to 254 decimal)</td> </tr> </tbody> </table> <p>The left switch sets the sixteens digit (most significant digit) and the right switch sets the ones digit (least significant digit). The node address is factory-set to 01.</p> <p>Default IP address = 192.168.250.node address</p> <p>With the factory-default node address setting of 01, the default IP address is 192.168.250.1.</p> | Setting range: | 01 to FE (1 to 254 decimal) |
| Setting range:              |  |   |                |                             |
| 01 to FE (1 to 254 decimal) |  |   |                |                             |

- 5 Connect the LAN cable to the EtherNet/IP port of the PLC, and connect the USB cable to the USB port. Connect the Personal computer, Switching hub and PLC as shown in 5.2. *Device Configuration*.



\*The Robot Controller and the switching Hub are already connected in step 4 of 7.2.1.

- 6 Turn ON the power supply to the Switching hub and PLC.

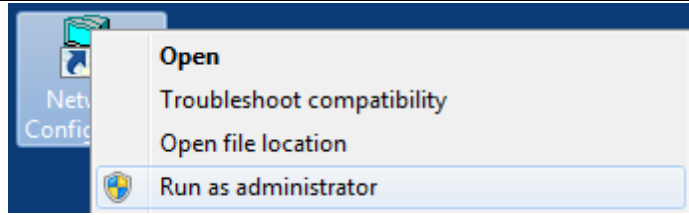
The set IP address is displayed on the seven-segment LED indicators from right to left. Afterwards, the rightmost 8 bits of the IP address are displayed in hexadecimal during normal operation.

### 7.3.2. Installing EDS Files

Install the EDS file in the Network Configurator.

Install the CX-One in the Personal computer beforehand.

- 1 Right-click the Network Configurator icon and select **Run as administrator** from the menu.

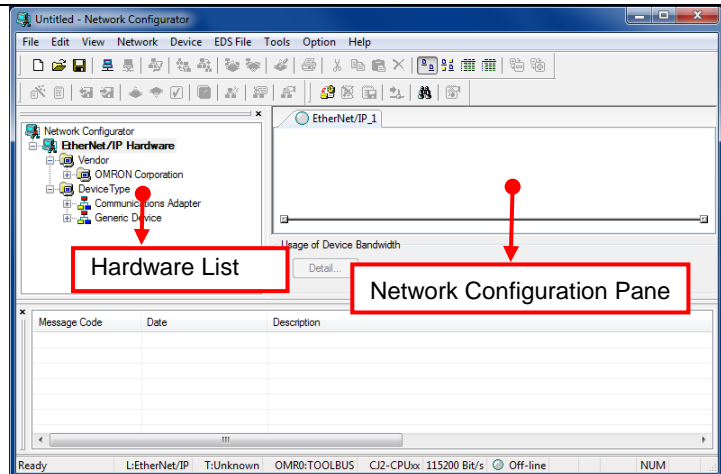


#### Precautions for Correct Use

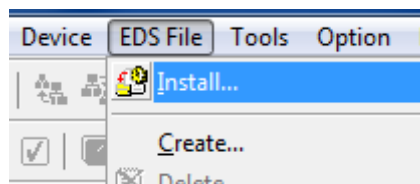
To manipulate EDS file, you must select “Run as administrator” as described in step 1 above to start the Network Configurator.

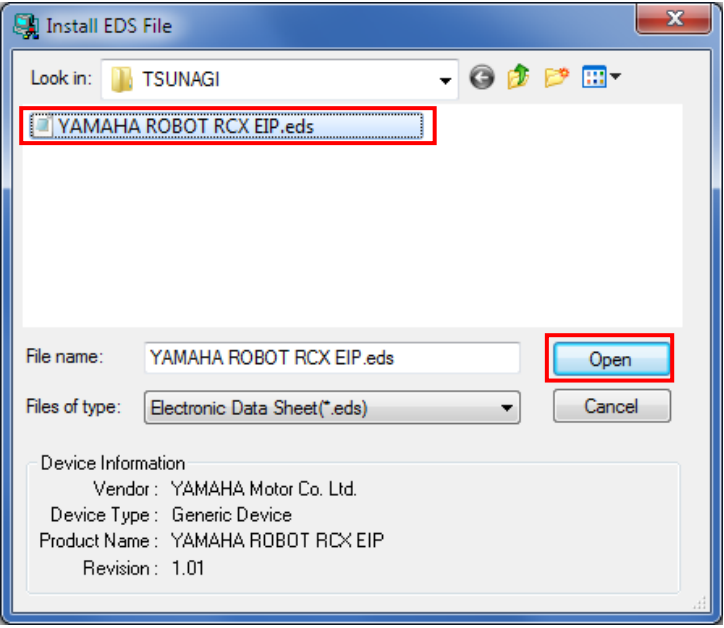
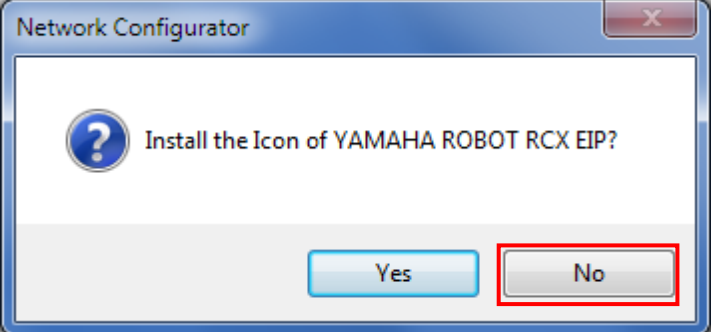
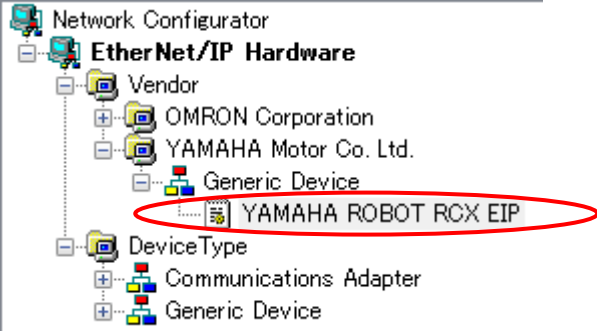
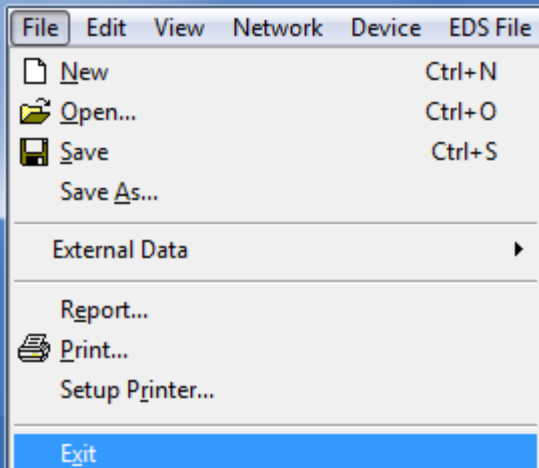
Otherwise, the following operations; “Install”, “Create”, “Delete” and “Creating EDS Index Files” that you selected from EDS File Menu; are not applied if you login with other user accounts due to user management for Windows security functions.

- 2 The Network Configurator starts.  
The left pane is called Hardware List and the right pane is called Network Configuration Pane.



- 3 Select **Install** from the EDS File Menu.


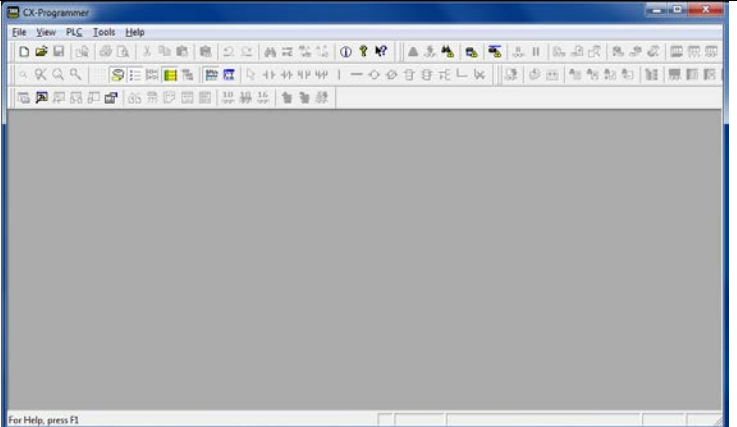
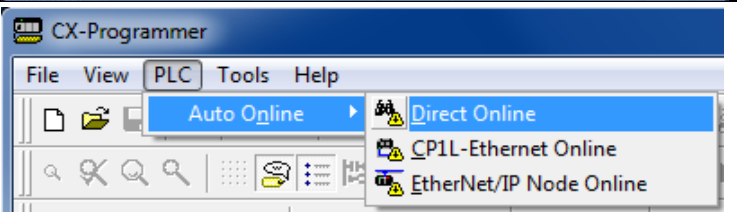
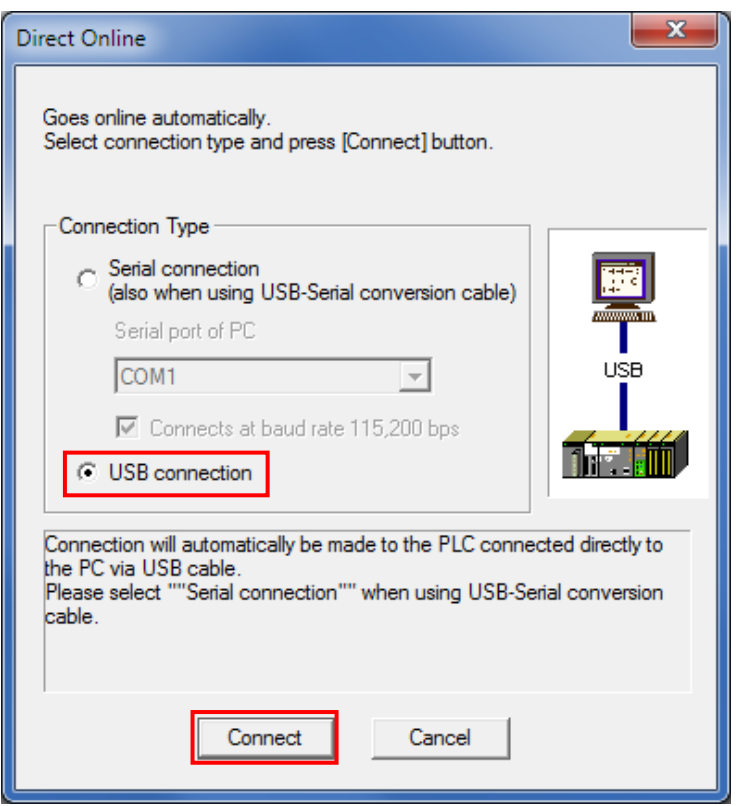


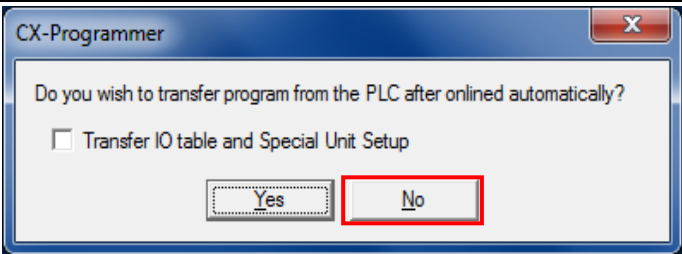
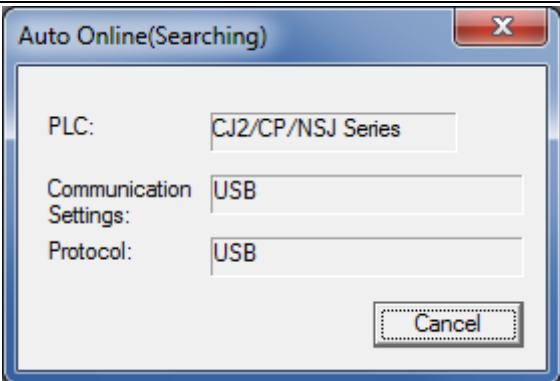

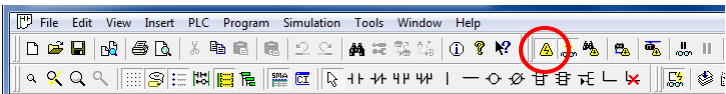
|   |  |
|---|--|
| <p>4 Select the <i>YAMAHA ROBOT RCX EIP. eds</i> EDS file to install and click the <b>Open</b> Button.</p> <p>*For how to obtain the EDS file, refer to <i>Precautions for Correct Use</i> in 5.2. <i>Device Configuration</i>.</p> |    |
| <p>5 The dialog box on the right is displayed. Check the contents and click the <b>No</b> Button.</p>   |   |
| <p>6 When the EDS file is normally installed, the device is added as shown on the right.</p> <p>Confirm that the device is added in Hardware List.</p>  |  |
| <p>7 Select <b>Exit</b> from the File Menu to exit the Network Configurator.</p>  |  |

### 7.3.3. Starting the CX-Programmer and Connecting Online with the PLC

Start the CX-Programmer and connect online with the PLC.

