


Machine Automation Controller NJ-series

EtherCAT[®] Connection Guide

OMRON Corporation

Displacement Sensor(Confocal Fiber Type)

(ZW-CE1)



Network
Connection
Guide

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1. Related Manuals

The table below lists the manuals related to this document.

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

| Cat. No. | Model | Manual name |
|----------|--------------------------|---|
| W500 | NJ501-□□□□ NJ301-□□□□ | NJ-series CPU Unit Hardware User's Manual |
| W501 | NJ501-□□□□ NJ301-□□□□ | NJ-series CPU Unit Software User's Manual |
| W505 | NJ501-□□□□ NJ301-□□□□ | NJ-series CPU Unit Built-in EtherCAT Port User's Manual |
| W504 | SYSMAC-SE2□□□□ | Sysmac Studio Version 1 Operation Manual |
| Z332 | ZW-CE1□ | ZW Series Displacement Sensor (Confocal Fiber Type) User's Manual |

2. Terms and Definitions

| Term | Explanation and Definition |
|--|--|
| PDO Communications (Communications using Process Data Objects) | <p>This method is used for cyclic data exchange between the master unit and the slave units.</p> <p>PDO data (i.e., I/O data that is mapped to PDOs) that is allocated in advance is input and output periodically each EtherCAT process data communications cycle (i.e., the period of primary periodic task).</p> <p>The NJ-series Machine Automation Controller uses the PDO communications for commands to refresh I/O data in a fixed control period, including I/O data for EtherCAT Slave Units, and the position control data for the Servomotors.</p> <p>It is accessed from the NJ-series Machine Automation Controller in the following ways.</p> <ul style="list-style-type: none"> •With device variables for EtherCAT slave I/O •With Axis Variables for Servo Drive and encoder input slaves to which assigned as an axis |
| SDO Communications (Communications using Service Data Objects) | <p>This method is used to read and write specified slave unit data from the master unit when required.</p> <p>The NJ-series Machine Automation Controller uses SDO communications for commands to read and write data, such as for parameter transfers, at specified times.</p> <p>The NJ-series Machine Automation Controller can read/write the specified slave data (parameters and error information, etc.) with the EC_CoESDORead (Read CoE SDO) instruction or the EC_CoESDOWrite (Write CoE SDO) instruction.</p> |
| Slave Unit | <p>There are various types of slaves such as Servo Drives that handle position data and I/O terminals that control the bit signals.</p> <p>The slave receives output data sent from the master, and transmits input data to the master.</p> |
| Node address | <p>An address to identify the unit connected to the EtherCAT.</p> |
| ESI file (EtherCAT Slave Information file) | <p>The ESI files contain information unique to the EtherCAT slaves in XML format.</p> <p>Install an ESI file into the Sysmac Studio, to allocate slave process data and make other settings.</p> |

3. Remarks

- (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 users are 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 of or whole of this document without the permission of OMRON Corporation.
- (5) This document provides the latest information as of April 2013. The information on this document is subject to change without notice for improvement.

The following notation is used in this document.



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. Additionally, there may be severe property damage.



Caution

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



Precautions for Safe Use

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



Precautions for Correct Use

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



Additional Information

Additional information to read as required.

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

Symbols



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

4. Overview

This document describes the procedure for connecting the Displacement Sensor (ZW series) of OMRON Corporation to NJ-series Machine Automation Controller (hereinafter referred to as Controller) via EtherCAT and provides the procedure for checking their connection. Refer to *Section 7 Connection Procedure* to understand the setting method and key points to connect the devices via EtherCAT.

5. Applicable Devices and Support Software

5.1. Applicable Devices

The applicable devices are as follows:

| Manufacturer | Name | Model |
|--------------|--|--------------------------|
| OMRON | NJ-series CPU Unit | NJ501-□□□□ NJ301-□□□□ |
| OMRON | Confocal Fiber Type Displacement Sensor Controller | ZW-CE1□ ZW-CE1□T |
| OMRON | Sensor Head | ZW-S□□ |



Additional Information

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

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

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

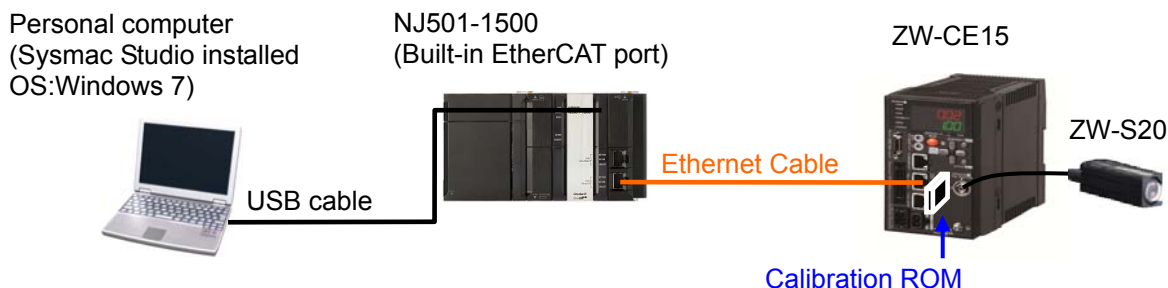


Additional Information

This document describes the procedure to establish the network connection. Except for the connection procedure, it does not provide information on operation, installation or wiring method. It also does not describe the functionality or operation of the devices. Refer to the manuals or contact your OMRON representative.

5.2. Device Configuration

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



| Manufacturer | Product Name | Model | Version |
|--------------|---|-----------------------------|-----------|
| OMRON | CPU Unit (Built-in EtherCAT port) | NJ501-1500 | Ver.1.03 |
| OMRON | Power Supply Unit | NJ1-PA3001 | |
| OMRON | Sysmac Studio | SYSMAC-SE2[] [] [] | Ver.1.05 |
| - | Personal computer (OS: Windows 7) | - | |
| - | USB cable (USB 2.0 type B connector) | - | |
| OMRON | Ethernet cable (with industrial Ethernet connector) | XS5W-T421-[]M[]-K | |
| OMRON | Displacement Sensor Controller | ZW-CE15 | Ver.1.110 |
| OMRON | Displacement Sensor Sensor Head | ZW-S20 | |
| OMRON | Calibration ROM | (Included with Sensor Head) | |
| OMRON | Recommended power supply: 24 VDC 2.5A 60W | | |

Precautions for Correct Use

The connection line of EtherCAT communication cannot be shared with other network, such as Ethernet.

The switching hub for Ethernet cannot be used for EtherCAT.

Please use the cable (double shielding with aluminum tape and braiding) of Category 5 or higher, and use the shielded connector of Category 5 or higher.

Connect the cable shield to the connector hood at both ends of the cable.

Additional Information

Update the Sysmac Studio to the version specified in this section or higher version using the auto update function.

If a version not specified in this section is used, the procedures described in Section 7 and subsequent sections may not be applicable. In that case, use the equivalent procedures described in the Sysmac Studio Version 1 Operation Manual (Cat.No. W504).



Additional Information

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



Additional Information

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

6. EtherCAT Settings

This section provides the specifications such as communication parameters and variable names that are set in this document.

Hereinafter, the Displacement Sensor is referred to as the "destination device" or "Slave Unit" in some descriptions.

6.1. EtherCAT Communications Settings

The setting required for EtherCAT communications is as follows:

| | Displacement Sensor |
|--------------|---------------------|
| Node address | 01 |

6.2. Allocation of EtherCAT Communications

The device variables of the destination device are allocated to the Controller's global variables.

The relationship between the device data and the global variables is shown below.

■ Output area (Controller → Destination device)

| Destination device data | Device variable name | Data type |
|--------------------------------|--------------------------------|-----------|
| Common Control Flag | E001_Common_Control_Flag | DWORD |
| Control command execution | E001_EXE | BOOL |
| Measurement synchronous start | E001_SYNC | BOOL |
| Error clear | E001_ERCLR | BOOL |
| Sensor Head1 Control Flag | E001_Sensor_Head1_Control_Flag | DWORD |
| Timing | E001_TIMING1 | BOOL |
| Reset | E001_RESET1 | BOOL |
| Light metering OFF | E001_LIGHTOFF1 | BOOL |
| Zero reset execution of task 1 | E001_ZERO1_T1 | BOOL |
| Zero reset execution of task 2 | E001_ZERO1_T2 | BOOL |
| Zero reset execution of task 3 | E001_ZERO1_T3 | BOOL |
| Zero reset execution of task 4 | E001_ZERO1_T4 | BOOL |
| Zero reset cancel of task 1 | E001_ZEROCLR1_T1 | BOOL |
| Zero reset cancel of task 2 | E001_ZEROCLR1_T2 | BOOL |
| Zero reset cancel of task 3 | E001_ZEROCLR1_T3 | BOOL |
| Zero reset cancel of task 4 | E001_ZEROCLR1_T4 | BOOL |
| Sensor Head2 Control Flag | E001_Sensor_Head2_Control_Flag | DWORD |
| Command code | E001_Command | DWORD |

| Destination device data | Device variable name | Data type |
|-------------------------|-------------------------|-----------|
| Command parameter1 | E001_Command_Parameter1 | UINT |
| Command parameter2 | E001_Command_Parameter2 | UINT |
| Command parameter3 | E001_Command_Parameter3 | DINT |

