OMRON

Machine Automation Controller NJ-series

EtherNet/IP™ Connection Guide

OMRON Corporation

Programmable Multi-Axis Controller
CK3E/CK3M-series

SYSMAC
always in control

O903-E1-01

NOTE

- All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form, or by any means, mechanical, electronic, photocopying, recording, or otherwise, without the prior written permission of OMRON.
- No patent liability is assumed with respect to the use of the information contained herein.
  Moreover, because OMRON is constantly striving to improve its high-quality products, the information contained in this manual is subject to change without notice.
- Every precaution has been taken in the preparation of this manual. Nevertheless, OMRON assumes no responsibility for errors or omissions.
  Neither is any liability assumed for damages resulting from the use of the information contained in this publication.

Trademarks

- Sysmac and SYSMAC are trademarks or registered trademarks of OMRON Corporation in Japan and other countries for OMRON factory automation products.
- Microsoft, Windows, Excel, and Visual Basic are either registered trademarks or trademarks of Microsoft Corporation in the United States and other countries.
- ODVA, CIP, CompoNet, DeviceNet, and EtherNet/IP are trademarks of ODVA.

Other company names and product names in this document are the trademarks or registered trademarks of their respective companies.

Copyrights

- Microsoft product screen shots reprinted with permission from Microsoft Corporation.
- This product incorporates certain third party software. The license and copyright information associated with this software is available at http://www.fa.omron.co.jp/nj_info_e/.

Sections in this Manual

1 Summary of Materials

2 Target Equipment and Device Configuration

3 EtherNet/IP Connection Procedures

A Appendices

CONTENTS

Sections in this Manual 3

Related Manuals 5

Revision History 6

Terms and Definitions 7

Precautions 8

Section 1 About This Guide

1-1 About This Guide 1-2

Section 2 Target Device and System Configuration

2-1 Target Device 2-2

2-2 System Configuration 2-3

2-3 Connection Configuration 2-4

Section 3 EtherNet/IP Connection Procedures

3-1 Work Flow 3-2

3-2 NJ/NX-series CPU Unit Settings 3-3

3-2-1 Creating a New Project 3-3
3-2-2 Setting the Network 3-3
3-2-3 Setting Variables 3-4
3-2-4 Creating and Checking the User Program 3-5
3-2-5 Setting EtherNet/IP (Tag Sets) 3-9
3-2-6 Installing the EDS File 3-10
3-2-7 EtherNet/IP (Connection) Setting 3-11

3-3 Preparations for Setting the PMAC 3-13

3-3-1 Creating a New Project 3-13
3-3-2 Performing the Initial Settings for the PMAC 3-14

3-4 PMAC EtherNet/IP Settings 3-16

3-4-1 Setting Connection 1 3-16
3-4-2 Setting Connections 2 to 16 3-18

3-5 PMAC Settings 3-19

3-5-1 Creating a User Program 3-19
3-5-2 Transferring Project Data and Checking the Operation 3-19

Appendices

A-1 Saving and Reading the Project A-2

A-1-1 Saving the Project A-2
A-1-2 Reading and Downloading the Project A-2

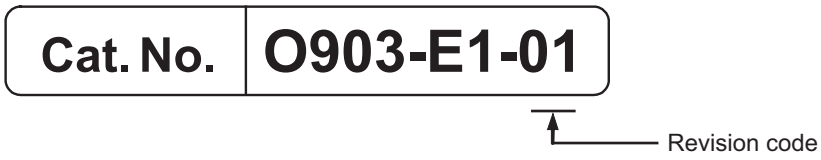
Related Manuals

Thoroughly read and understand the manuals and user's guides for all of the devices and equipment that are used in the system to ensure that the system is used safely. Review the entire contents of these materials, including all safety precautions, precautions for safe use, and other precautions.
The related manuals of OMRON Corporation (hereafter may be called "OMRON") and Delta Tau Data Systems Inc. (hereafter may be called "DT") are as shown below.

Manufacturer	Cat. No.	Model	Manual name
OMRON	W500	NJ501-□□□□ NJ301-□□□□ NJ101-□□□□	NJ-series CPU Unit Hardware User's Manual
OMRON	W593	NX102-□□□□	NX-series NX102 CPU Unit Hardware User's Manual
OMRON	W578	NX1P2-□□□□□□	NX-series NX1P2 CPU Unit Hardware User's Manual
OMRON	W501	NX701-□□□□ NX102-□□□□ NX1P2-□□□□□□ NJ501-□□□□ NJ301-□□□□ NJ101-□□□□	NJ/NX-series CPU Unit Software User's Manual
OMRON	W506	NX701-□□□□ NX102-□□□□ NX1P2-□□□□□□ NJ501-□□□□ NJ301-□□□□ NJ101-□□□□	NJ/NX-series CPU Unit Built-in EtherNet/IP™ Port User's Manual
OMRON	W504	SYSMAC-SE2□□□	Sysmac Studio Version 1 Operation Manual
OMRON	0969584-7	W4S1-05□ W4S1-03B	Switching Hub W4S1-series Users Manual
OMRON	I610	CK3E-1□10	CK3E-series Programmable Multi-Axis Controller Hardware User's Manual
OMRON	O036	CK3M-CPU1□1	CK3M-series Programmable Multi-Axis Controller Hardware User's Manual
DT	O014	---	Power PMAC User's Manual
DT	O015	---	Power PMAC Software Reference Manual
DT	O016	---	Power PMAC IDE User's Manual