Install the USB driver in the Personal computer beforehand.

|   |   |  |
|---|---|--|
| 1 | Start the CX-Programmer.  |     |
| 2 | The CX-Programmer starts.   |    |
| 3 | Select <b>Auto Online - Direct Online</b> from the PLC Menu.  |   |
| 4 | <p>The Direct Online Dialog Box is displayed.</p> <p>Select the <i>USB connection</i> Option for Connection Type and click the <b>Connect</b> Button.</p> |  |

|   |  |  |
|---|--|--|
| 5 | The dialog box on the right is displayed. Check the contents and click the <b>No</b> Button.   |  |
| 6 | The dialog box on the right is displayed, and the CX-Programmer and the PLC are automatically connected.   |  |
| 7 | <p>Confirm that the CX-Programmer and the PLC are normally connected online.</p> <p>*The  icon is pressed down during online connection.</p> |  |



#### Additional Information

If an online connection cannot be made to the PLC, check the cable connection.  
 Or, return to step 1, check the settings and repeat each step.  
 Refer to *Connecting Directly to a CJ2 CPU Unit Using a USB Cable* in *Chapter 3 Communications* in *PART 3: CX-Server Runtime of the CX-Programmer Operation Manual* (Cat. No. W446) for details.



#### Additional Information

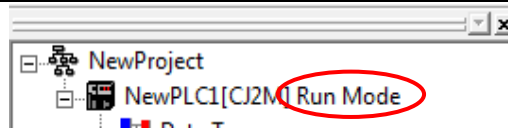
The dialog boxes explained in the following procedures may not be displayed depending on the environmental setting of CX-Programmer.  
 For details on the environmental setting, refer to *Options and Preferences* in *Chapter 3 Project Reference* in *PART 1: CX-Programmer of the CX-Programmer Operation Manual* (Cat. No. W446). This document explains the setting procedure when the *Confirm all operations affecting the PLC Check Box* is selected.



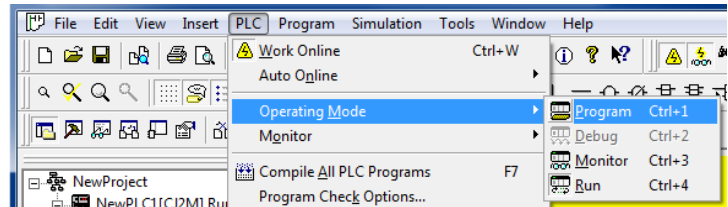
### 7.3.4. Creating the I/O Table and setting IP Addresses

Create the I/O table and set the IP address of the PLC.

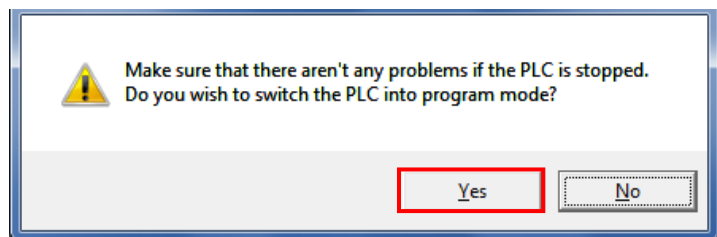
- 1 If the operating mode of the PLC is RUN Mode or Monitor Mode, change it to Program Mode by following the steps below.



- (1) Select **Operating Mode - Program** from the PLC Menu of the CX-Programmer.

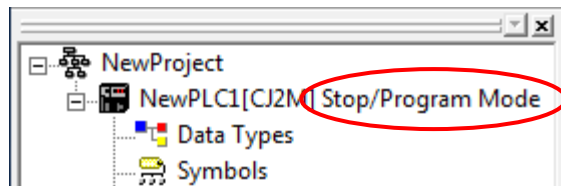


- (2) The dialog box on the right is displayed. Confirm that there is no problem and click the **Yes** Button.

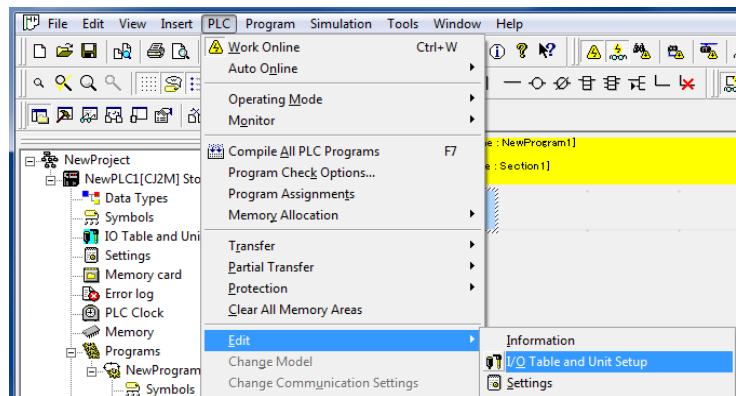


- \*Refer to *Additional Information* on the previous page for the settings concerning the dialog display.

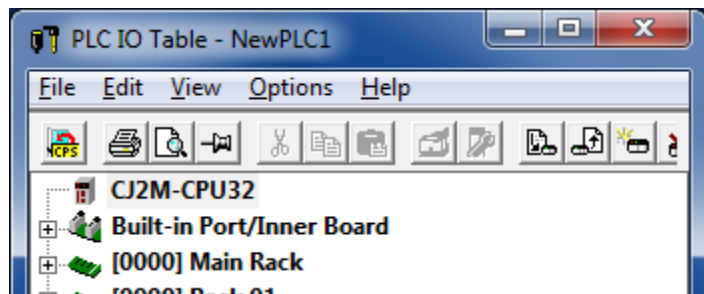
- (3) Confirm that Stop/Program Mode is displayed on the right of the PLC model in the project workspace of the CX-Programmer.



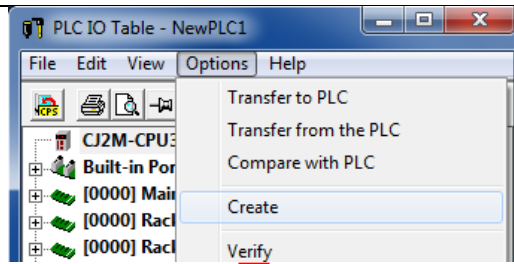
- 2 Select **Edit - I/O Table and Unit Setup** from the PLC Menu of the CX-Programmer.



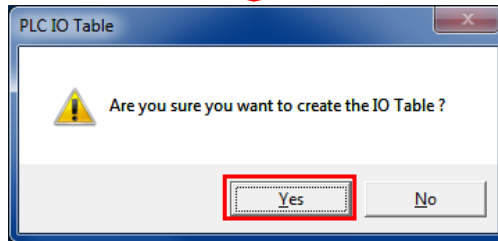
The PLC IO Table Window is displayed.



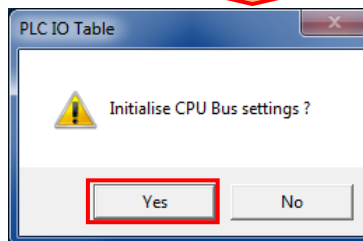
- 3 Select **Create** from the Options Menu of the PLC IO Table Window.



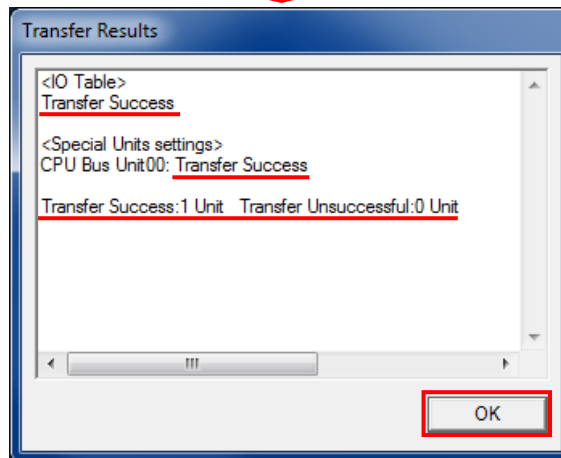
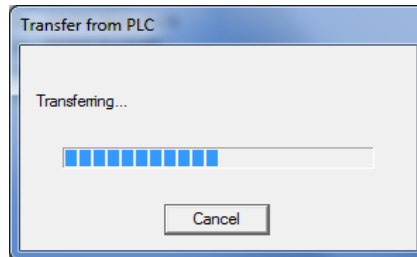
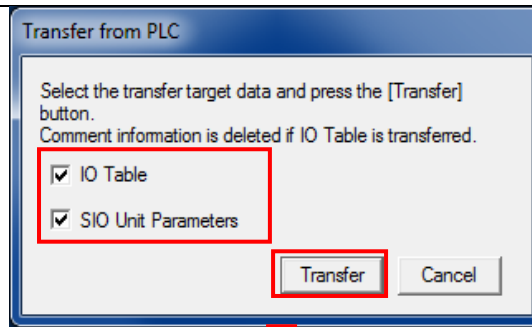
The dialog box on the right is displayed. Confirm that there is no problem and click the **Yes** Button.



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



- 4 The Transfer from PLC Dialog Box is displayed. Select the *I/O Table* Check Box and the *SIO Unit Parameters* Check Box, and click the **Transfer** Button.



When the transfer is completed, the Transfer Results Dialog Box is displayed. Confirm that the transfer was normally executed by referring to the message in the dialog box.

When the I/O table is created normally, the dialog box displays as follows:

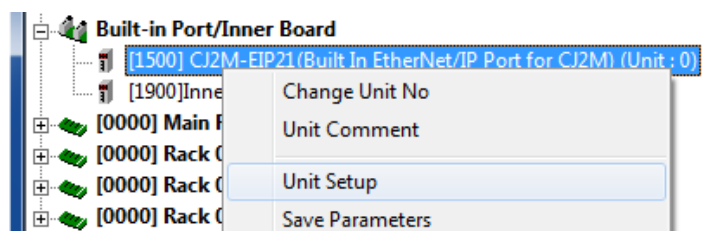
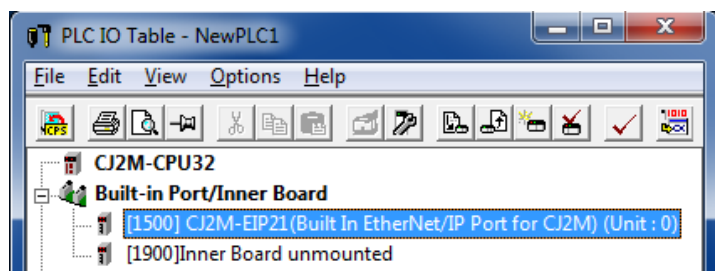
Transfer Success: 1 Unit  
Transfer Unsuccessful: 0 Unit

Click the **OK** Button.

- 5 On the PLC IO Table Window, click + to the left of Built-in Port/Inner Board to display CJ2M-EIP21.

\*The right figure displays the CPU Unit (built-in EtherNet/IP port) specified in 5.2. *Device Configuration*. When you use other applicable EtherNet/IP Units, the display position and name are different from this figure.

Right-click **CJ2M-EIP21** and select **Unit Setup**.