■ Input area (Controller ← Destination device)

| Destination device data | Device variable name | Data type |
|--|-------------------------------|-----------|
| Common Status Flag | E001_Common_Status_Flag | DWORD |
| Control command completion | E001_FLG | BOOL |
| Measurement synchronization completion | E001_SYNCFLG | BOOL |
| Ready | E001_READY | BOOL |
| Run screen | E001_RUN | BOOL |
| Current bank bit0 | E001_BANKOUT1_A | BOOL |
| Current bank bit1 | E001_BANKOUT1_B | BOOL |
| Current bank bit2 | E001_BANKOUT1_C | BOOL |
| Current bank bit3 | E001_BANKOUT1_D | BOOL |
| Current bank bit4 | E001_BANKOUT1_E | BOOL |
| Error | E001_ERR | BOOL |
| Sensor Head1 Status Flag | E001_Sensor_Head1_Status_Flag | DWORD |
| Hold execution status | E001_HOLDSTAT1 | BOOL |
| Reset execution state | E001_RESETSTAT1 | BOOL |
| Logical beam lighting state | E001_LIGHT1 | BOOL |
| Measurement position | E001_STABILITY1 | BOOL |
| Measurement state | E001_ENABLE1 | BOOL |
| Data output completed | E001_GATE1 | BOOL |
| Overall judgment output | E001_OR1 | BOOL |
| Zero reset execution of task 1 | E001_ZEROSTAT1_T1 | BOOL |
| Zero reset execution of task 2 | E001_ZEROSTAT1_T2 | BOOL |
| Zero reset execution of task 3 | E001_ZEROSTAT1_T3 | BOOL |
| Zero reset execution of task 4 | E001_ZEROSTAT1_T4 | BOOL |
| HIGH output of task 1 | E001_HIGH1_T1 | BOOL |
| PASS output of task 1 | E001_PASS1_T1 | BOOL |
| LOW output of task 1 | E001_LOW1_T1 | BOOL |
| HIGH output of task 2 | E001_HIGH1_T2 | BOOL |
| PASS output of task 2 | E001_PASS1_T2 | BOOL |
| LOW output of task 2 | E001_LOW1_T2 | BOOL |
| HIGH output of task 3 | E001_HIGH1_T3 | BOOL |
| PASS output of task 3 | E001_PASS1_T3 | BOOL |

| Destination device data | | Device variable name | Data type |
|-----------------------------|-----------------------|-----------------------------------|-----------|
| | LOW output of task 3 | E001_LOW1_T3 | BOOL |
| | HIGH output of task 4 | E001_HIGH1_T4 | BOOL |
| | PASS output of task 4 | E001_PASS1_T4 | BOOL |
| | LOW output of task 4 | E001_LOW1_T4 | BOOL |
| Sensor Head2 Status Flag | | E001_Sensor_Head2_Status_Flag | DWORD |
| Echo back of command code | | E001_Response | DWORD |
| Response code | | E001_Response_Code | DWORD |
| Response data | | E001_Response_Data1 | DINT |
| Measurement value of task 1 | | E001_Measurement_Value_of_Task_1 | DINT |
| Measurement value of task 2 | | E001_Measurement_Value_of_Task_2 | DINT |
| Measurement value of task 3 | | E001_Measurement_Value_of_Task_3 | DINT |
| Measurement value of task 4 | | E001_Measurement_Value_of_Task_4 | DINT |
| reserve | | E001_Measurement_Value_Reserve_01 | DINT |
| reserve | | E001_Measurement_Value_Reserve_02 | DINT |
| reserve | | E001_Measurement_Value_Reserve_03 | DINT |
| reserve | | E001_Measurement_Value_Reserve_04 | DINT |

■ Details of the status allocation (Controller ← Destination device)

| Destination device data | | Global variable name | Data type |
|-------------------------|-----------------------------------|--------------------------|-----------|
| Sysmac error status | | E001_Sysmac_Error_Status | BYTE |
| | Observation levels of information | E001_Observation | BOOL |
| | Minor Fault levels of information | E001_Minor_Fault | BOOL |

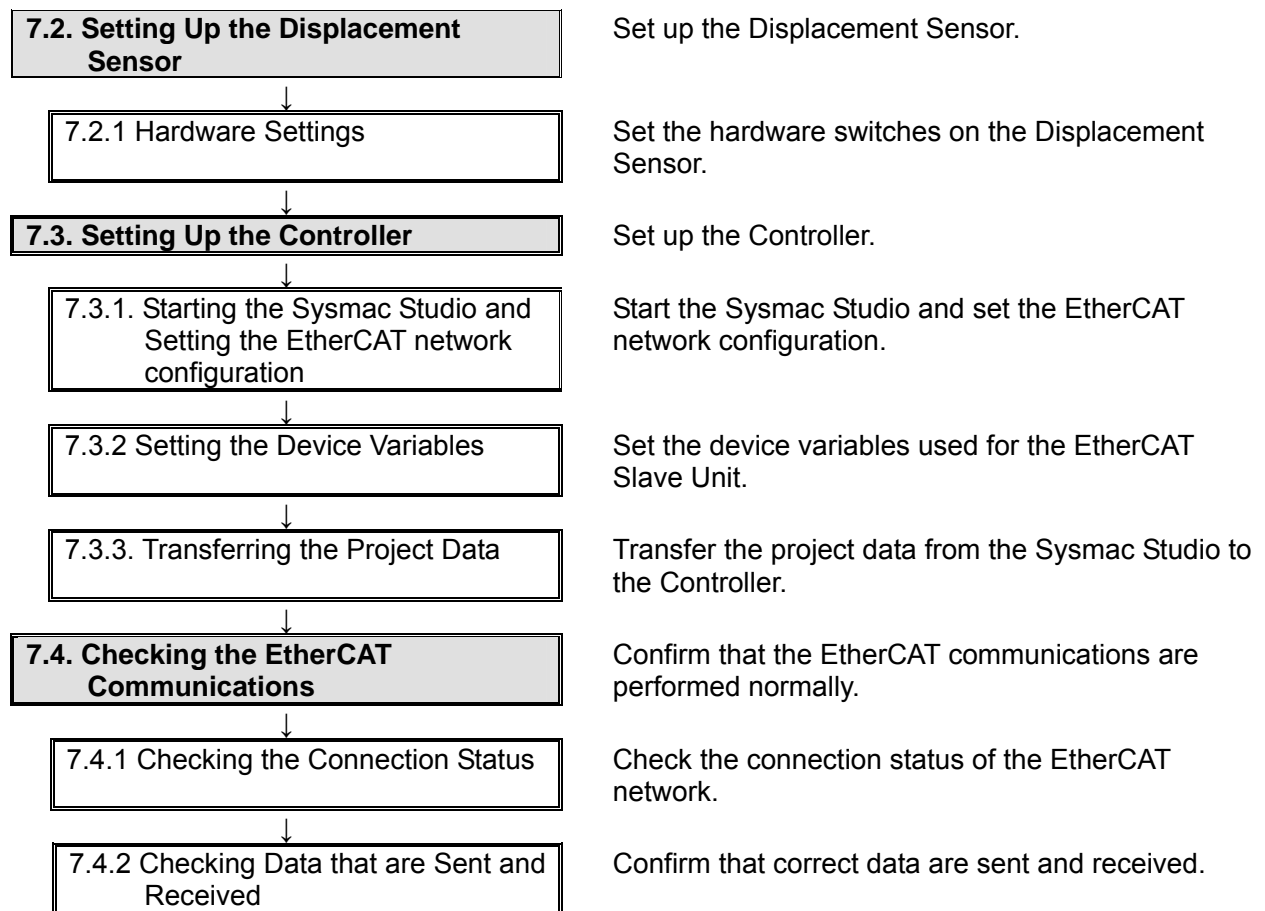
7. Connection Procedure

This section describes the procedure for connecting the Controller via EtherCAT.

This document explains the procedure for setting up the Controller and Displacement Sensor from the factory default setting. For the initialization, refer to *Section 8 Initialization Method*.

7.1. Work Flow

Take the following steps to connect to EtherCAT.



7.2. Setting Up the Displacement Sensor

Set up the Displacement Sensor.

7.2.1. Hardware Settings

Set the hardware switches on the Displacement Sensor.



Precautions for Correct Use

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

- 1 Confirm that the power supply to the Displacement Sensor is OFF.

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

- 2 Refer to the figure on the right and check the hardware switches of the Displacement Sensor.

Connect the Ethernet cable to the EtherCAT connector (input).

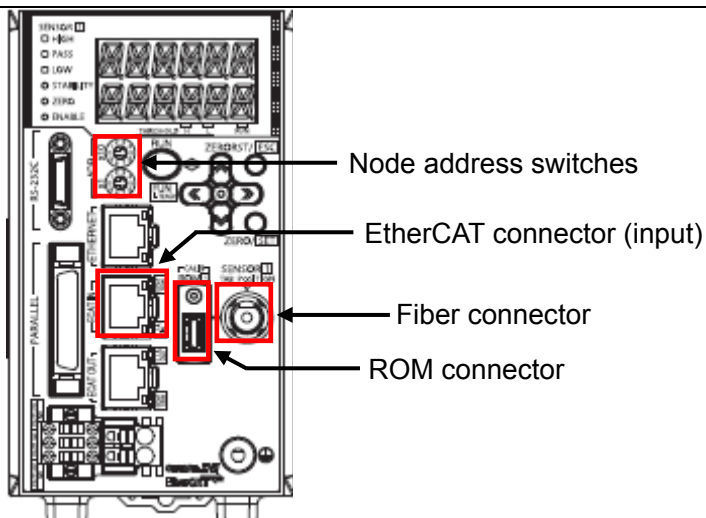
Connect the calibration ROM to the ROM connector.