Revision History

A manual revision code appears as a suffix to the catalog number on the front and back covers of the manual.



Revision code	Date	Revised content
01	September 2020	Original production

Terms and Definitions

Terms	Descriptions and Definitions
Node	Controllers and devices are connected to an EtherNet/IP network through EtherNet/IP ports. EtherNet/IP recognizes each EtherNet/IP port connected to the network as a node. This means that a connected device that has two EtherNet/IP ports is recognized as two nodes. EtherNet/IP achieves communications between Controllers, or communications between a Controller and devices, through data exchange between the nodes connected to the network.
Tag	The minimum unit of data that can be exchanged over an EtherNet/IP network is called tag. A tag is defined as a network variable name or physical address and allocated to the memory area of each device.
Tag set	In an EtherNet/IP network, data can be exchanged in a data unit that is composed of two or more tags. A data unit that is composed of two or more tags for the purpose of data exchange is called tag set.
Tag data link	EtherNet/IP supports cyclic exchange of tags and tag sets between nodes without the need for a user program. This function is called tag data link.
Connection	The unit of data exchange is called connection. A connection is composed of tags and tag sets. Opening a synchronous tag data link between specified nodes is called “establishing a connection.” Once a connection is established, the tags and tag sets that compose the connection are exchanged synchronously between specified nodes.
Connection type	There are two connection types for tag data link connections. They are multicast connection and unicast (point-to-point) connection. Multicast sends a single output tag set in a packet to multiple nodes. On the other hand, unicast sends a single output tag set to each node individually. This means that multicast allows a single output tag set to be sent to multiple nodes with less communications load.
Originator and target	To perform tag data link communications, one node makes a request to open a communications line called “connection.” The node that requests to open a connection is called “originator”, whereas the node that is requested to open a connection is called “target”. The data that is communicated by these nodes is called “originator variables” and “target variables”, respectively.
Tag data link parameters	In tag data link settings, tag data link parameters refer to a set of setting data that consists of “tag settings”, “tag set settings”, and “connection settings”.
RPI	An abbreviation for Requested Packet Interval. Represents a data refresh period set for each connection between originators and targets on an EtherNet/IP network.
EDS file	EDS (Electric Data Sheet) is a text-based file that provides device-related information to a programming software. You can use EDS files provided by EtherNet/IP device manufacturers to easily configure connections.
Power PMAC IDE	This is computer software that is used to configure the PMAC, create user programs, and perform monitoring. PMAC is an abbreviation for Programmable Multi-Axis Controller.

Precautions

- For actual system construction, check the specifications for each device and piece of equipment that makes up the system, use a method with sufficient margin for ratings and performance, and adopt safety circuits and other safety measures to minimize risks even if a breakdown occurs.
- To safely utilize the system, obtain a manual or user's guide for each device and piece of equipment that makes up the system, confirm their content, including "Safety Precautions", "Precautions for Safe Use", and other precautions related to safety, and then proceed with use.
- The customer must check all regulations, laws, and rules that are applicable to the system themselves.
- The content of this guide is valid as of September 2020.

The marks used in this document are defined as follows.

Precautions for Correct Use

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

Additional Information

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

1

About This Guide

This section describes the overview of this guide.

1-1 About This Guide 1-2

1-1 About This Guide

This guide summarizes the procedures for connecting the OMRON Programmable Multi-Axis Controller CK3E-□□□□/CK3M-CPU1□1 (hereinafter may be called “PMAC”) with an NJ/NX-series CPU Unit via EtherNet/IP and how to check the connections.

2

Target Device and System Configuration

This section describes the target devices and system configuration to be used for EtherNet/IP connection in this guide.

2-1 Target Device 2-2
2-2 System Configuration 2-3
2-3 Connection Configuration 2-4

2-1 Target Device

The devices to be used in this guide are as follows.