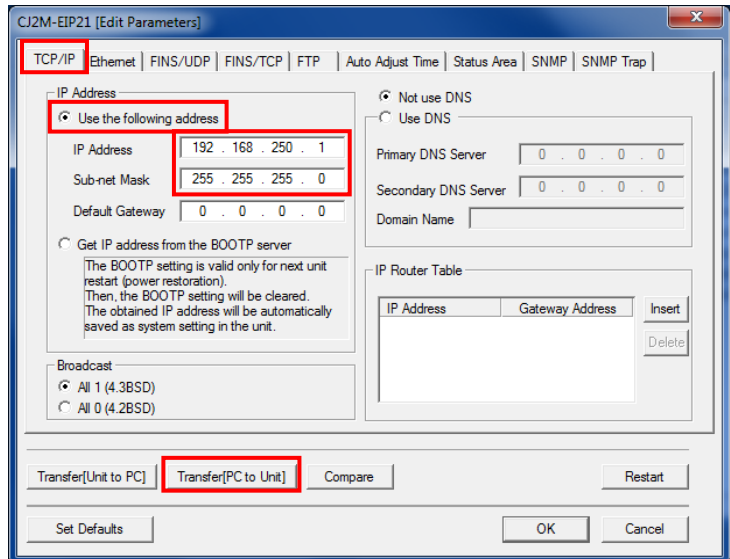
6 The Edit Parameters Dialog Box is displayed.

Select the **TCP/IP** Tab.

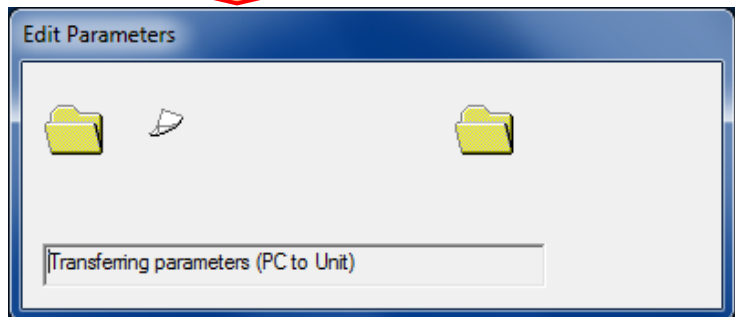
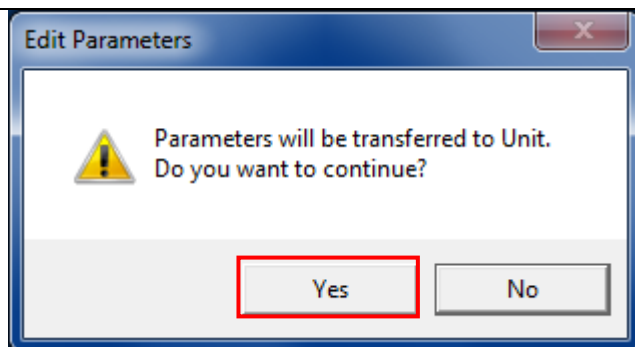
Make the following settings in the *IP Address* Field.

- Select the *Use the following address* Check Box
- IP Address: 192.168.250.1
- Subnet Mask: 255.255.255.0

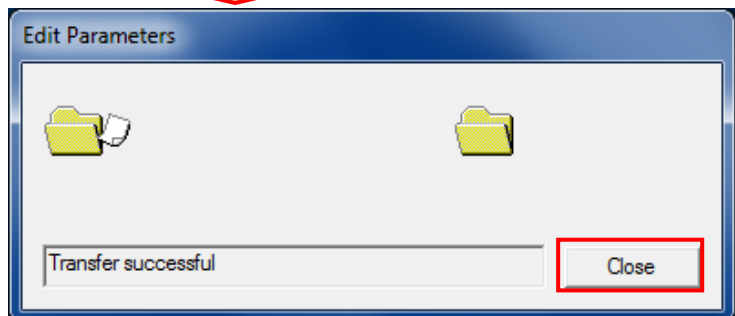
Click the **Transfer [PC to Unit]** Button.



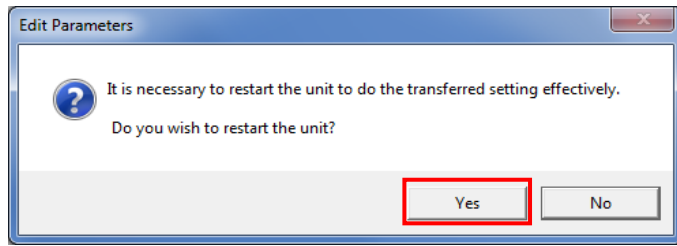
7 The dialog box on the right is displayed. Confirm that there is no problem and click the **Yes** Button.



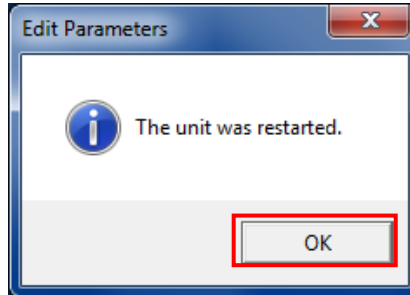
Confirm that parameters were normally transferred to the PLC, and click the **Close** Button.



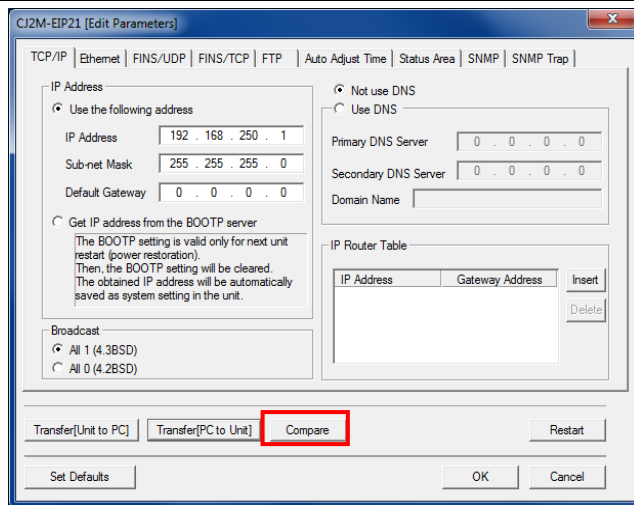
8 A dialog box on the right is displayed. Check the contents and click the **Yes** Button.



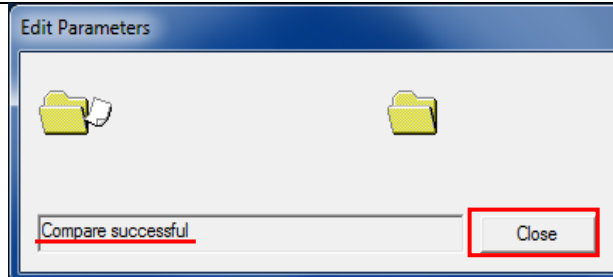
When the Unit is restarted, the dialog box on the right is displayed. Check the contents and click the **OK** Button.



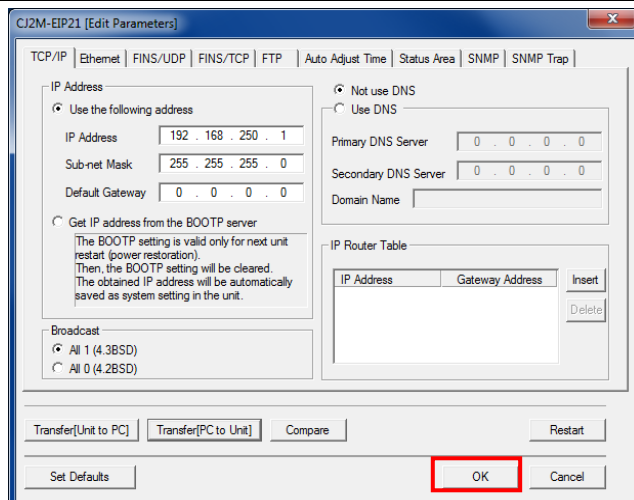
9 Click the **Compare** Button to confirm that the IP address is correctly changed.



10 After confirming that parameters match, click the **Close** Button.



11 Click the **OK** Button on the Edit Parameters Dialog Box.



## 7.4. Setting Up the Network

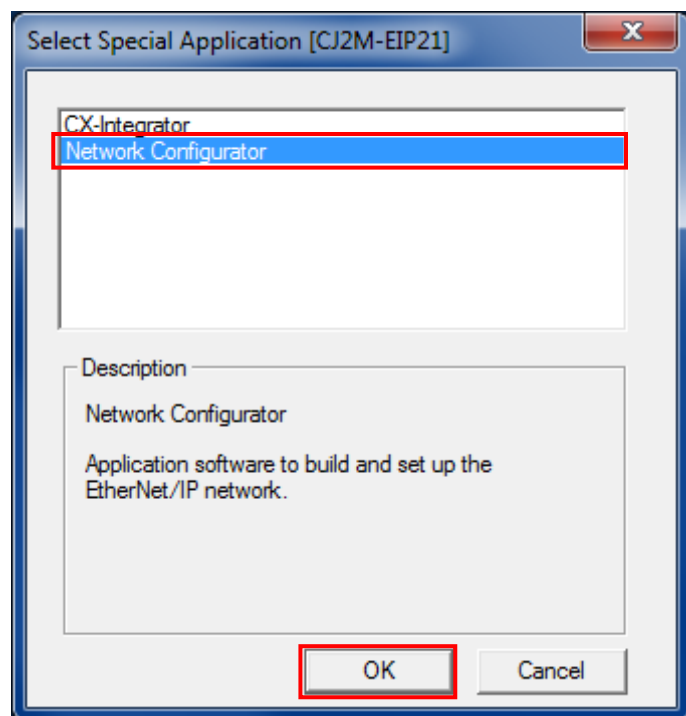
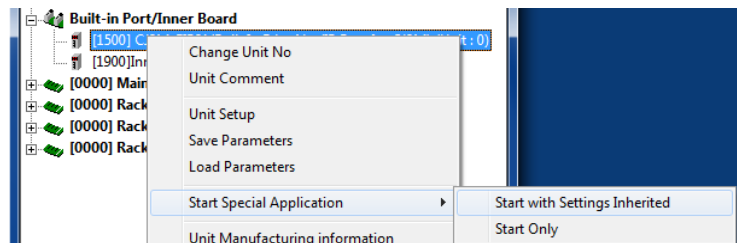
Set the tag data links for the EtherNet/IP.

### 7.4.1. Starting the Network Configurator and Connecting Online with the PLC

Start the Network Configurator and connect online with the PLC.

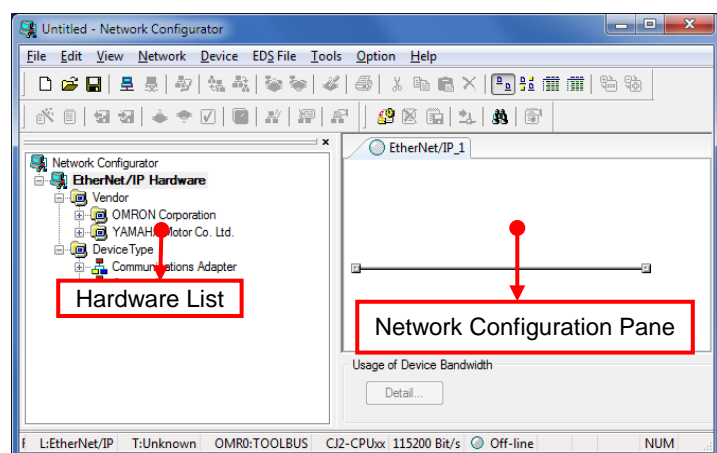
- 1 Right-click **CJ2M-EIP21** on the PLC IO Table Window, and select **Start Special Application - Start with Settings Inherited**.

The Select Special Application Dialog Box is displayed. Select *Network Configurator* and click the **OK** Button.



- 2 The Network Configurator starts.

The left pane is called Hardware List and the right pane is called Network Configuration Pane.