Connect the Sensor Head to the Fiber Connector.

Set the node address switches as follows:

x10: 0, x1: 1

*Set the node address to 01.



- 3 Turn ON the power supply to the Displacement Sensor.

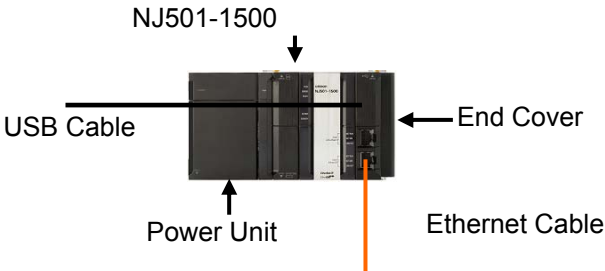

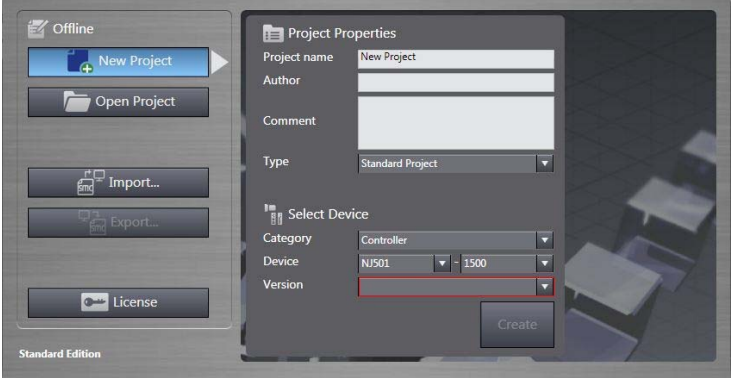
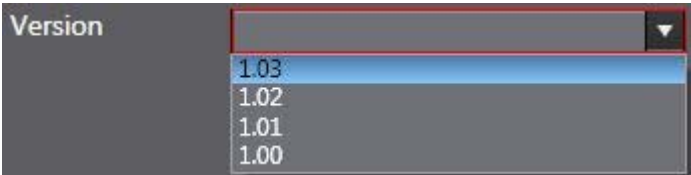
7.3. Setting Up the Controller

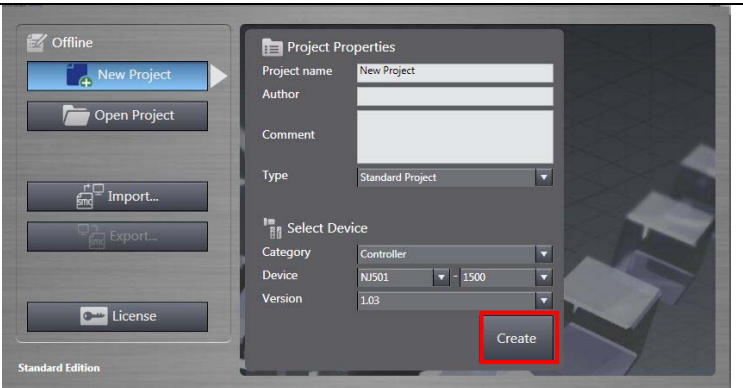
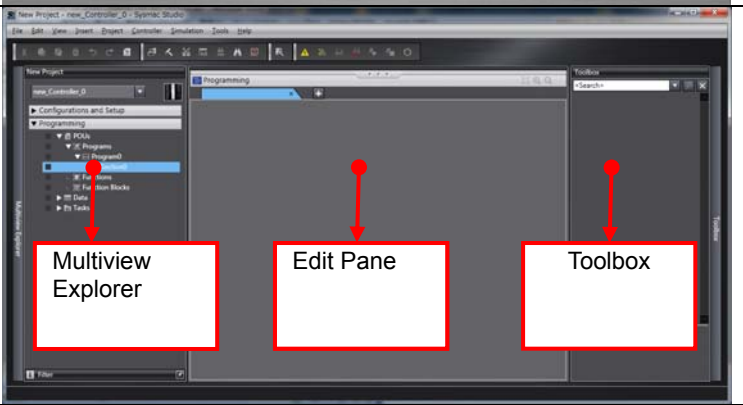
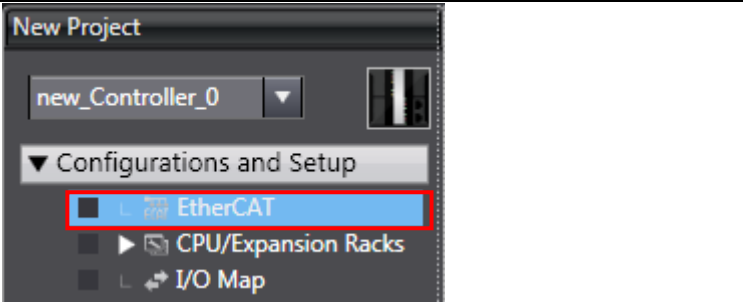
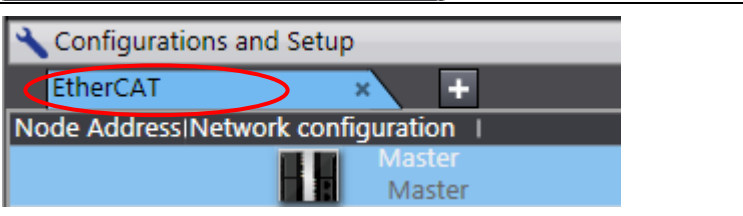
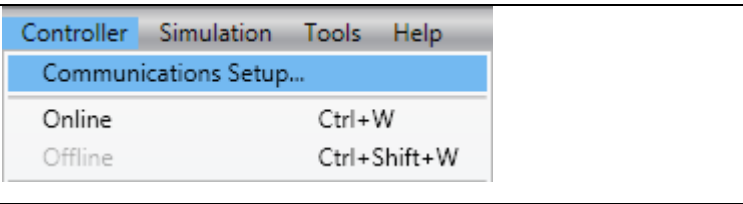
Set up the Controller.

7.3.1. Starting the Sysmac Studio and Setting the EtherCAT Network Configuration

Start the Sysmac Studio and set the EtherCAT network configuration.

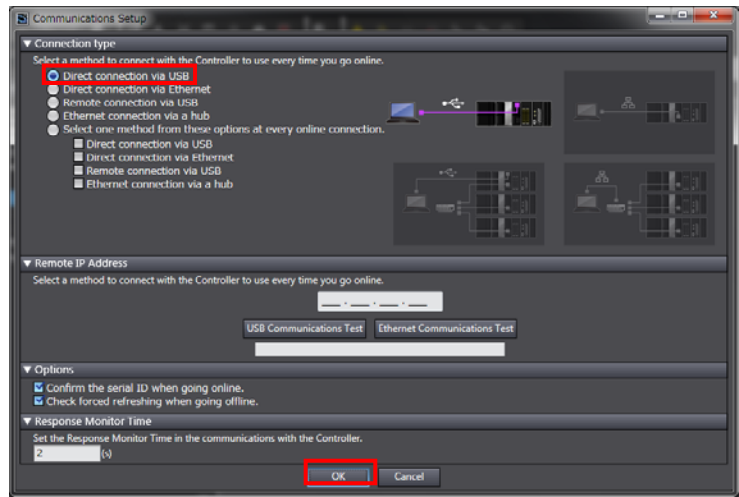
Install the Sysmac Studio and USB driver in the personal computer beforehand.

| | |
|---|---|
| <p>1 Connect the Ethernet cable to the built-in EtherCAT port (PORT2) of the Controller and the USB cable to the peripheral (USB) port. As shown in 5.2. Device Configuration, connect the personal computer, Displacement Sensor and Controller. Turn ON the power supply to the Controller.</p> |  <p>The diagram shows the NJ501-1500 controller unit. A USB Cable is connected to the left side. A Power Unit is connected to the bottom. An End Cover is on the right side. An Ethernet Cable is connected to the bottom right.</p> |
| <p>2 Start the Sysmac Studio. Click the New Project Button.</p> <p>*If a confirmation dialog for an access right is displayed at start, select to start.</p> |  <p>The screenshot shows the Sysmac Studio interface. A dialog box is open with the 'New Project' button highlighted in red. Other buttons include 'Open Project', 'Import...', 'Export...', and 'License'.</p> |
| <p>3 The Project Properties Dialog Box is displayed.</p> <p>*In this document, New Project is set as the project name.</p> <p>Confirm that Category and Device to use are set in the Select Device Field.</p> <p>Select version 1.03 from the pull-down list of Version.</p> <p>*Although 1.03 is selected in this document, select a version you actually use.</p> |   <p>The Project Properties dialog box is shown. The 'Project name' field contains 'New Project'. The 'Select Device' section has 'Controller' selected for Category, 'NJ501' for Device, and '1500' for Version. A 'Create' button is at the bottom right. A separate screenshot shows the 'Version' dropdown menu with '1.03' selected.</p> |

| | |
|--|--|
| <p>4 Click the Create Button.</p> |  |
| <p>5 The New Project is displayed. The left pane is called Multiview Explorer, the right pane is called Toolbox and the middle pane is called Edit Pane.</p> |  |
| <p>6 Double-click EtherCAT under Configurations and Setup in the Multiview Explorer.</p> |  |
| <p>7 The EtherCAT Tab is displayed on the Edit Pane.</p> |  |
| <p>8 Select Communications Setup from the Controller Menu.</p> |  |