Manufacturer	Name	Model
OMRON	CK3E-series Programmable Multi-Axis Controller	CK3E-□□□□
OMRON	CK3M-series Programmable Multi-Axis Controller	CK3M-CPU1□1
OMRON	NJ/NX-series CPU Unit	NX701-□□□□ NX102-□□□□ NX1P2-□□□□□□ NJ501-□□□□ NJ301-□□□□ NJ101-□□□□
OMRON	Industrial Switching Hub	W4S1-0□□

Precautions for Correct Use

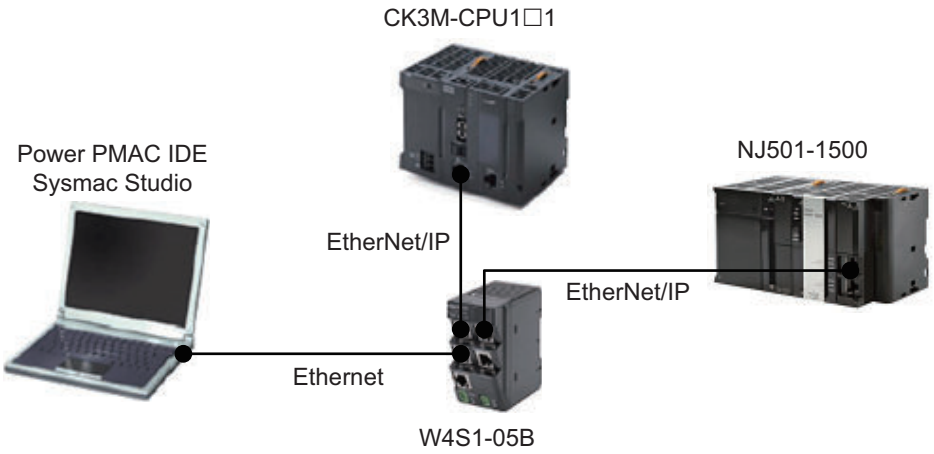
The connection procedures and confirmation methods in this document use the models and versions of devices described in *2-2 System Configuration* on page 2-3 among the above target devices.
You cannot use devices whose versions are older than those listed in *2-2 System Configuration* on page 2-3.
To use models that are not listed in *2-2 System Configuration* on page 2-3 among the above target devices, or devices whose versions are newer than those listed in *2-2 System Configuration* on page 2-3, check their manuals or user's guides to confirm differences in the specifications before use.

Additional Information

This document provides the connection procedures to establish communications. It does not provide information other than the connection procedures, such as the operation, installation, wiring, and functions and motions of the devices. Refer to the relevant manuals or user's guides, or contact your OMRON representative.

2-2 System Configuration

The configuration devices for reproducing the connection procedures in this document are shown below.



Manufacturer	Name	Model	Version
OMRON	NJ/NX-series CPU Unit (With built-in EtherNet/IP port)	NJ501-1500	Ver. 1.21 or later
OMRON	Power Supply Unit	NJ-PA3001	---
OMRON	Industrial Switching Hub	W4S1-05B	---
OMRON	Sysmac Studio	SYSMAC-SE2□□□	---
OMRON	Programmable Multi-Axis Controller	CK3M-CPU1□1	Ver. 2.5.4 or later
OMRON	Industrial Switching Hub	W4S1-05B	---
OMRON	Ethernet Cable (Industrial Ethernet connector cable)	XS5W-T421-□M□-K	---
DT	Power PMAC IDE	---	Ver. 4.4 or higher

Precautions for Correct Use

Auto-update the Sysmac Studio to the version specified in this section or later. Using a version that is not specified in this section may cause differences in the procedures in Section 3 and later. In that case, refer to the *Sysmac Studio Version 1 Operation Manual (Cat. No. W504)* to perform equivalent procedures.

Additional Information

This documents provides an example of connecting an NJ501-1500 and a CK3M-CPU1□1. You can use similar procedures to connect CK3E-□□□□ and other NJ/NX-series CPU Unit.

2-3 Connection Configuration

This section describes the connection configuration of the PMAC and NJ/NX-series CPU Unit that you will set in this guide.

Originator	Target	Connection I/O Type	Size	RPI	Number of connections
NJ/NX-series CPU Unit	PMAC	Exclusive Owner	504 bytes each for input and output	50 ms	16

The correspondence of variables between each node is listed below.

Variable name on the NJ/NX-series CPU Unit side	Variable name on the NJ/NX side
eip_from_ppmac_XX (XX: Connection number)	Eip[XX].Output.Udata[YY] (XX: Connection number, YY: Number of array elements)
eip_to_ppmac_XX	Eip[XX].Input.Udata[YY]

3

EtherNet/IP Connection Procedures

This section describes the procedures for connecting the NJ/NX-series CPU Unit and PMAC via EtherNet/IP to enable communications between them. The description assumes that the NJ/NX-series CPU Unit and PMAC are set to factory default.