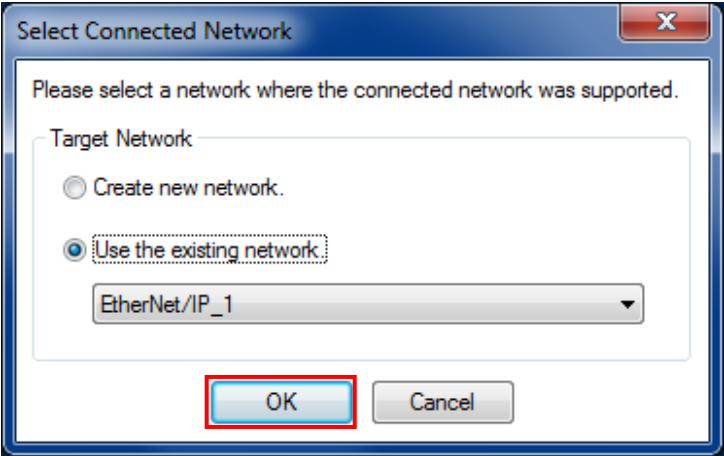
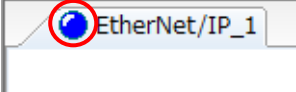




**Precautions for Correct Use**

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

|  |  |
|--|--|
| <p>3 Select <b>Select Interface - CJ2 USB/Serial Port</b> from the Option Menu.</p>  |  |
| <p>4 Select <b>Connect</b> from the Network Menu.</p>  |  |
| <p>5 The Setup Interface Dialog Box is displayed. Confirm that the following settings are made.</p> <ul style="list-style-type: none"> <li>• Port Type: USB</li> <li>• Port: OMR0</li> <li>• Baud Rate: 115200 Bit/s</li> </ul> <p>Click the <b>OK</b> Button.</p> |  |
| <p>6 The Select Connect Network Port Dialog Box is displayed. Select <b>Back Plane - CJ2M-EIP21 - TCP:2</b>, and click the <b>OK</b> Button.</p>   |  |

- 7 The Select Connected Network Dialog Box is displayed.  
Click the **OK** Button.
- 
- 8 When an online connection is established normally, the color of the icon on the figure changes to blue.
- 



#### Additional Information

If an online connection cannot be made to the PLC, check the cable connection.

Or, return to step 3, check the settings and repeat each step.

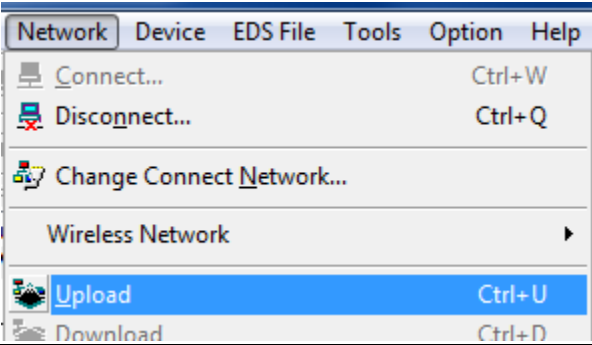
For details, refer to 6.2.9 *Connecting the Network Configurator to the Network* in Section 6 *Tag Data Link Functions of the EtherNet/IP™ Units Operation Manual* (Cat. No. W465).

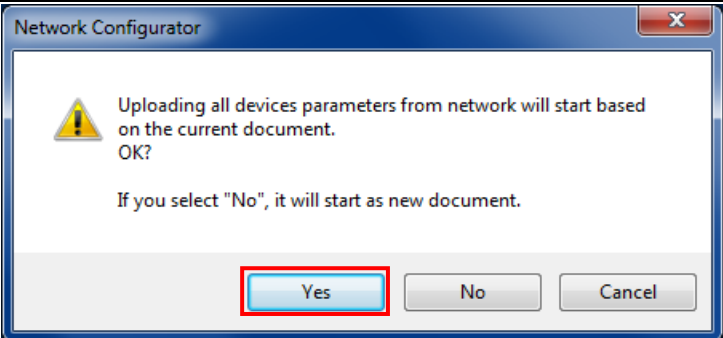


### 7.4.2. Uploading Network Configuration

Upload the network configuration.

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

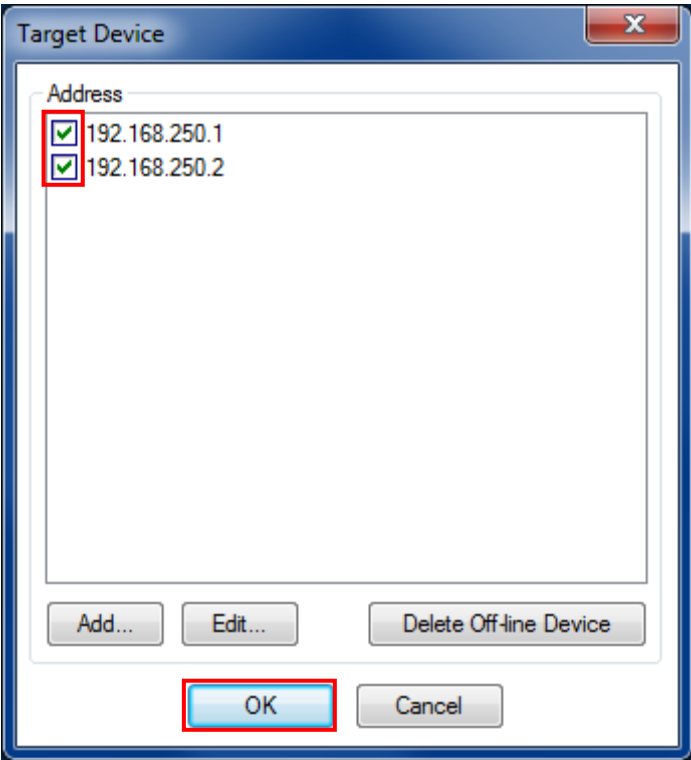

- 2 The dialog box on the right is displayed. Confirm that there is no problem and click the **Yes** Button.

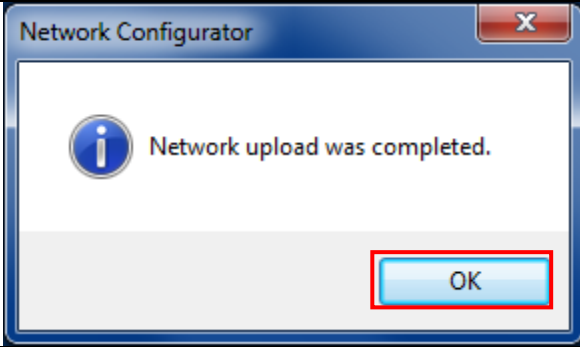
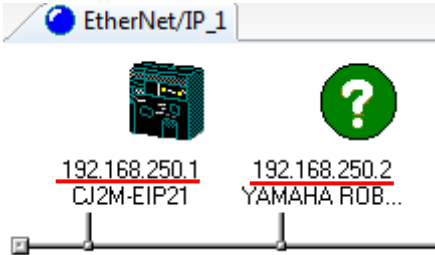
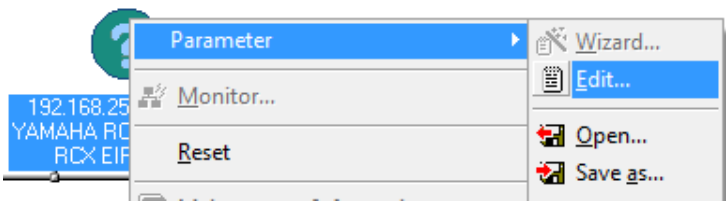
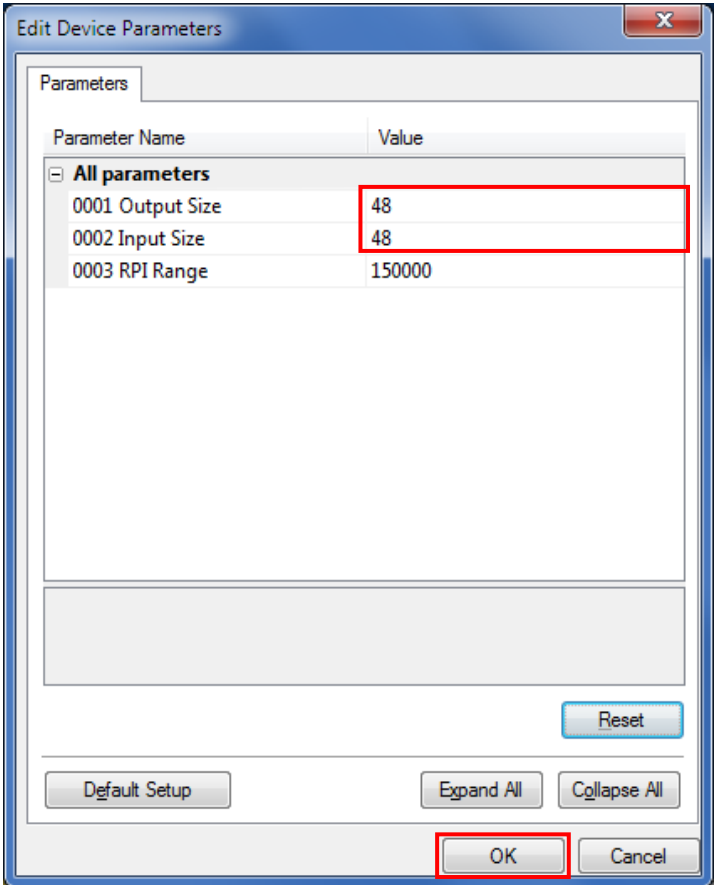

- 3 The Target Device Dialog Box is displayed. Select the *192.168.250.1* Check Box and the *192.168.250.2* Check Box.

Click the **OK** Button.

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

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

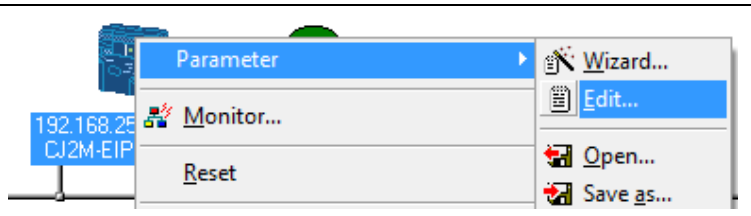
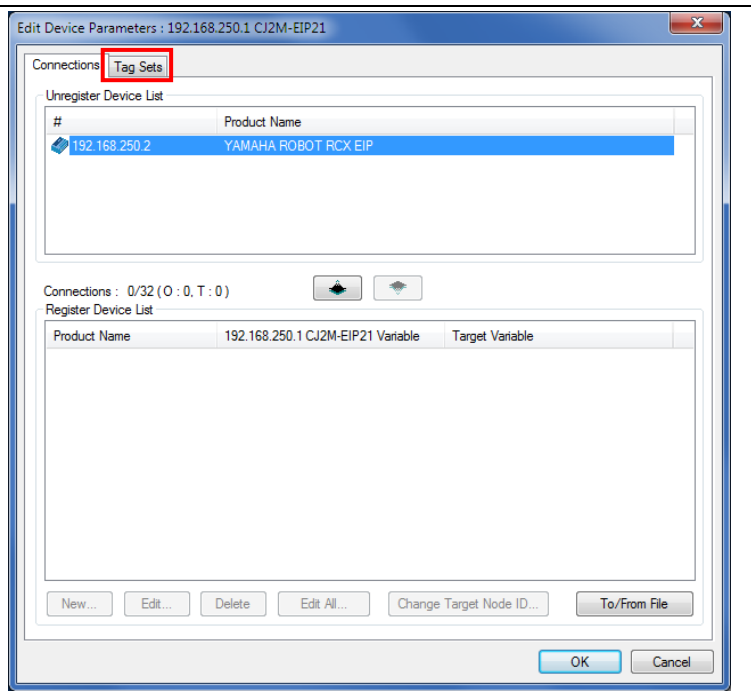
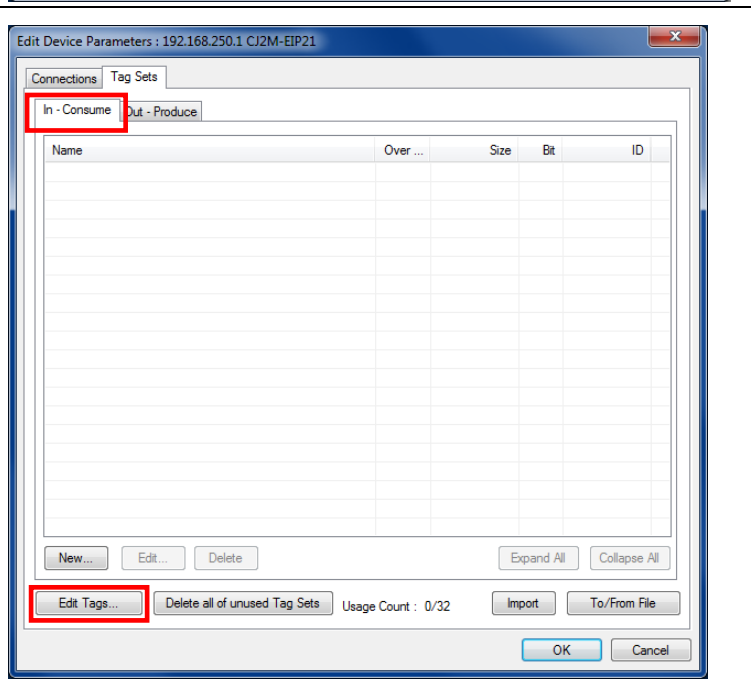