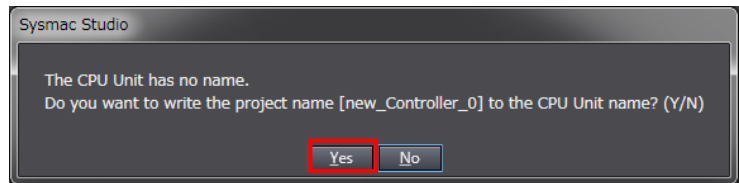
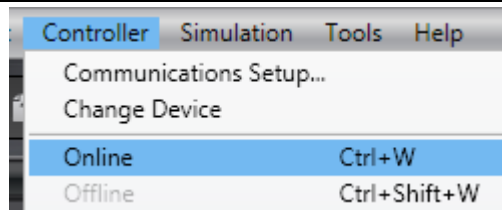
9 The Communications Setup Dialog Box is displayed. Select the *Direct connection via USB* Option for Connection Type.

Click the **OK** Button.



10 Select **Online** from the Controller Menu. If a confirmation dialog is displayed, click the **Yes** Button.

*The displayed dialog depends on the status of the Controller used. Click the **Yes** Button to proceed with the processing.



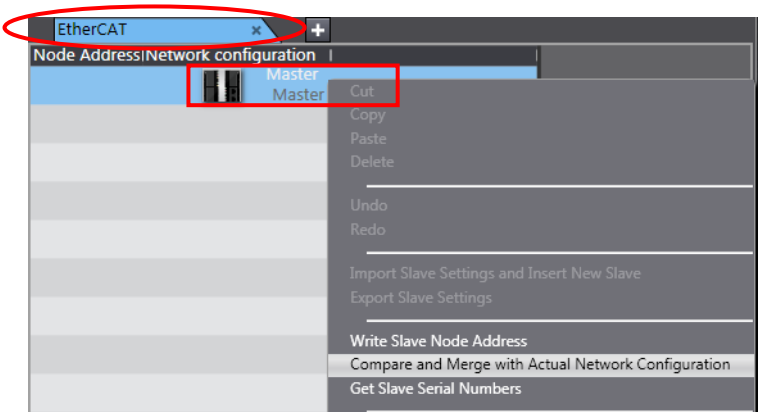
11 When an online connection is established, a yellow bar is displayed on the top of the Edit Pane.



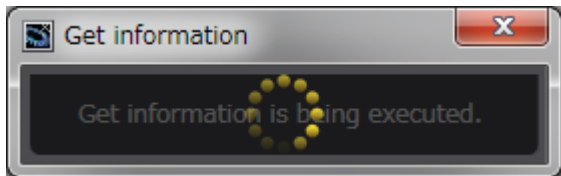
Additional Information

Refer to *Section 5 Online Connections to a Controller* in the *Sysmac Studio Version 1 Operation Manual* (Cat. No. W504) for details on online connections to a Controller.

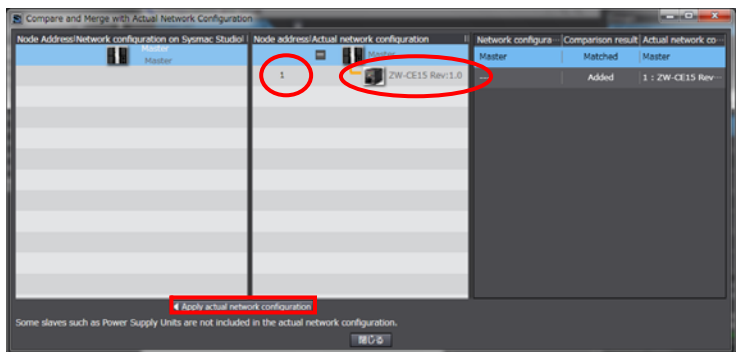
12 Right-click **Master** on the EtherCAT Tab Page, and select **Compare and Merge with Actual Network Configuration**.



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

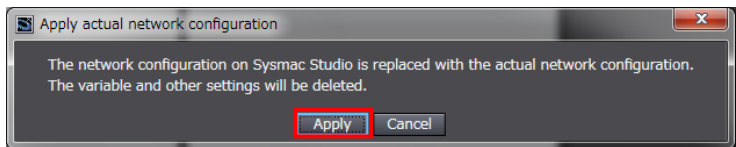


13 The Compare and Merge with Actual Network Configuration Pane is displayed. Node address 1 and ZW-CE15 Rev.1.0 are added to the Actual network configuration after the comparison.

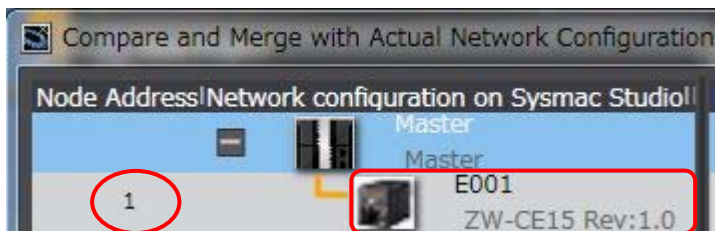


Click the **Apply actual network configuration** Button.

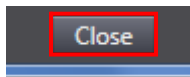
14 A confirmation dialog box is displayed. Click the **Apply** Button.



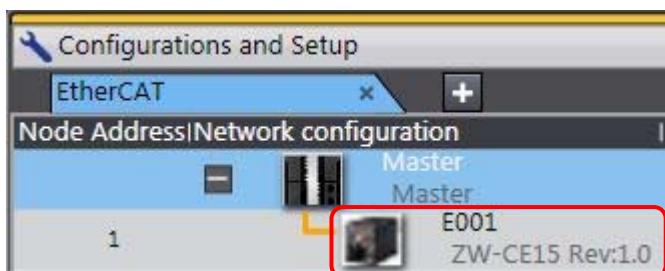
Confirm that node address 1 and E001 ZW-CE15 Rev.1.0 are added to the Network configuration on Sysmac Studio.



Click the **Close** Button.

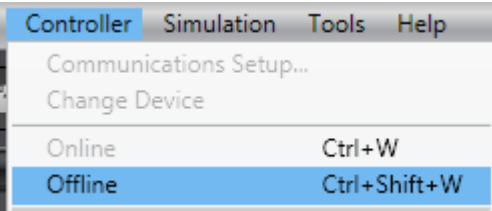

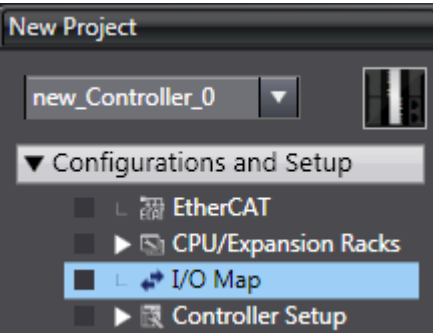
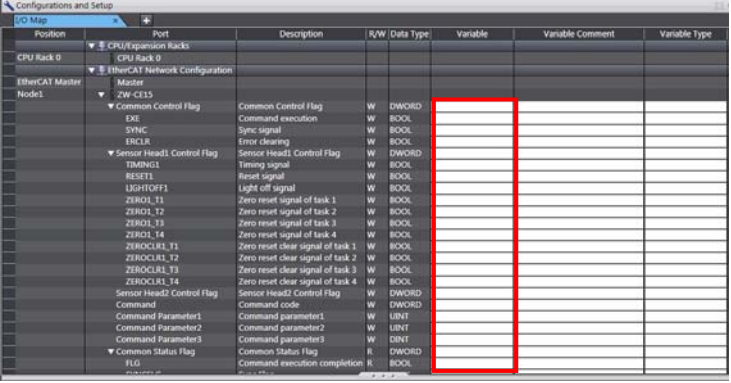