3-1 Work Flow 3-2

3-2 NJ/NX-series CPU Unit Settings 3-3

3-2-1 Creating a New Project 3-3
3-2-2 Setting the Network 3-3
3-2-3 Setting Variables 3-4
3-2-4 Creating and Checking the User Program 3-5
3-2-5 Setting EtherNet/IP (Tag Sets) 3-9
3-2-6 Installing the EDS File 3-10
3-2-7 EtherNet/IP (Connection) Setting 3-11

3-3 Preparations for Setting the PMAC 3-13

3-3-1 Creating a New Project 3-13
3-3-2 Performing the Initial Settings for the PMAC 3-14

3-4 PMAC EtherNet/IP Settings 3-16

3-4-1 Setting Connection 1 3-16
3-4-2 Setting Connections 2 to 16 3-18

3-5 PMAC Settings 3-19

3-5-1 Creating a User Program 3-19
3-5-2 Transferring Project Data and Checking the Operation 3-19

3-1 Work Flow

The procedures for connecting the NJ/NX-series CPU Unit and PMAC via EtherNet/IP to enable communications between them are shown below.

***3-2 NJ/NX-series CPU Unit Settings* on page 3-3**	Perform the preparation for connecting the NJ/NX-series CPU Unit.
▼	
3-2-1 Creating a New Project on page 3-3	
▼	
3-2-2 Setting the Network on page 3-3	
▼	
3-2-3 Setting Variables on page 3-4	
▼	
3-2-4 Creating and Checking the User Program on page 3-5	
▼	
3-2-5 Setting EtherNet/IP (Tag Sets) on page 3-9	
▼	
3-2-6 Installing the EDS File on page 3-10	
▼	
3-2-7 EtherNet/IP (Connection) Setting on page 3-11	
▽	
***3-3 Preparations for Setting the PMAC* on page 3-13**	Perform the preparations for setting the PMAC.
▼	
3-3-1 Creating a New Project on page 3-13	
▼	
3-3-2 Performing the Initial Settings for the PMAC on page 3-14	
▽	
***3-4 PMAC EtherNet/IP Settings* on page 3-16**	Perform the EtherNet/IP settings.
▼	
3-4-1 Setting Connection 1 on page 3-16	
▼	
3-4-2 Setting Connections 2 to 16 on page 3-18	
▽	
***3-5 PMAC Settings* on page 3-19**	Perform the PMAC settings.
▼	
3-5-1 Creating a User Program on page 3-19	
▼	
3-5-2 Transferring Project Data and Checking the Operation on page 3-19	

3-2 NJ/NX-series CPU Unit Settings

Configure the devices for connection to the network.

3-2-1 Creating a New Project

1 Connect the CPU Unit and a computer with a USB cable.

2 Turn ON the power supply to the CPU Unit.

3 Start up the Sysmac Studio.

- If a dialog box for checking access rights is displayed at the time of start-up, select the option for starting up.

4 In the Sysmac Studio, create a new project.

- **Project Properties**
  Enter the **Project name** and other information.

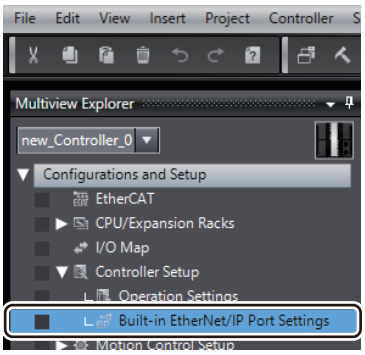
- **Select Device**
  Select **Controller** as the **Category**. Set the **Device** and **Version** according to the device to connect. Here, select **NJ501-1500** and **1.21**.

Click the **Create** button.

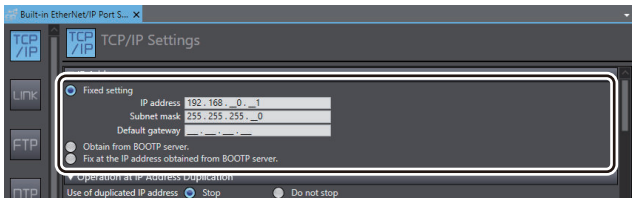
3-2-2 Setting the Network

Change the IP address of the NJ/NX-series CPU Unit to one that enables connection to the PMAC.

1 In the Multiview Explorer, double-click **Built-in EtherNet/IP Port Settings** under **Configurations and Setup** – **Controller Setup**.



2 In the **TCP/IP Settings** view of the **Built-in EtherNet/IP Port Settings** tab page, set the **IP Address**[*1] to enable connection to the PMAC.



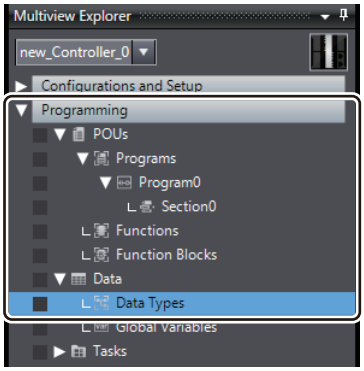
*1. Set this to the same network address as that of the PMAC.