- 4 The device parameters are uploaded. When uploading is completed, the dialog box on the right is displayed. Check the contents and click the **OK** Button.
- 
- 5 After uploading is completed, confirm that the IP address of each node is updated on the Network Configuration Pane as follows:
- IP address of node 1:  
192.168.250.1
- IP address of node 2:  
192.168.250.2
- 
- 6 Right-click the node 2 device and select **Parameter - Edit**.
- 
- 7 The Edit Device Parameters Dialog Box is displayed. Enter the following values and click the **OK** Button.
- Output Size : 48
  - Input Size : 48
- 
- | Parameter Name        | Value  |
|-----------------------|--------|
| <b>All parameters</b> |        |
| 0001 Output Size      | 48     |
| 0002 Input Size       | 48     |
| 0003 RPI Range        | 150000 |

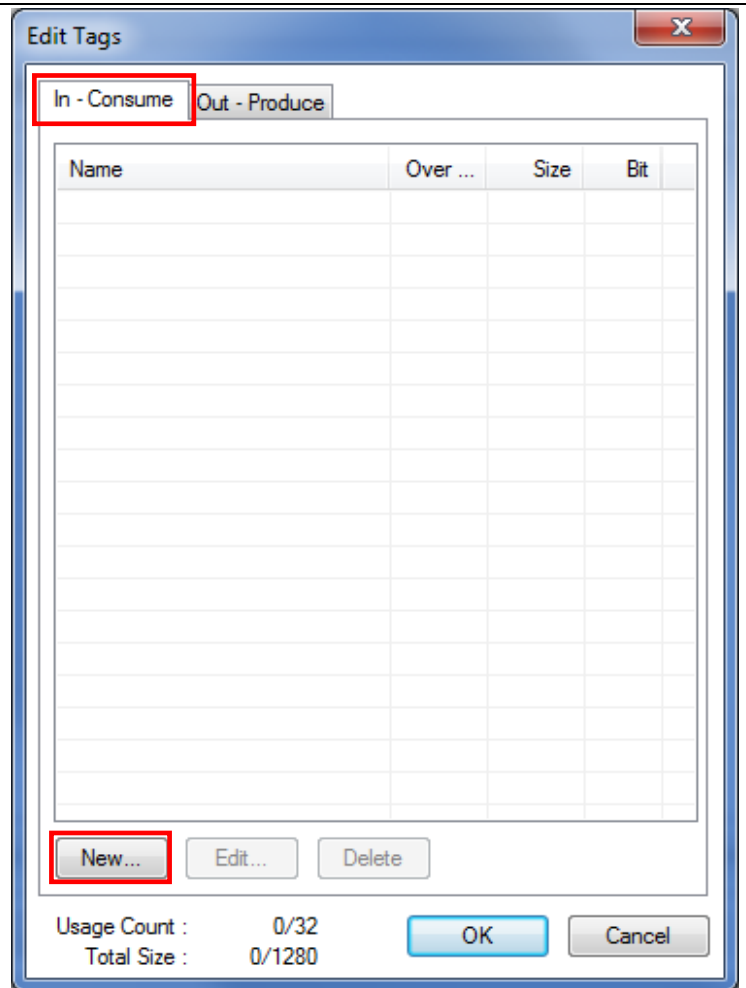
### 7.4.3. Setting Tags

Register the tags of the send area and receive area.

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

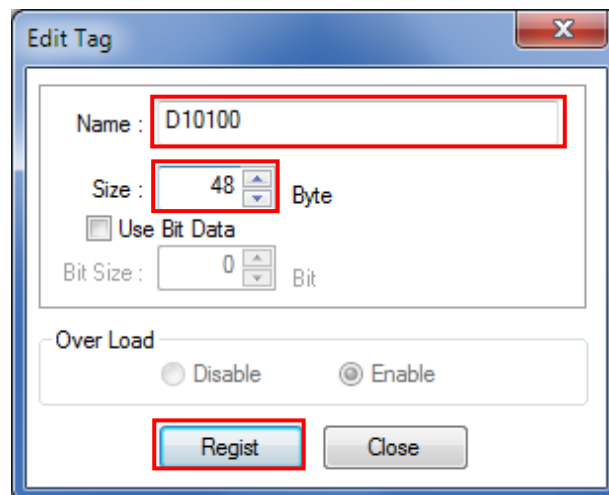
|   |  |
|---|--|
| <p>1 On the Network Configuration Pane of the Network Configurator, right-click the node 1 device and select <b>Parameter - Edit</b>.</p> |    |
| <p>2 The Edit Device Parameters Dialog Box is displayed. Select the <b>Tag Sets</b> Tab.</p>  |   |
| <p>3 The data on the Tag Sets Tab is displayed. Select the <b>In-Consume</b> Tab and click the <b>Edit Tags</b> Button.</p>               |  |

- 4 The Edit Tags Dialog Box is displayed. Select the **In - Consume** Tab and click the **New** Button.  
Here, register an area where node 1 receives data from node 2.



- 5 The Edit Tag Dialog Box is displayed.  
Enter the following values in the parameters.
- Name: *D10100* (Start address of the input data to node 1)
  - Size: *48* (bytes)

After entering, click the **Register** Button.

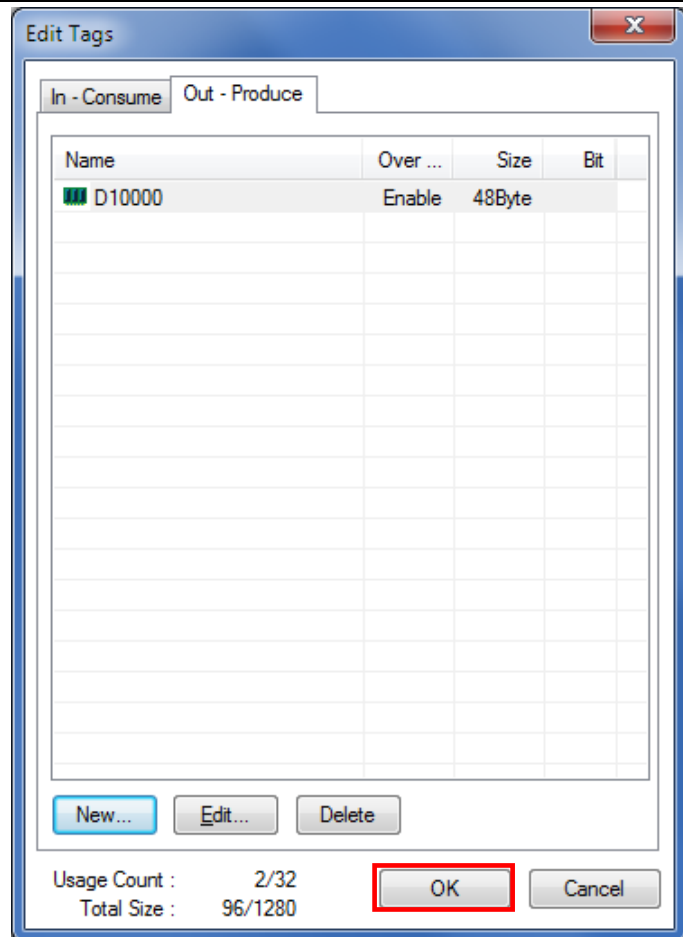


- 6 The Edit Tag Dialog Box is displayed again.  
Click the **Close** Button.

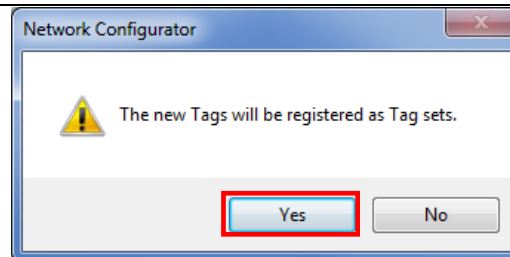




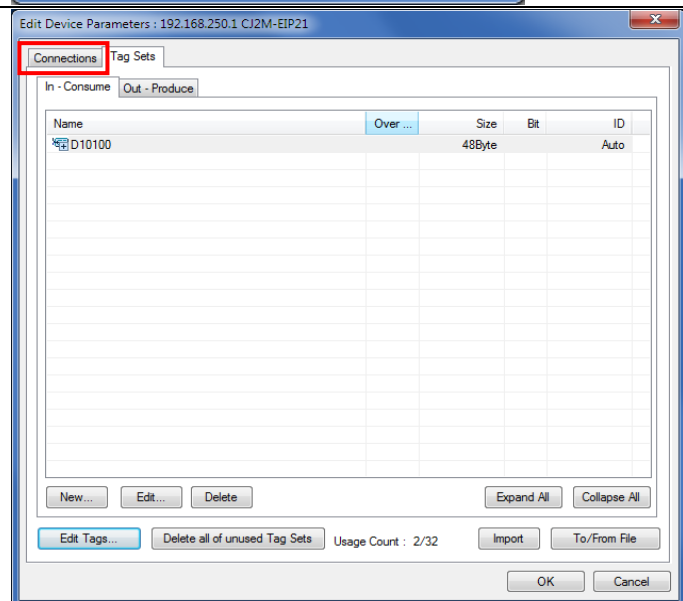
- 10 When you finish the registration, click the **OK** Button on the Edit Tags Dialog Box.



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

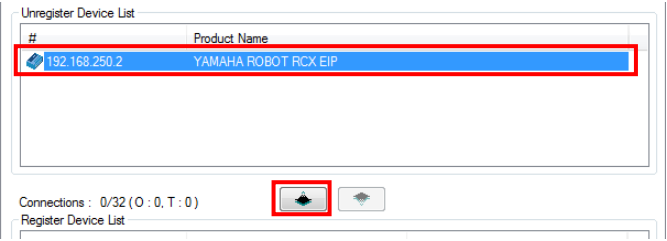
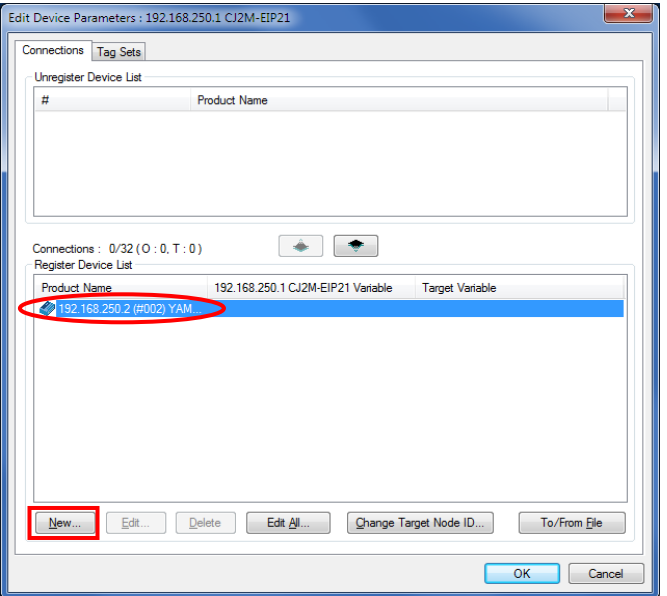
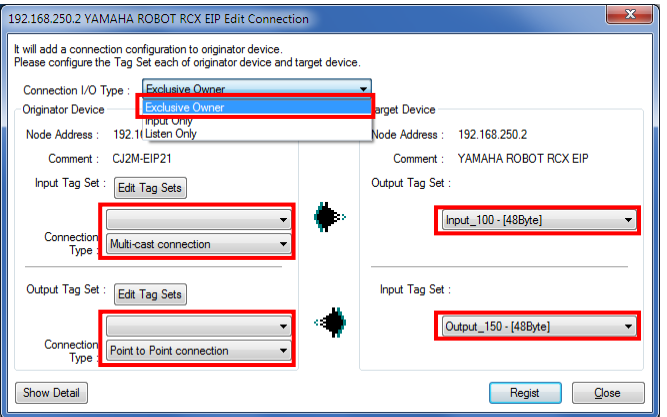


- 12 The Edit Device Parameters Dialog Box is displayed again. Select the **Connections** Tab.