15 Node address 1 and E001 ZW-CE15 Rev:1.0 are added to the EtherCAT Tab Page in the Edit Pane.

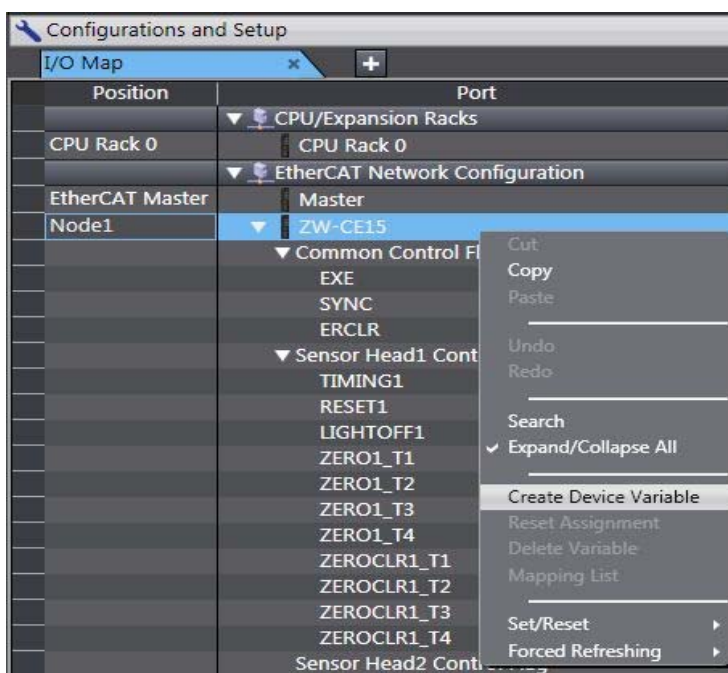


7.3.2. Setting the Device Variables

Set the device variables used for the EtherCAT Slave Unit.

| <p>1 Select Offline from the Controller Menu.</p> <p>The yellow bar on the top of the Edit Pane disappears.</p> |   | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|-----------------------------------|------|-------------|----------|------------------|---------------|------------------|---------------|------------|------------|--|--|--|--|--|--|-----------------|--|--|--|--|--|--|--|-------|---------|--|--|--|--|--|--|--|---------------------|---------------------|---|-------|--|--|--|--|-----|-------------------|---|------|--|--|--|--|------|-------------|---|------|--|--|--|--|-------|----------------|---|------|--|--|--|--|---------------------------|---------------------------|---|-------|--|--|--|--|---------|---------------|---|------|--|--|--|--|--------|--------------|---|------|--|--|--|--|-----------|------------------|---|------|--|--|--|--|-----------|-----------------------------|---|------|--|--|--|--|-----------|-----------------------------|---|------|--|--|--|--|-----------|-----------------------------|---|------|--|--|--|--|-----------|-----------------------------|---|------|--|--|--|--|-------------|-----------------------------------|---|------|--|--|--|--|-------------|-----------------------------------|---|------|--|--|--|--|-------------|-----------------------------------|---|------|--|--|--|--|-------------|-----------------------------------|---|------|--|--|--|--|---------------------------|---------------------------|---|-------|--|--|--|--|---------|--------------|---|-------|--|--|--|--|--------------------|--------------------|---|------|--|--|--|--|--------------------|--------------------|---|------|--|--|--|--|--------------------|--------------------|---|------|--|--|--|--|--------------------|--------------------|---|-------|--|--|--|--|-----|------------------------------|---|------|--|--|--|
| <p>2 Double-click I/O Map under Configurations and Setup on the Multiview Explorer.</p> |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>3 The I/O Map Tab is displayed on the Edit Pane.</p> <p>Confirm that Node1 is displayed in the Position Column and the Slave Unit is displayed.</p> <p>*To manually set a variable name for the Slave Unit, click a column under Variable Column and enter a name.</p> |  <table border="1" data-bbox="710 1019 1444 1400"> <thead> <tr> <th>Position</th> <th>Port</th> <th>Description</th> <th>R/W</th> <th>Data Type</th> <th>Variable</th> <th>Variable Comment</th> <th>Variable Type</th> </tr> </thead> <tbody> <tr> <td>CPU Rack 0</td> <td>CPU Rack 0</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>EtherCAT Master</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Node1</td> <td>ZW C115</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Common Control Flag</td> <td>Common Control Flag</td> <td>W</td> <td>DWORD</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>ERE</td> <td>Command execution</td> <td>W</td> <td>BOOL</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>SYNC</td> <td>Sync signal</td> <td>W</td> <td>BOOL</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>ENCLR</td> <td>Error clearing</td> <td>W</td> <td>BOOL</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Sensor Head1 Control Flag</td> <td>Sensor Head1 Control Flag</td> <td>W</td> <td>DWORD</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>TIMING1</td> <td>Timing signal</td> <td>W</td> <td>BOOL</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>RESET1</td> <td>Reset signal</td> <td>W</td> <td>BOOL</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>LIGHTOFF1</td> <td>Light off signal</td> <td>W</td> <td>BOOL</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>ZEROL1_11</td> <td>Zero reset signal of task 1</td> <td>W</td> <td>BOOL</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>ZEROL1_12</td> <td>Zero reset signal of task 2</td> <td>W</td> <td>BOOL</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>ZEROL1_13</td> <td>Zero reset signal of task 3</td> <td>W</td> <td>BOOL</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>ZEROL1_14</td> <td>Zero reset signal of task 4</td> <td>W</td> <td>BOOL</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>ZEROCLE1_11</td> <td>Zero reset clear signal of task 1</td> <td>W</td> <td>BOOL</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>ZEROCLE1_12</td> <td>Zero reset clear signal of task 2</td> <td>W</td> <td>BOOL</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>ZEROCLE1_13</td> <td>Zero reset clear signal of task 3</td> <td>W</td> <td>BOOL</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>ZEROCLE1_14</td> <td>Zero reset clear signal of task 4</td> <td>W</td> <td>BOOL</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Sensor Head2 Control Flag</td> <td>Sensor Head2 Control Flag</td> <td>W</td> <td>DWORD</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Command</td> <td>Command code</td> <td>W</td> <td>DWORD</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Command Parameter1</td> <td>Command parameter1</td> <td>W</td> <td>UINT</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Command Parameter2</td> <td>Command parameter2</td> <td>W</td> <td>UINT</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Command Parameter3</td> <td>Command parameter3</td> <td>W</td> <td>UINT</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>Common Status Flag</td> <td>Common status flag</td> <td>R</td> <td>DWORD</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>FLG</td> <td>Command execution completion</td> <td>R</td> <td>BOOL</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> | Position | Port | Description | R/W | Data Type | Variable | Variable Comment | Variable Type | CPU Rack 0 | CPU Rack 0 | | | | | | | EtherCAT Master | | | | | | | | Node1 | ZW C115 | | | | | | | | Common Control Flag | Common Control Flag | W | DWORD | | | | | ERE | Command execution | W | BOOL | | | | | SYNC | Sync signal | W | BOOL | | | | | ENCLR | Error clearing | W | BOOL | | | | | Sensor Head1 Control Flag | Sensor Head1 Control Flag | W | DWORD | | | | | TIMING1 | Timing signal | W | BOOL | | | | | RESET1 | Reset signal | W | BOOL | | | | | LIGHTOFF1 | Light off signal | W | BOOL | | | | | ZEROL1_11 | Zero reset signal of task 1 | W | BOOL | | | | | ZEROL1_12 | Zero reset signal of task 2 | W | BOOL | | | | | ZEROL1_13 | Zero reset signal of task 3 | W | BOOL | | | | | ZEROL1_14 | Zero reset signal of task 4 | W | BOOL | | | | | ZEROCLE1_11 | Zero reset clear signal of task 1 | W | BOOL | | | | | ZEROCLE1_12 | Zero reset clear signal of task 2 | W | BOOL | | | | | ZEROCLE1_13 | Zero reset clear signal of task 3 | W | BOOL | | | | | ZEROCLE1_14 | Zero reset clear signal of task 4 | W | BOOL | | | | | Sensor Head2 Control Flag | Sensor Head2 Control Flag | W | DWORD | | | | | Command | Command code | W | DWORD | | | | | Command Parameter1 | Command parameter1 | W | UINT | | | | | Command Parameter2 | Command parameter2 | W | UINT | | | | | Command Parameter3 | Command parameter3 | W | UINT | | | | | Common Status Flag | Common status flag | R | DWORD | | | | | FLG | Command execution completion | R | BOOL | | | |
| Position | Port | Description | R/W | Data Type | Variable | Variable Comment | Variable Type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CPU Rack 0 | CPU Rack 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| EtherCAT Master | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Node1 | ZW C115 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Common Control Flag | Common Control Flag | W | DWORD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ERE | Command execution | W | BOOL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | SYNC | Sync signal | W | BOOL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ENCLR | Error clearing | W | BOOL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Sensor Head1 Control Flag | Sensor Head1 Control Flag | W | DWORD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | TIMING1 | Timing signal | W | BOOL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | RESET1 | Reset signal | W | BOOL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | LIGHTOFF1 | Light off signal | W | BOOL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ZEROL1_11 | Zero reset signal of task 1 | W | BOOL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ZEROL1_12 | Zero reset signal of task 2 | W | BOOL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ZEROL1_13 | Zero reset signal of task 3 | W | BOOL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ZEROL1_14 | Zero reset signal of task 4 | W | BOOL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ZEROCLE1_11 | Zero reset clear signal of task 1 | W | BOOL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ZEROCLE1_12 | Zero reset clear signal of task 2 | W | BOOL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ZEROCLE1_13 | Zero reset clear signal of task 3 | W | BOOL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ZEROCLE1_14 | Zero reset clear signal of task 4 | W | BOOL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Sensor Head2 Control Flag | Sensor Head2 Control Flag | W | DWORD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Command | Command code | W | DWORD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Command Parameter1 | Command parameter1 | W | UINT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Command Parameter2 | Command parameter2 | W | UINT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Command Parameter3 | Command parameter3 | W | UINT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Common Status Flag | Common status flag | R | DWORD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | FLG | Command execution completion | R | BOOL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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