3-2-3 Setting Variables

Add variables to use in the user program and for EtherNet/IP communications.

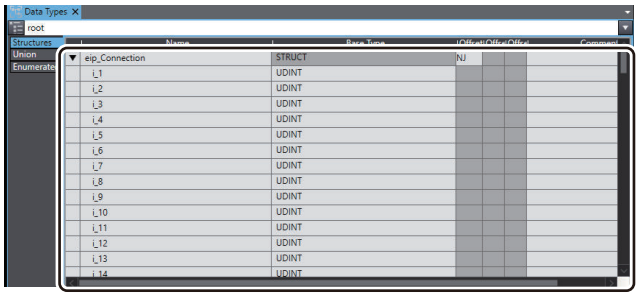
1 Define date types to use for the variables to add.

In the Multiview Explorer, double-click **Data Types** under **Programming** – **Data**.



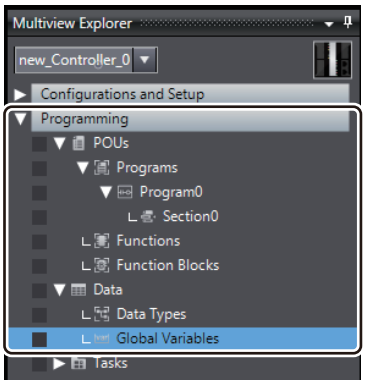
2 As shown on the right, add the name of the data type as *eip_Connection*.
Next, add a member with the name *i_1* and the data type *UDINT*.
Similarly, add the subsequent members up to *i_126*.

Data types are added in this way because the test program uses 126 variables of the UDINT data type, which add up to 504 bytes.



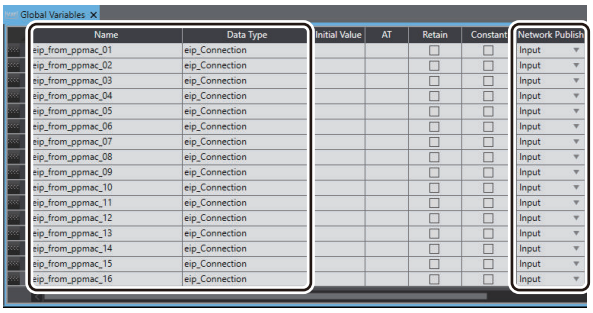
3 Add variables to use.

In the Multiview Explorer, double-click **Global Variables** under **Programming** – **Data**.



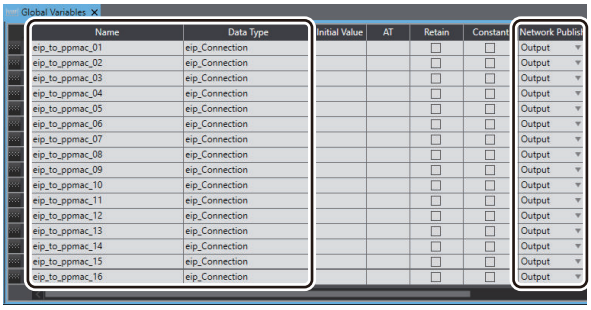
4 As shown on the right, add a variable with the name *eip_from_ppmac_01*, the data type *eip_Connection*, and the network publish setting of *Input*.
Similarly, add the subsequent variables up to *eip_from_ppmac_16*.

Variables are added in this way because the test program and EtherNet/IP use 16 connections for input.



5 As shown on the right, add a variable with the name *eip_to_ppmac_01*. the data type *eip_Connection*, and the network publishs setting of *Output*.
Similarly, add the subsequent variables up to *eip_to_ppmac_16*.

Variables are added in this way because the test program and EtherNet/IP use 16 connections for output.

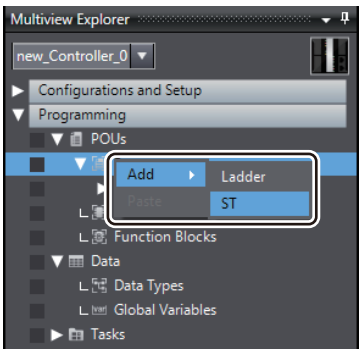


3-2-4 Creating and Checking the User Program

Create a program for the operations check.
The operations check program uses the ST language. Refer to the *NJ/NX-series CPU Unit Software User's Manual (Cat. No. W501)* for details.