7.4.4. Setting the Connection

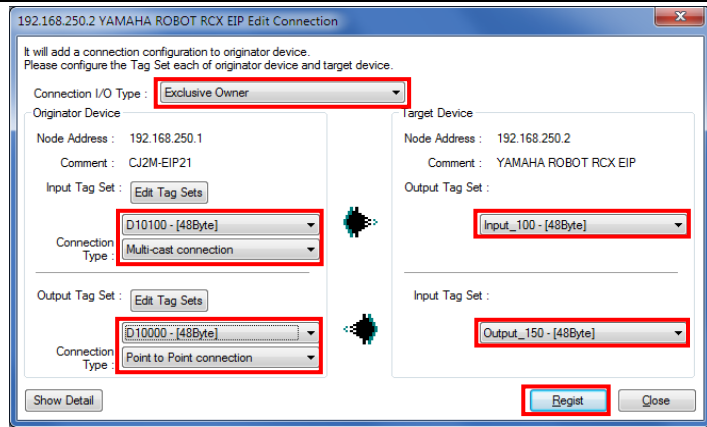
Associate the tags of the target device (that receives the open request) with the tags of the originator (that requests opening).

|   |  |
|---|--|
| <p>1 Select 192.168.250.2 in Unregister Device List. Click the <b>Down Arrow</b> Button that is shown in the dialog box.</p>  |    |
| <p>2 192.168.250.2 is registered in the Register Device List Field. Select 192.168.250.2 and click the <b>New</b> Button.</p>   |   |
| <p>3 The Edit Connection Dialog Box is displayed. Select <b>Exclusive Owner</b> from the Connection I/O Type pull-down list. Set the values listed in the following table to the Originator Device Field and the Target Device Field.</p> |  |

■ Settings of connection

| Connection allocation |                 | Set value                 |
|-----------------------|-----------------|---------------------------|
| Connection I/O Type   |                 | Exclusive Owner           |
| Originator Device     | Input Tag Set   | D10100-[48 Byte]          |
|                       | Connection Type | Multi-cast connection     |
|                       | Output Tag Set  | D10000-[48 Byte]          |
| Target Device         | Connection Type | Point to Point connection |
|                       | Output Tag Set  | Input_100-[48 Byte]       |
|                       | Input Tag Set   | Output_150-[48 Byte]      |

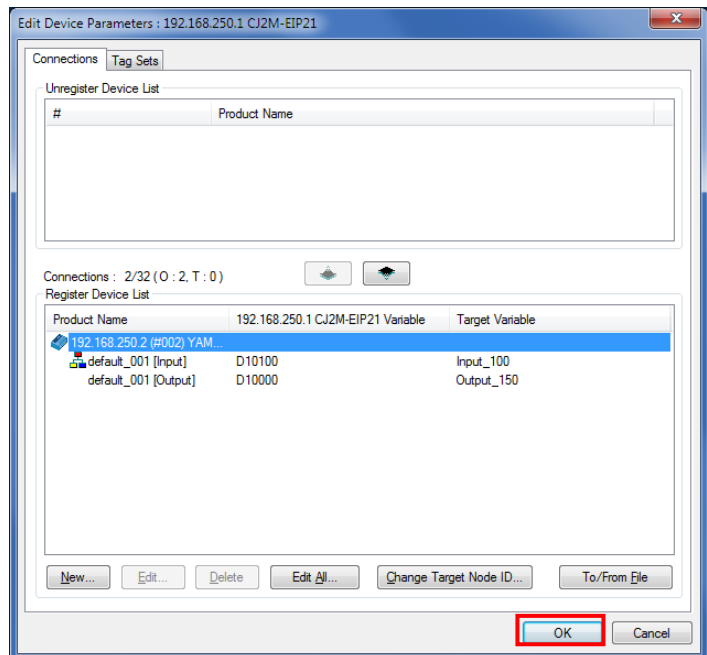
- 4 Confirm that the settings are correct and click the **Register** Button.



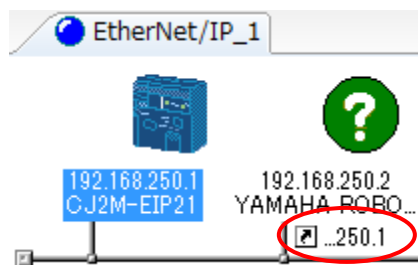
- 5 The Edit Connection Dialog Box is displayed again. Click the **Close** Button.



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



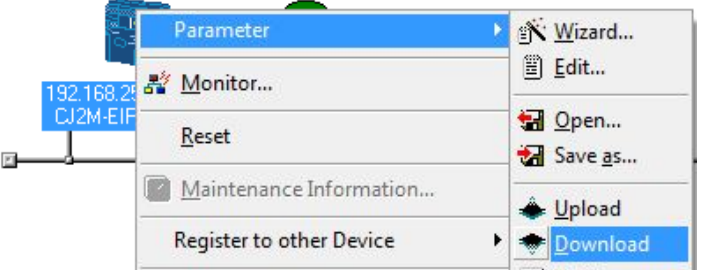
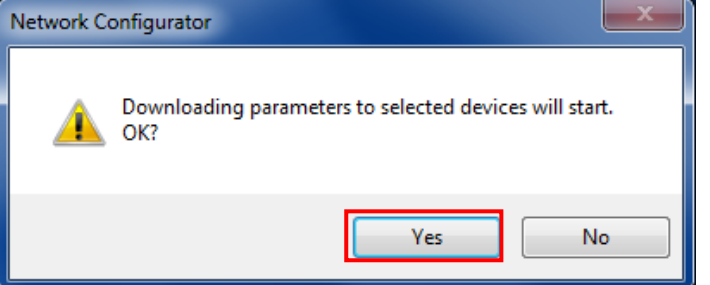
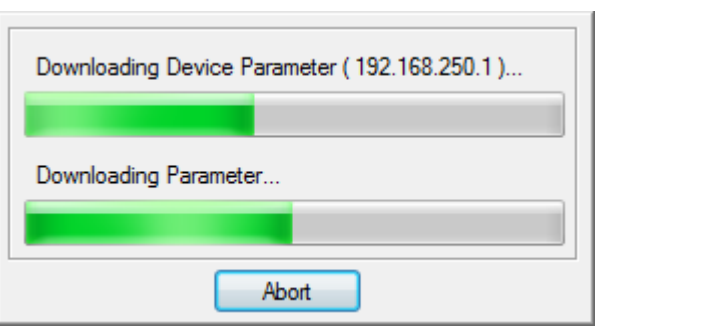
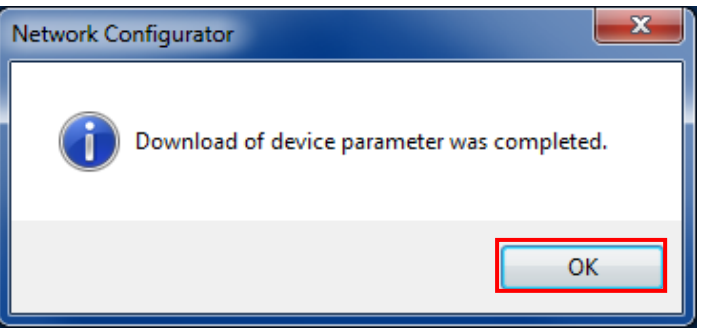
- 7 When the connection setting is completed, the registered node address is displayed under the device icon of node 2 on the Network Configuration Pane.





### 7.4.5. Transferring the Tag Data Link Parameters

Transfer the set tag data link parameters to the PLC.

|   |  |  |
|---|--|--|
| 1 | <p>Right-click the device icon of node 1 on the Network Configuration Pane and select <b>Parameter - Download</b>.</p> |    |
| 2 | <p>The dialog box on the right is displayed. Confirm that there is no problem and click the <b>Yes</b> Button.</p>     |    |
| 3 | <p>The tag data link parameters are downloaded from Network Configurator to the PLC.</p>                               |   |
| 4 | <p>The dialog box on the right is displayed. Check the contents and click the <b>OK</b> Button.</p>                    |  |

## 7.5. Checking the EtherNet/IP Communications

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

### 7.5.1. Checking the Connection Status

Check the connection status of EtherNet/IP.

- 1 Confirm that the tag data links are normally in operation by checking the LED indicators on each device.

- PLC (EtherNet/IP Unit)

The LED indicators in normal status are as follows:

[MS]: Lit green

[NS]: Lit green

[COMM]: Lit yellow

[100M] or [10M]: Lit yellow

- Robot Controller

The LED indicators in normal status are as follows:

(1) [Activity]: Flashing green while packets are being sent and received

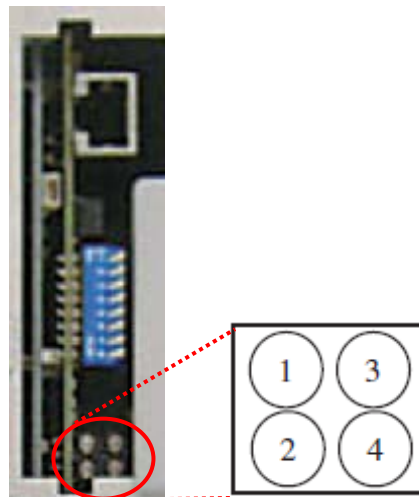
(2) [Network Status]: Lit green

(3) [Link]: Lit green

(4) [Module Status]: Lit green

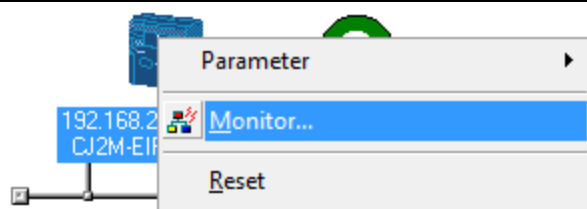


PLC (EtherNet/IP Unit)



Robot Controller (EtherNet/IP Compatible Module)

- 2 Confirm that the tag data links are normally in operation by checking the status information on the Monitor Device Window of the Network Configurator.

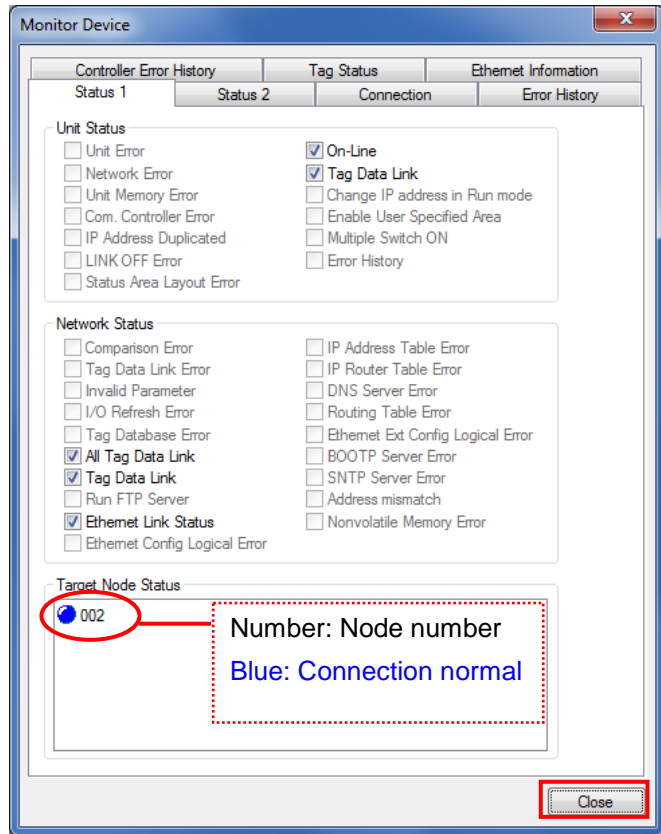


Right-click the device icon of node 1 on the Network Configuration Pane and select **Monitor**.