5 The variable names and variable types are automatically set.

| Position | Port | Description | R/W | Data Type | Variable | Variable Comment | Variable Type |
|-----------------|--------------------------------|-----------------------------------|-----|-----------|--------------------------------|------------------|------------------|
| CPU Rack 0 | CPU Rack 0 | | | | | | |
| EtherCAT Master | EtherCAT Network Configuration | | | | | | |
| Node1 | Master | | | | | | |
| | Common Control Flag | Common Control Flag | W | DWORD | 0001_Common_Control_Flag | | Global Variables |
| | EXE | Command execution | W | BOOL | 0002_EXE | | Global Variables |
| | SYNC | Sync signal | W | BOOL | 0003_SYNC | | Global Variables |
| | ERCLR | Error clearing | W | BOOL | 0004_ERCLR | | Global Variables |
| | Sensor Head1 Control Flag | Sensor Head1 Control Flag | W | DWORD | 0005_Sensor_Head1_Control_Flag | | Global Variables |
| | TIMING1 | Timing signal | W | BOOL | 0006_TIMING1 | | Global Variables |
| | RESET1 | Reset signal | W | BOOL | 0007_RESET1 | | Global Variables |
| | LIGHTOFF1 | Light off signal | W | BOOL | 0008_LIGHTOFF1 | | Global Variables |
| | ZERO1_T1 | Zero reset signal of task 1 | W | BOOL | 0009_ZERO1_T1 | | Global Variables |
| | ZERO1_T2 | Zero reset signal of task 2 | W | BOOL | 0010_ZERO1_T2 | | Global Variables |
| | ZERO1_T3 | Zero reset signal of task 3 | W | BOOL | 0011_ZERO1_T3 | | Global Variables |
| | ZERO1_T4 | Zero reset signal of task 4 | W | BOOL | 0012_ZERO1_T4 | | Global Variables |
| | ZEROCLR1_T1 | Zero reset clear signal of task 1 | W | BOOL | 0013_ZEROCLR1_T1 | | Global Variables |
| | ZEROCLR1_T2 | Zero reset clear signal of task 2 | W | BOOL | 0014_ZEROCLR1_T2 | | Global Variables |
| | ZEROCLR1_T3 | Zero reset clear signal of task 3 | W | BOOL | 0015_ZEROCLR1_T3 | | Global Variables |
| | ZEROCLR1_T4 | Zero reset clear signal of task 4 | W | BOOL | 0016_ZEROCLR1_T4 | | Global Variables |
| | Sensor Head2 Control Flag | Sensor Head2 Control Flag | W | DWORD | 0017_Sensor_Head2_Control_Flag | | Global Variables |
| | Command | Command code | W | DWORD | 0018_Command | | Global Variables |
| | Command Parameter1 | Command parameter1 | W | UINT | 0019_Command_Parameter1 | | Global Variables |
| | Command Parameter2 | Command parameter2 | W | UINT | 0020_Command_Parameter2 | | Global Variables |
| | Command Parameter3 | Command parameter3 | W | DINT | 0021_Command_Parameter3 | | Global Variables |
| | Common Status Flag | Common Status Flag | R | DWORD | 0022_Common_Status_Flag | | Global Variables |
| | FLG | Command execution completion | R | BOOL | 0023_FLG | | Global Variables |



Additional Information

The device variables are named automatically from a combination of the device names and the I/O port names.

For slave units, the default device names start with an "E" followed by a sequential number starting from "001"



Additional Information

In the example above, all device variables of the slave are automatically created. However, a device variable of each I/O port can also be automatically created.

Also, you can set any device variables manually.

7.3.3. Transferring the Project Data

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

! WARNING

Always confirm safety at the destination node before you transfer a user program, configuration data, setup data, device variables, or values in memory used for CJ-series Units from the Sysmac Studio.

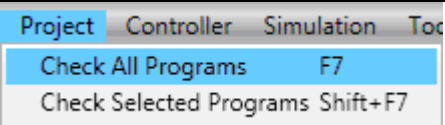
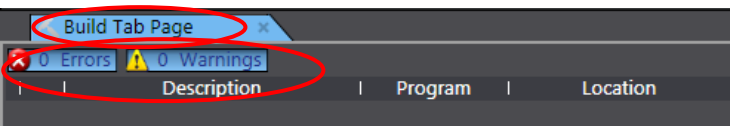
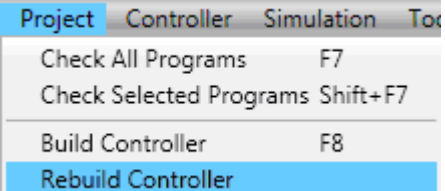
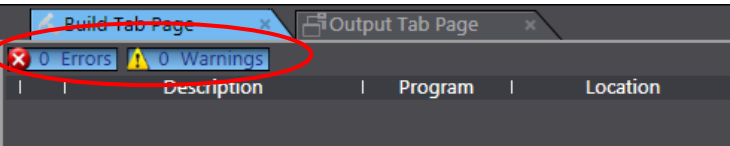
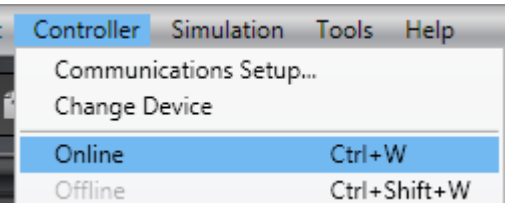
The devices or machines may perform unexpected operation regardless of the operating mode of the CPU Unit.

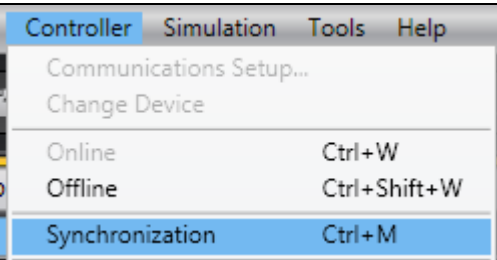
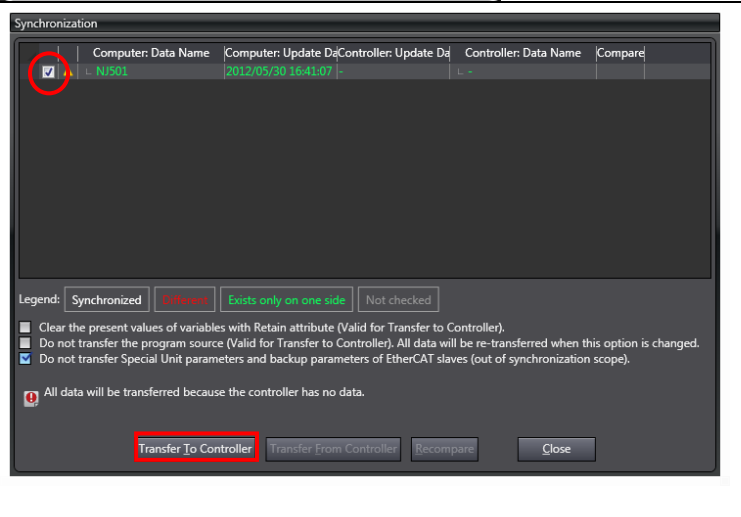
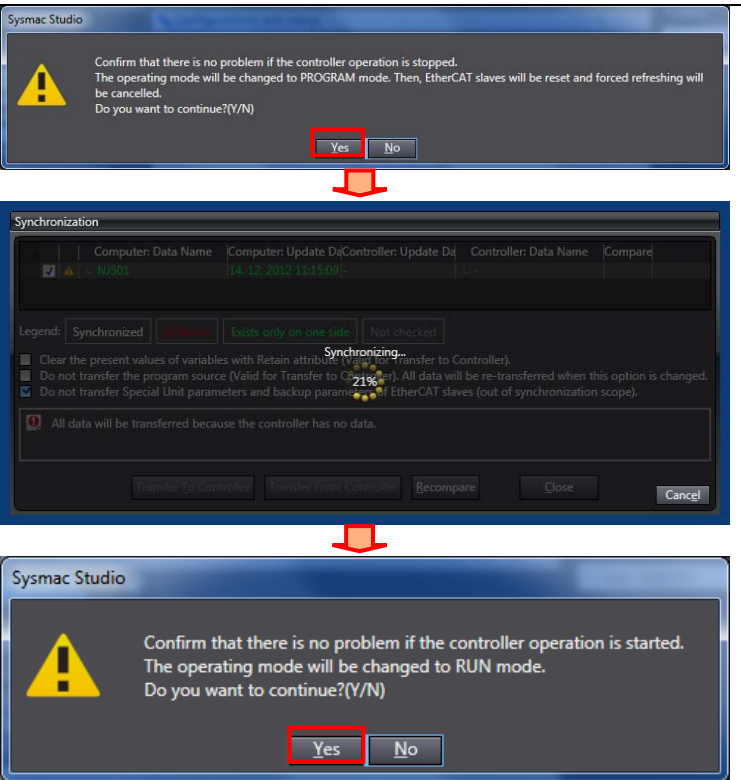


Precautions for Safe Use

After you transfer the user program, the CPU Unit restarts and communications with the EtherCAT slaves are cut off. During that period, the slave outputs behave according to the slave settings.