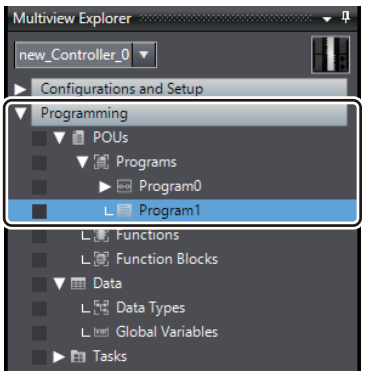
1 Adding a user program (ST)

In the Multiview Explorer, right-click **Programs** under **Programming** and select **Add** – **ST** from the menu.



2 Selecting the user program (Program1)

In the Multiview Explorer, double-click **Program1** under **Programming** – **Programs**.

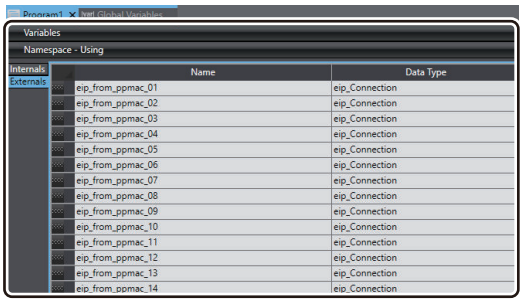


3 Adding variable definitions to use in the user program

Click **Variables** and, in the **Externals** tab page, add a variable with the name *eip_from_ppmac_01* and the data type *eip_Connection*.

Similarly, add the subsequent variables up to *eip_from_ppmac_16*.

Similarly, add variables from *eip_to_ppmac_01* up to *eip_to_ppmac_16*.



4 In the programming area, write the program listed on the right.

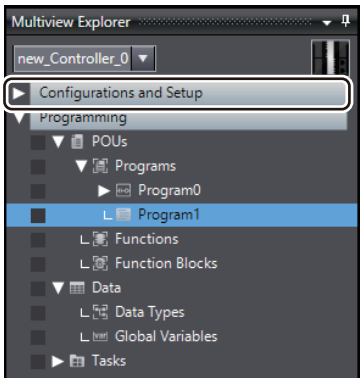
This program example outputs the values of the first, middle, and last variables for Input Connections 1 to 16 to the first, middle, and last variables for Output Connections 1 to 16.

It sends back the transmission data from the PMAC.

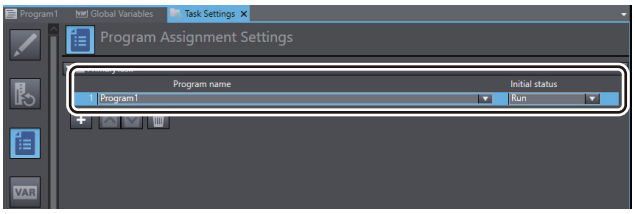
```
eip_to_ppmac_01.i_1   := eip_from_ppmac_01.i_1;
eip_to_ppmac_01.i_63  := eip_from_ppmac_01.i_63;
eip_to_ppmac_01.i_126 := eip_from_ppmac_01.i_126;
eip_to_ppmac_02.i_1   := eip_from_ppmac_02.i_1;
eip_to_ppmac_02.i_63  := eip_from_ppmac_02.i_63;
eip_to_ppmac_02.i_126 := eip_from_ppmac_02.i_126;
eip_to_ppmac_03.i_1   := eip_from_ppmac_03.i_1;
eip_to_ppmac_03.i_63  := eip_from_ppmac_03.i_63;
eip_to_ppmac_03.i_126 := eip_from_ppmac_03.i_126;
eip_to_ppmac_04.i_1   := eip_from_ppmac_04.i_1;
eip_to_ppmac_04.i_63  := eip_from_ppmac_04.i_63;
eip_to_ppmac_04.i_126 := eip_from_ppmac_04.i_126;
eip_to_ppmac_05.i_1   := eip_from_ppmac_05.i_1;
eip_to_ppmac_05.i_63  := eip_from_ppmac_05.i_63;
eip_to_ppmac_05.i_126 := eip_from_ppmac_05.i_126;
eip_to_ppmac_06.i_1   := eip_from_ppmac_06.i_1;
eip_to_ppmac_06.i_63  := eip_from_ppmac_06.i_63;
eip_to_ppmac_06.i_126 := eip_from_ppmac_06.i_126;
eip_to_ppmac_07.i_1   := eip_from_ppmac_07.i_1;
eip_to_ppmac_07.i_63  := eip_from_ppmac_07.i_63;
eip_to_ppmac_07.i_126 := eip_from_ppmac_07.i_126;
eip_to_ppmac_08.i_1   := eip_from_ppmac_08.i_1;
eip_to_ppmac_08.i_63  := eip_from_ppmac_08.i_63;
eip_to_ppmac_08.i_126 := eip_from_ppmac_08.i_126;
eip_to_ppmac_09.i_1   := eip_from_ppmac_09.i_1;
eip_to_ppmac_09.i_63  := eip_from_ppmac_09.i_63;
eip_to_ppmac_09.i_126 := eip_from_ppmac_09.i_126;
eip_to_ppmac_10.i_1   := eip_from_ppmac_10.i_1;
eip_to_ppmac_10.i_63  := eip_from_ppmac_10.i_63;
eip_to_ppmac_10.i_126 := eip_from_ppmac_10.i_126;
eip_to_ppmac_11.i_1   := eip_from_ppmac_11.i_1;
eip_to_ppmac_11.i_63  := eip_from_ppmac_11.i_63;
eip_to_ppmac_11.i_126 := eip_from_ppmac_11.i_126;
eip_to_ppmac_12.i_1   := eip_from_ppmac_12.i_1;
eip_to_ppmac_12.i_63  := eip_from_ppmac_12.i_63;
eip_to_ppmac_12.i_126 := eip_from_ppmac_12.i_126;
eip_to_ppmac_13.i_1   := eip_from_ppmac_13.i_1;
eip_to_ppmac_13.i_63  := eip_from_ppmac_13.i_63;
eip_to_ppmac_13.i_126 := eip_from_ppmac_13.i_126;
eip_to_ppmac_14.i_1   := eip_from_ppmac_14.i_1;
eip_to_ppmac_14.i_63  := eip_from_ppmac_14.i_63;
eip_to_ppmac_14.i_126 := eip_from_ppmac_14.i_126;
eip_to_ppmac_15.i_1   := eip_from_ppmac_15.i_1;
eip_to_ppmac_15.i_63  := eip_from_ppmac_15.i_63;
eip_to_ppmac_15.i_126 := eip_from_ppmac_15.i_126;
eip_to_ppmac_16.i_1   := eip_from_ppmac_16.i_1;
eip_to_ppmac_16.i_63  := eip_from_ppmac_16.i_63;
eip_to_ppmac_16.i_126 := eip_from_ppmac_16.i_126;
```