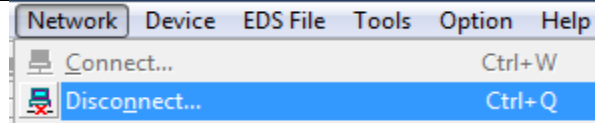
- 3 The dialog box on the right displays the Status 1 Tab Page of the Monitor Device Dialog Box.

When the same check boxes are selected as shown on the right, the data links are normally in operation.

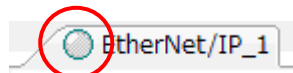
Click the **Close** Button.



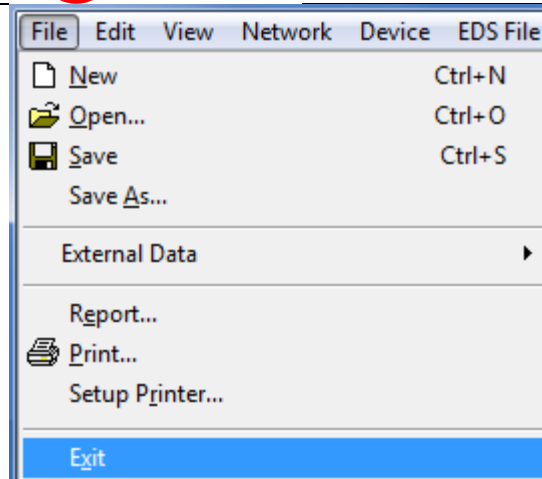
- 4 Select **Disconnect** from the Network Menu to go offline.



- 5 The color of the icon on the figure changes from blue.



- 6 Select **Exit** from the File Menu to exit the Network Configurator.



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

Confirm that the correct data are sent and received.

## Caution

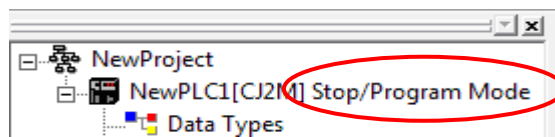
Confirm safety sufficiently before monitoring power flow and present value status in the Ladder Section window or before monitoring present values in the Watch window.

If force-set/reset or set/reset operations are incorrectly performed by pressing short-cut keys, the devices connected to Output Units may malfunction, regardless of the operating mode of the CPU Unit.

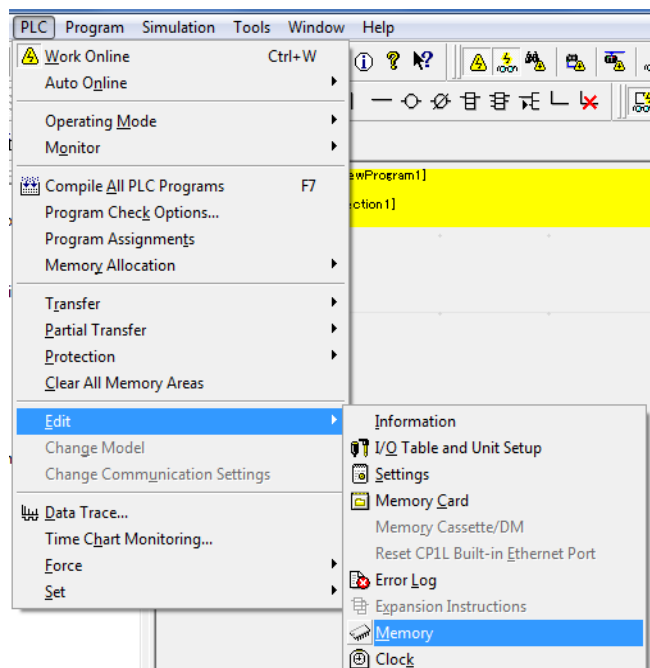


- 1 Confirm that the PLC is in Program Mode.

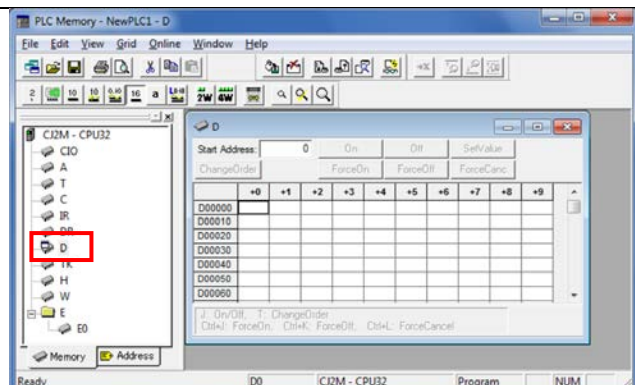
\*If the PLC is not in Program Mode, change to Program Mode by referring to step 1 of 7.3.4. *Creating the I/O Table and setting IP Addresses.*



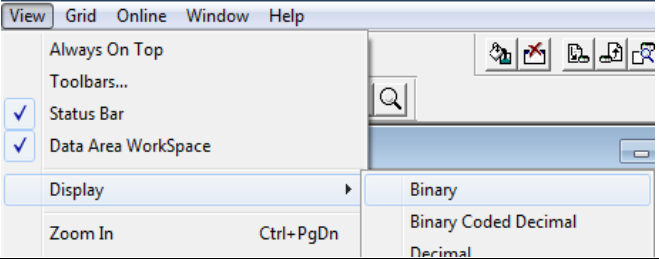
- 2 Select **Edit - Memory** from the PLC Menu.

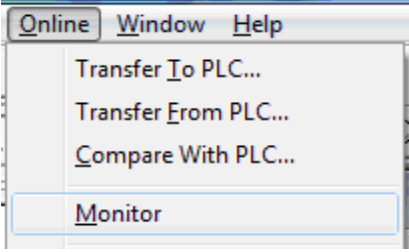


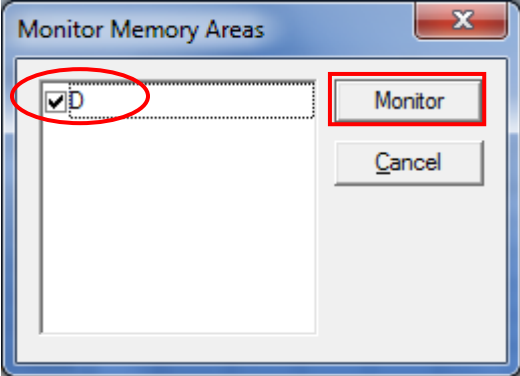
- 3 Double-click **D** from the list in the PLC Memory Window that is displayed.



- 4 Select **Display - Binary** from the View Menu.

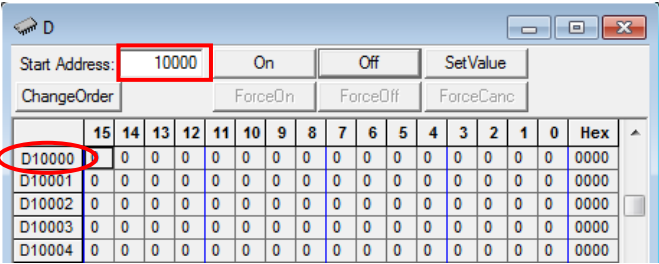

- 5 Select **Monitor** from the Online Menu.


- 6 The Monitor Memory Areas Dialog Box is displayed. Confirm that the **D** Check Box is selected and click the **Monitor** Button.

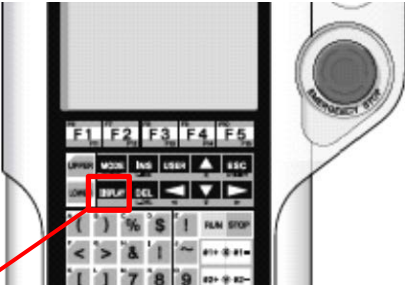

- 7 Enter **10000** in the **Start Address** Field in the D Window.

Confirm that the start address changes to D10000.

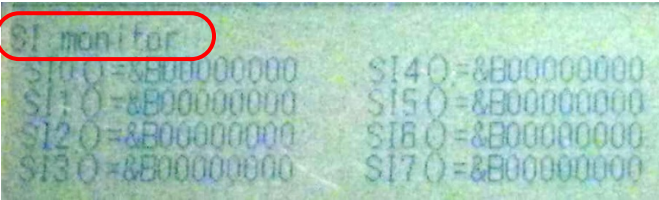
\*D10000 and subsequent areas correspond to input data of the Robot Controller.



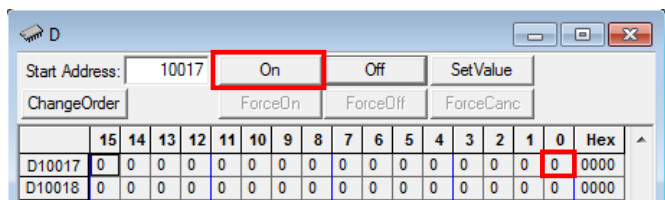
|        | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | Hex  |
|--------|----|----|----|----|----|----|---|---|---|---|---|---|---|---|---|---|------|
| D10000 | 0  | 0  | 0  | 0  | 0  | 0  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0000 |
| D10001 | 0  | 0  | 0  | 0  | 0  | 0  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0000 |
| D10002 | 0  | 0  | 0  | 0  | 0  | 0  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0000 |
| D10003 | 0  | 0  | 0  | 0  | 0  | 0  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0000 |
| D10004 | 0  | 0  | 0  | 0  | 0  | 0  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0000 |
- 8 Press **DISPLAY** on the Programming box.



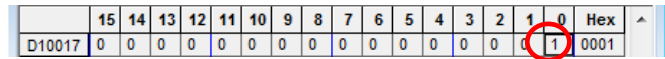
**DISPLAY** : Selects the robot I/O monitor screen.
- 9 The DI monitor screen is displayed. Press **DISPLAY** at certain times until the SI monitor screen is displayed as shown on the right.



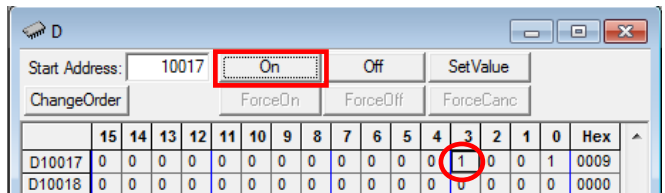
- 10 Display the D10017 area in the D Window.  
Select bit 0 and click the **On** Button.



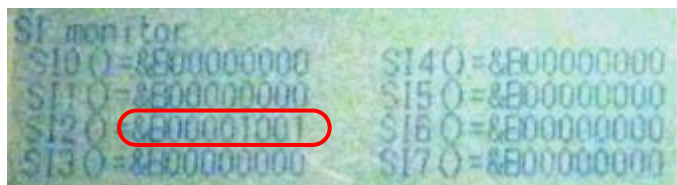
The value of bit 0 changes to 1.



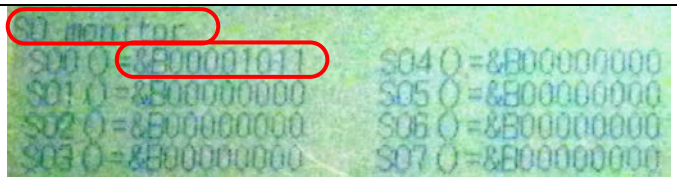
In the same way, select bit 3 and click the **On** Button.  
The value of bit 3 changes to 1.