The time that communications are cut off depends on the EtherCAT network configuration. Before you transfer the user program, confirm that the system will not be adversely affected.

| | | |
|---|--|--|
| 1 | Select Check All Programs from the Project Menu. |  |
| 2 | The Build Tab Page is displayed in the Edit Pane. Confirm that “0 Errors” and “0 Warnings” are displayed. |  |
| 3 | Select Rebuild Controller from the Project Menu. |  |
| 4 | Confirm that “0 Errors” and “0 Warnings” are displayed in the Build Tab Page. |  |
| 5 | Select Online from the Controller Menu. |  |

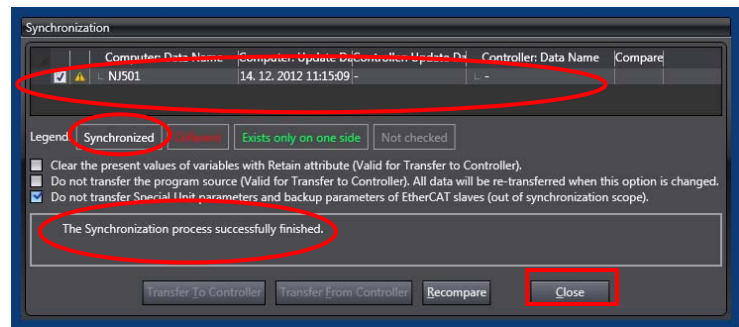
| | |
|--|---|
| <p>6 Select Synchronization from the Controller Menu.</p> |  |
| <p>7 The Synchronization Dialog Box is displayed. Confirm that the data to transfer (NJ501 in the right dialog) is selected. Then, click the Transfer to Controller Button. *After executing the Transfer to Controller, the Sysmac Studio data is transferred to the Controller and the data are compared.</p> |  |
| <p>8 A confirmation dialog is displayed. Click the Yes Button. A screen stating "Synchronizing" is displayed. A confirmation dialog is displayed. Click the Yes Button.</p> |  |

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

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

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

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



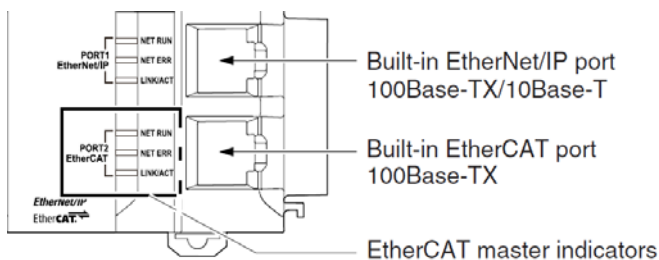
7.4. Checking the EtherCAT Communications

Confirm that the EtherCAT communications are performed normally.

7.4.1. Checking the Connection Status

Check the connection status of the EtherCAT network.

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



LED indicators in normal status

[NET RUN]: Lit green

[NET ERR]: Not lit

[LINK/ACT]: Flashing yellow

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

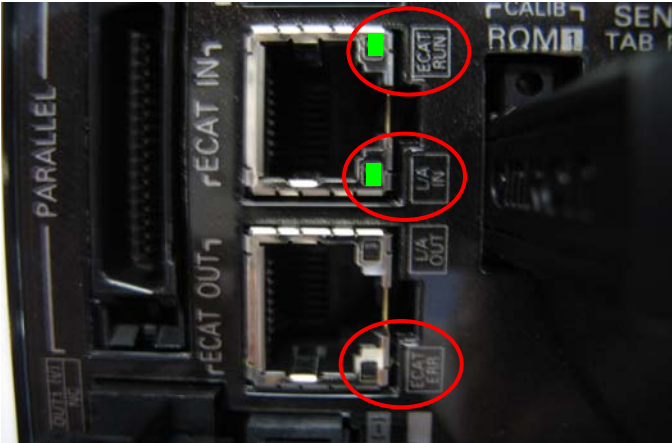
2 Check the LED indicators on the Displacement Sensor.

LED indicators in normal status

[ECAT RUN]: Lit green

[L/A IN]: Flashing green

[ECAT ERROR]: Not lit



| LED name | Color | Status | Contents |
|----------------------|-------|--------------|--|
| ECAT RUN indicator | Green | OFF | Initialization status |
| | | Blinking | Pre-Operational status |
| | | Single flash | Safe-Operational status |
| | | ON | Operational status |
| ECAT ERROR indicator | Red | OFF | No error |
| | | Blinking | Communication setting error or PDO mapping error |
| | | Single flash | Synchronization error or communications data error |
| | | Double flash | Application WDT timeout |
| | | ON | PDI WDT timeout |
| L/A IN indicator | Green | OFF | Link not established in physical layer |
| | | Flickering | In operation after establishing link |
| | | ON | Link established in physical layer |
| L/A OUT indicator | Green | OFF | Link not established in physical layer |
| | | Flickering | In operation after establishing link |
| | | ON | Link established in physical layer |

7.4.2. Checking Data that are Sent and Received

Confirm that correct data are sent and received.

WARNING

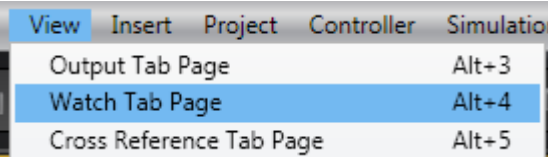
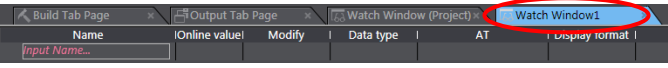
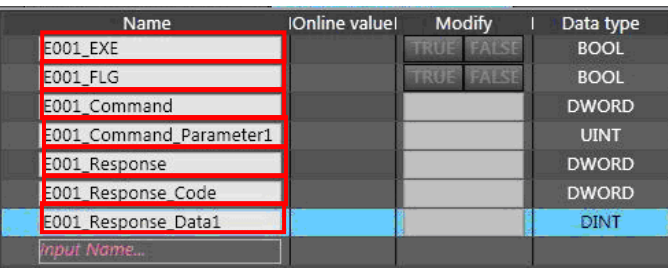
Always confirm safety at the destination node before you transfer a user program, configuration data, setup data, device variables, or values in memory used for CJ-series Units from the Sysmac Studio.

The devices or machines may perform unexpected operation regardless of the operating mode of the CPU Unit.

Caution

Always turn OFF the power supply to the devices and confirm safety before I/O wiring.

Make sure to wire in an appropriate state by confirming the safety related descriptions in manuals for the devices.

| 1 | Select Watch Tab Page from the View Menu. |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------------------|---|---|-----------|--------------|--------|-----------|----------|--|------------|------|----------|--|------------|------|--------------|--|--|-------|-------------------------|--|--|------|---------------|--|--|-------|--------------------|--|--|-------|---------------------|--|--|------|---------------|--|--|--|
| 2 | The Watch Tab Page 1 is displayed in the lower section of the Edit Pane. |  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Enter the following names in the Watch Tab Page1 for monitoring. To enter a new name, click a column stating Input Name... E001_EXE E001_FLG E001_Command E001_Command_Parameter1 E001_Response E001_Response_Code E001_Response_Data1 |  <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 60%;">Name</th> <th style="width: 15%;">Online value</th> <th style="width: 15%;">Modify</th> <th style="width: 10%;">Data type</th> </tr> </thead> <tbody> <tr> <td>E001_EXE</td> <td></td> <td>TRUE FALSE</td> <td>BOOL</td> </tr> <tr> <td>E001_FLG</td> <td></td> <td>TRUE FALSE</td> <td>BOOL</td> </tr> <tr> <td>E001_Command</td> <td></td> <td></td> <td>DWORD</td> </tr> <tr> <td>E001_Command_Parameter1</td> <td></td> <td></td> <td>UINT</td> </tr> <tr> <td>E001_Response</td> <td></td> <td></td> <td>DWORD</td> </tr> <tr> <td>E001_Response_Code</td> <td></td> <td></td> <td>DWORD</td> </tr> <tr> <td>E001_Response_Data1</td> <td></td> <td></td> <td>DINT</td> </tr> <tr> <td>Input Name...</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> | Name | Online value | Modify | Data type | E001_EXE | | TRUE FALSE | BOOL | E001_FLG | | TRUE FALSE | BOOL | E001_Command | | | DWORD | E001_Command_Parameter1 | | | UINT | E001_Response | | | DWORD | E001_Response_Code | | | DWORD | E001_Response_Data1 | | | DINT | Input Name... | | | |
| Name | Online value | Modify | Data type | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E001_EXE | | TRUE FALSE | BOOL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E001_FLG | | TRUE FALSE | BOOL | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E001_Command | | | DWORD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E001_Command_Parameter1 | | | UINT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E001_Response | | | DWORD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E001_Response_Code | | | DWORD | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E001_Response_Data1 | | | DINT | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Input Name... | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