5 Adding the user program execution settings

In the Multiview Explorer, double-click **Task Settings** under **Configurations and Setup**.

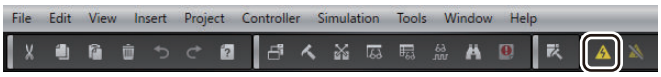


Click the **Program Assignment Settings** button and set **Program1** to **Run**.

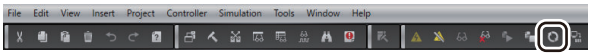


6 Transferring the non-EtherNet/IP settings and user program

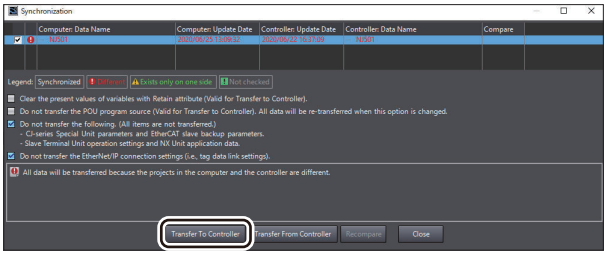
Click the **Online** icon in the toolbar.



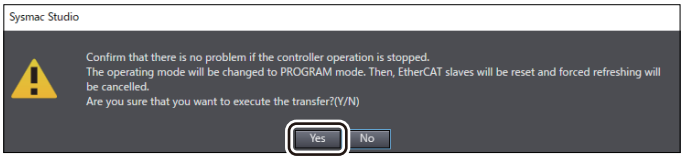
Then, click the **Synchronization** icon on the right side.



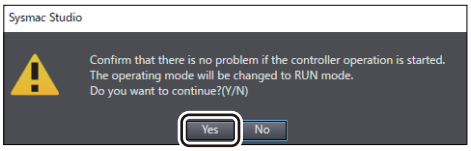
Click the **Transfer to Controller** button.



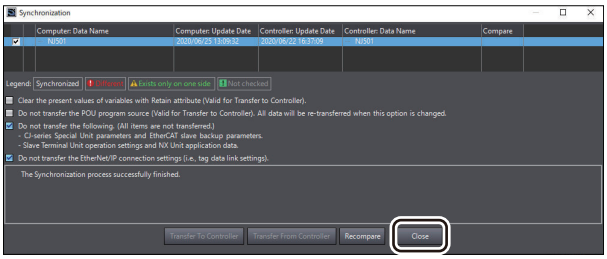
- If the message shown on the right appears, click the **Yes** button.



- If the message shown on the right appears, click the **Yes** button.

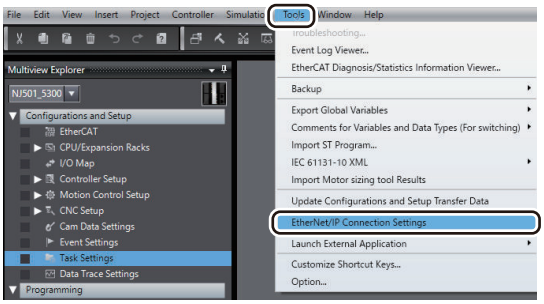


- The transfer is successful if the *The Synchronization process successfully finished.* message is displayed. Click the **Close** button.