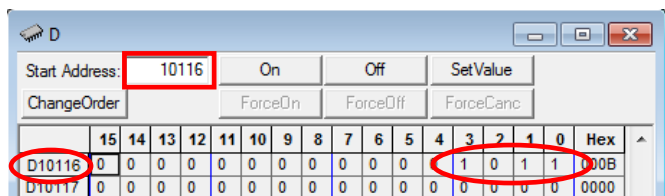
- 11 Check the monitor screen of the Programming box.  
You can confirm that the value of SI2() is 00001001 and, in addition, SI2(0) and SI2(3) are turned ON.



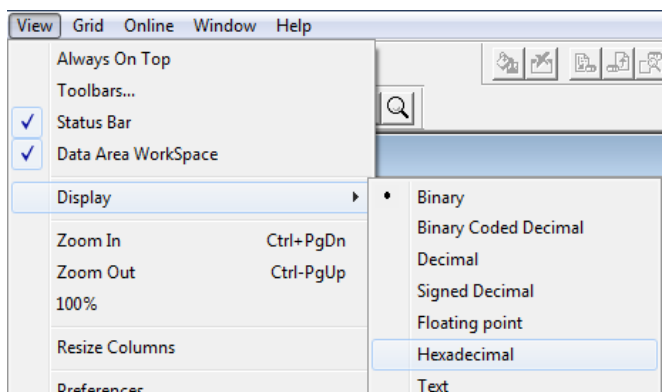
- 12 Press **DISPLAY** at certain times until the SO monitor screen is displayed as shown on the right.  
Confirm that the value of SO0() is 00001011.



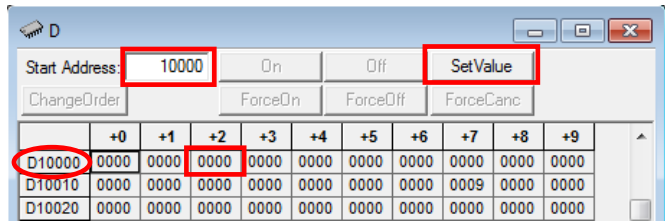
- 13 Enter 10116 in the *Start Address* Field in the D Window.  
The start address changes to D10116.  
Confirm that the values of D10116 of bits 3,1, and 0 are 1 that are the same values displayed in step 12.



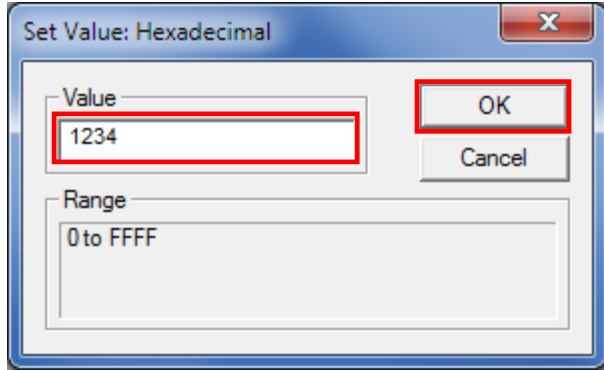
- 14 Select **Display - Hexadecimal** from the View Menu.



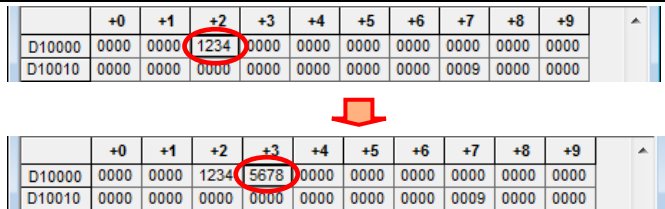
- 15 Enter 10000 in the *Start Address* Field in the D Window.  
The start address changes to D10000.  
Select D10002 and click the **Set Value** Button.



- 16 The Set Value: Hexadecimal Dialog Box is displayed.  
Enter 1234 and click the **OK** Button.



- 17 Confirm that the value of D10002 changes to 1234.  
  
In the same way, enter 5678 in D10003.  
Confirm that the value of D10003 changes to 5678.



- 18 Press **DISPLAY** at certain times until the SIW monitor screen is displayed as shown on the right.  
Confirm that the values of SIW(2) and SIW(3) are 1234 and 5678 respectively which are the same values you set in step 17.





## 8. Initialization Method

This document explains the setting procedure from the factory default setting.

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

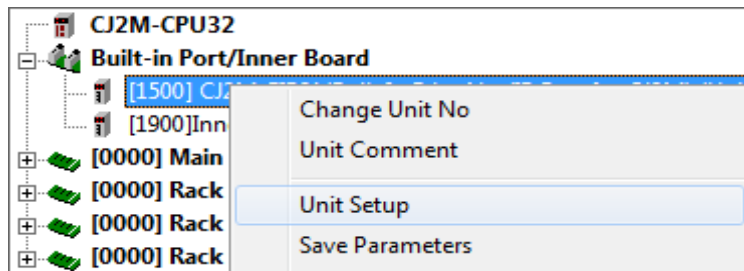
### 8.1. Initializing the PLC

To initialize the settings of the PLC, it is necessary to initialize the CPU Unit and EtherNet/IP Unit. Change the PLC to PROGRAM mode before the initialization.

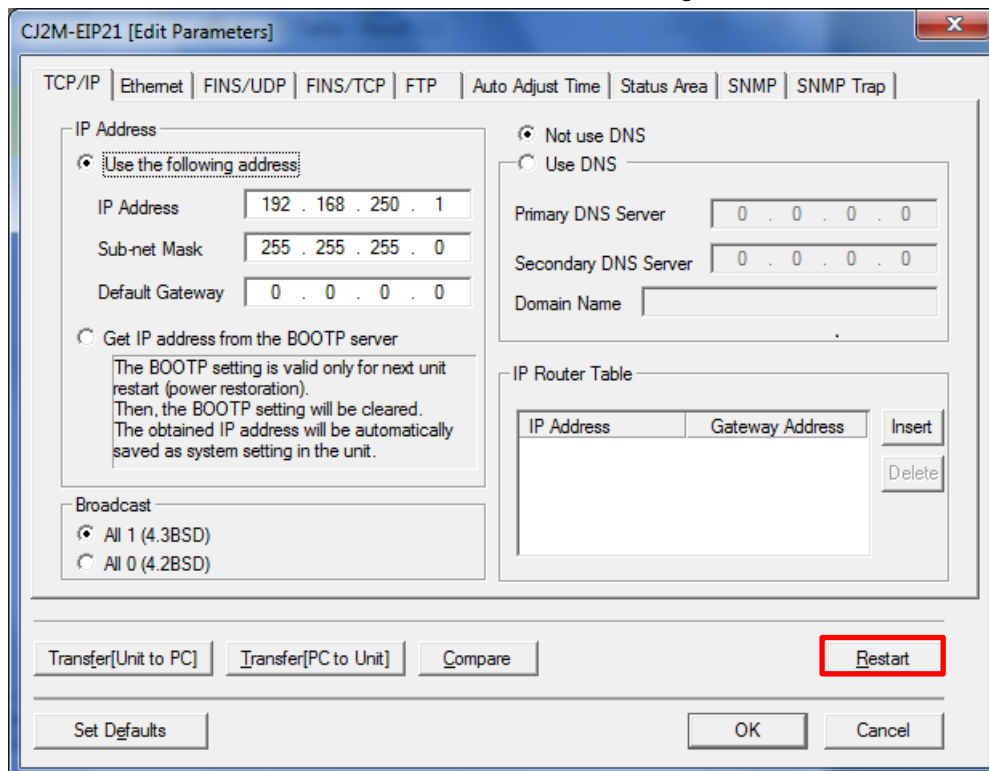
#### 8.1.1. EtherNet/IP Unit

(1) Select **Edit - I/O Table and Unit Setup** from the PLC Menu of the CX-Programmer.

Right-click the EtherNet/IP Unit on the PLC IO Table Window and select **Unit Setup** from the menu.



(2) Click the **Restart** Button on the Edit Parameters Dialog Box.

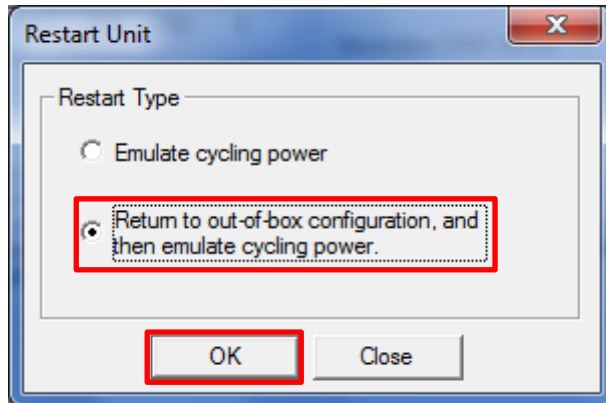




(3) A confirmation dialog box is displayed. Confirm that there is no problem and click the **Yes** Button.

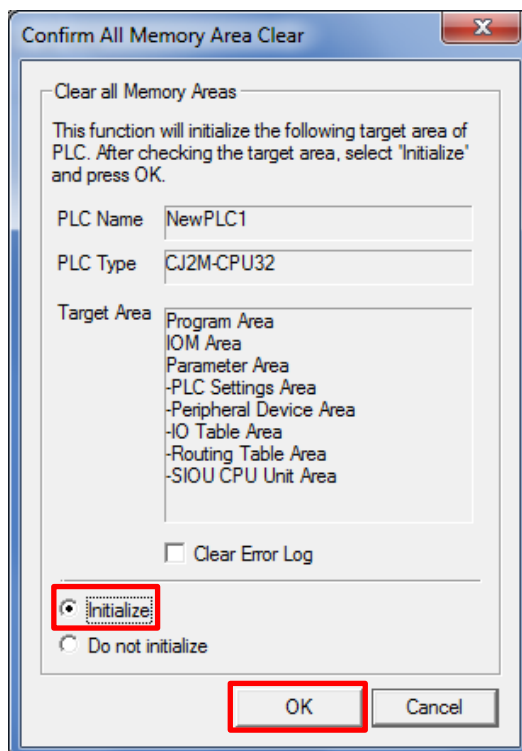
On the Restart Unit Dialog Box that is displayed, select the *Return to out-of-box configuration, and then emulate cycling power* Option, and click the **OK** Button.

Then, a complete dialog box is displayed. Check the contents and click the **OK** Button.



### 8.1.2. CPU Unit

To initialize the settings of the CPU Unit, select **Clear All Memory Areas** from the PLC Menu of the CX-Programmer. On the Confirm All Memory Area Clear Dialog Box, select the *Initialize* Option and click the **OK** Button.



## 8.2. Initializing the YAMAHA MOTOR Robot Controller

For information on how to initialize the Robot Controller, refer to 5. *Initialization* in Chapter 7 *Controller system settings of the YAMAHA 4-AXIS ROBOT CONTROLLER RCX240 User's Manual* (Cat. No. E123).

## 9. Revision History

| Revision code | Date of revision | Revision reason and revision page |
|---------------|------------------|-----------------------------------|
| 01            | Jun. 2, 2014     | First edition                     |
|               |                  |                                   |
|               |                  |                                   |



**OMRON Corporation Industrial Automation Company**

Tokyo, JAPAN

Contact: [www.ia.omron.com](http://www.ia.omron.com)

**Regional Headquarters**

**OMRON EUROPE B.V.**

Wegalaan 67-69-2132 JD Hoofddorp  
The Netherlands

Tel: (31)2356-81-300/Fax: (31)2356-81-388

**OMRON ELECTRONICS LLC**

One Commerce Drive Schaumburg,  
IL 60173-5302 U.S.A.

Tel: (1) 847-843-7900/Fax: (1) 847-843-7787

**OMRON ASIA PACIFIC PTE. LTD.**

No. 438A Alexandra Road # 05-05/08 (Lobby 2),  
Alexandra Technopark,  
Singapore 119967

Tel: (65) 6835-3011/Fax: (65) 6835-2711

**OMRON (CHINA) CO., LTD.**

Room 2211, Bank of China Tower,  
200 Yin Cheng Zhong Road,  
PuDong New Area, Shanghai, 200120, China

Tel: (86) 21-5037-2222/Fax: (86) 21-5037-2200

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