- 4 Enter 00404000 in the Modify Column of *E001_Command*.
- *By setting the value of *E001_Command* to 00404000, the system data acquisition command is executed.
- | Name | Online value | Modify | Data type |
|-------------------------|--------------|------------|-----------|
| E001_EXE | False | TRUE FALSE | BOOL |
| E001_FLG | False | TRUE FALSE | BOOL |
| E001_Command | 0000 0000 | 00404000 | DWORD |
| E001_Command_Parameter1 | 0 | | UINT |
| E001_Response | 0000 0000 | | DWORD |
| E001_Response_Code | 0000 0000 | | DWORD |
| E001_Response_Data1 | 0 | | DINT |
| Input Name... | | | |
- 5 Press the **Enter** Key. The value in the Modify Column is displayed in green.
- Then, the online value of *E001_Command* changes to 0040 4000.
- | Name | Online value | Modify | Data type |
|-------------------------|--------------|------------|-----------|
| E001_EXE | False | TRUE FALSE | BOOL |
| E001_FLG | False | TRUE FALSE | BOOL |
| E001_Command | 0040 4000 | 00404000 | DWORD |
| E001_Command_Parameter1 | 0 | | UINT |
| E001_Response | 0000 0000 | | DWORD |
| E001_Response_Code | 0000 0000 | | DWORD |
| E001_Response_Data1 | 0 | | DINT |
| Input Name... | | | |
- 6 Enter 900 in the Modify Column of *E001_Command_Parameter1*.
- *By setting the value of *E001_Command_Parameter1* to 900, the system data to be acquired is set to Number of digits displayed past decimal point.
- | Name | Online value | Modify | Data type |
|-------------------------|--------------|------------|-----------|
| E001_EXE | False | TRUE FALSE | BOOL |
| E001_FLG | False | TRUE FALSE | BOOL |
| E001_Command | 0040 4000 | 00404000 | DWORD |
| E001_Command_Parameter1 | 0 | 900 | UINT |
| E001_Response | 0000 0000 | | DWORD |
| E001_Response_Code | 0000 0000 | | DWORD |
| E001_Response_Data1 | 0 | | DINT |
| Input Name... | | | |
- 7 Press the **Enter** Key. The value in the Modify Column is displayed in green.
- Then, the online value of *E001_Command_Parameter1* changes to 900.
- | Name | Online value | Modify | Data type |
|-------------------------|--------------|------------|-----------|
| E001_EXE | False | TRUE FALSE | BOOL |
| E001_FLG | False | TRUE FALSE | BOOL |
| E001_Command | 0040 4000 | 00404000 | DWORD |
| E001_Command_Parameter1 | 900 | 900 | UINT |
| E001_Response | 0000 0000 | | DWORD |
| E001_Response_Code | 0000 0000 | | DWORD |
| E001_Response_Data1 | 0 | | DINT |
| Input Name... | | | |

8 If the online values of *E001_EXE* and *E001_FLG* are False, click **TRUE** in the Modify Column of *E001_EXE*.

| Name | Online value | Modify | Data type |
|----------|--------------|------------|-----------|
| E001_EXE | False | TRUE FALSE | BOOL |
| E001_FLG | False | TRUE FALSE | BOOL |



Confirm that the online values of *E001_EXE* and *E001_FLG* change to True.

| Name | Online value | Modify | Data type |
|----------|--------------|------------|-----------|
| E001_EXE | True | TRUE FALSE | BOOL |
| E001_FLG | True | TRUE FALSE | BOOL |

*The online value of *E001_FLG* changes to True when the execution of the system data acquisition command is completed in the Displacement Sensor.

9 Confirm that the online value of *E001_Response* is 0040 4000.

| Name | Online value | Modify | Data type |
|-------------------------|--------------|------------|-----------|
| E001_EXE | True | TRUE FALSE | BOOL |
| E001_FLG | True | TRUE FALSE | BOOL |
| E001_Command | 0040 4000 | 00404000 | DWORD |
| E001_Command_Parameter1 | 900 | 900 | UINT |
| E001_Response | 0040 4000 | | DWORD |
| E001_Response_Code | 0000 0000 | | DWORD |
| E001_Response_Data1 | 1 | | DINT |
| Input Name... | | | |

**E001_Response* stores the command code executed by the Displacement Sensor.

10 Confirm that the online value of *E001_Response_Code* is 0000 0000.

| Name | Online value | Modify | Data type |
|-------------------------|--------------|------------|-----------|
| E001_EXE | True | TRUE FALSE | BOOL |
| E001_FLG | True | TRUE FALSE | BOOL |
| E001_Command | 0040 4000 | 00404000 | DWORD |
| E001_Command_Parameter1 | 900 | 900 | UINT |
| E001_Response | 0040 4000 | | DWORD |
| E001_Response_Code | 0000 0000 | | DWORD |
| E001_Response_Data1 | 1 | | DINT |
| Input Name... | | | |

**E001_Response_Code* stores the response code of the command executed by the Displacement Sensor.

*If the online value of *E001_Response_Code* is 0000 0000, the execution result of the command is OK.

11 Confirm that the online value of *E001_Response_Data1* is 1.

**E001_Response_Data1* stores the response data of the command executed by the Displacement Sensor.

*If the online value of *E001_Response_Data1* is 1, the number of decimal places setting is set to 1 (default value).

| Name | Online value | Modify | | Data type |
|-------------------------|--------------|----------|-------|-----------|
| | | TRUE | FALSE | |
| E001_EXE | True | TRUE | FALSE | BOOL |
| E001_FLG | True | TRUE | FALSE | BOOL |
| E001_Command | 0040 4000 | 00404000 | | DWORD |
| E001_Command_Parameter1 | 900 | 900 | | UINT |
| E001_Response | 0040 4000 | | | DWORD |
| E001_Response_Code | 0000 0000 | | | DWORD |
| E001_Response_Data1 | 1 | | | DINT |
| Input Name... | | | | |



Additional Information

For details on the command, refer to 6-2 *EtherCAT connection* in the *ZW Series Displacement Sensor (Confocal Fiber Type) User's Manual* (Cat. No. Z332).

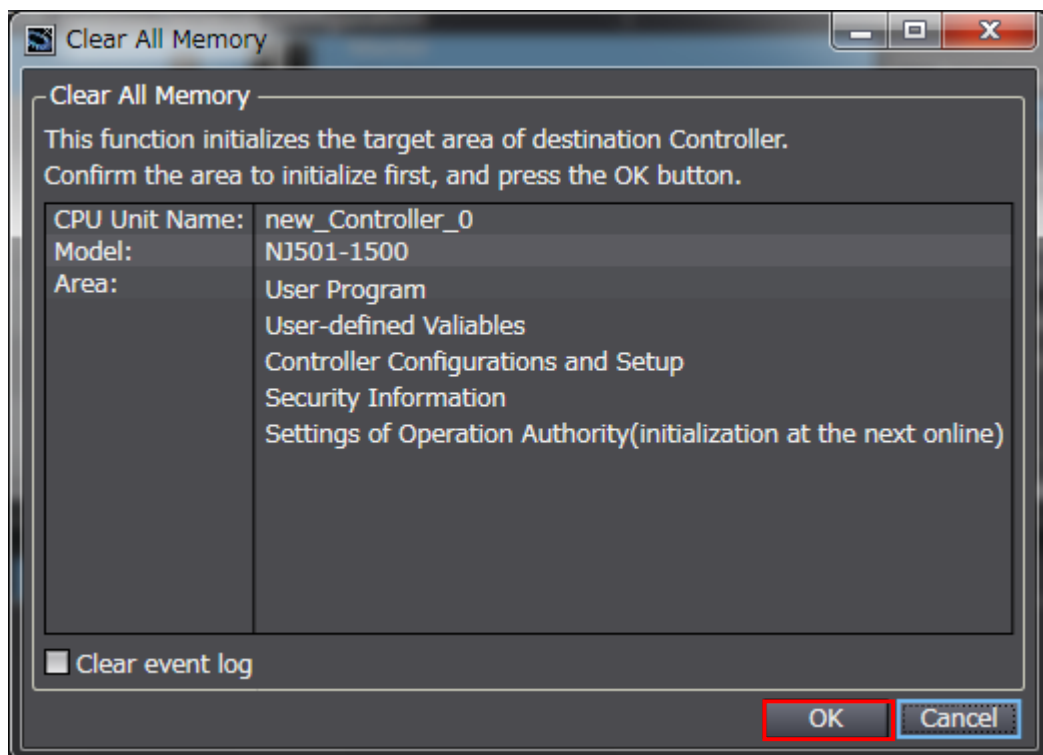
8. Initialization Method

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

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

8.1. Initializing the Controller

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



8.2. Initializing the Displacement Sensor

For information on how to initialize the Displacement Sensor, refer to *Initializing Settings* in 4-5 *Setting the System* of the *ZW Series Displacement Sensor (Confocal Fiber Type) User's Manual* (Cat. No. Z332).

9. Revision History

| Revision code | Date of revision | Revision reason and revision page |
|---------------|------------------|-----------------------------------|
| 01 | April 26, 2013 | First edition |

OMRON Corporation Industrial Automation Company

Tokyo, JAPAN

Contact: 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

Authorized Distributor:

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