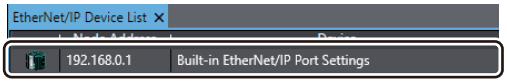


3-2-5 Setting EtherNet/IP (Tag Sets)

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



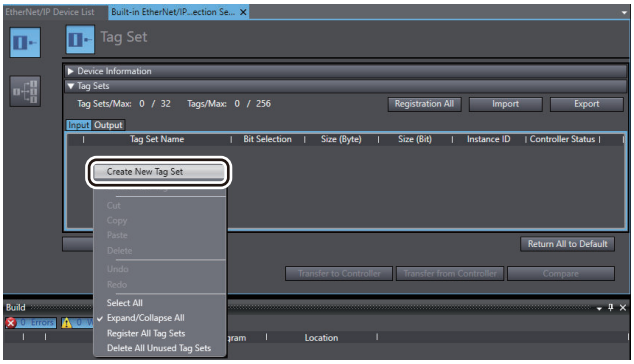
2 Double-click the row that contains *192.168.0.1*.



3 Setting the input tag sets

Right-click on the **Input** tab page and select **Create New Tag Set** from the menu.

Enter *eip_from_ppmac_01* as the tag set name.

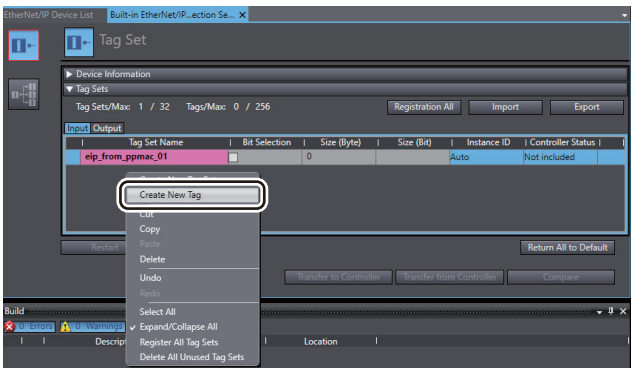


4 Setting the input tags

Right-click on the **Input** tab page and select **Create New Tag** from the menu.

Enter *eip_from_ppmac_01* as the tag name.

Similarly, create the subsequent tag sets and tags up to *eip_from_ppmac_16*.

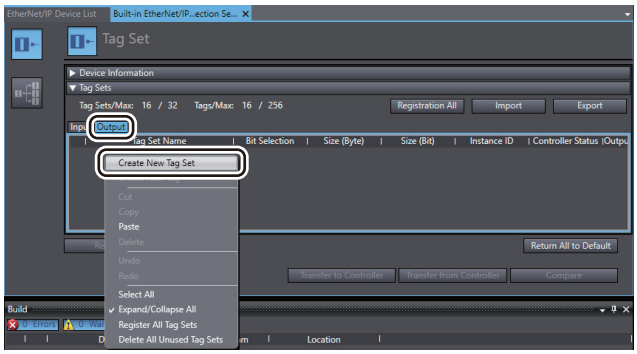


5 Setting the output tag sets

Click the **Output** tab to switch to the **Output** tab page.

Right-click on the **Output** tab page and select **Create New Tag Set** from the menu.

Enter *eip_to_ppmac_01* as the tag set name.

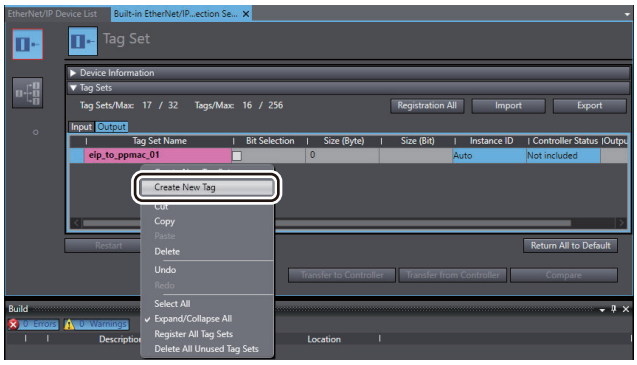


6 Setting the output tags

Right-click on the **Output** tab page and select **Create New Tag** from the menu.

Enter *eip_to_ppmac_01* as the tag name.

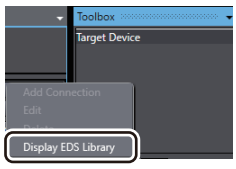
Similarly, create the subsequent tag sets and tags up to *eip_to_ppmac_16*.



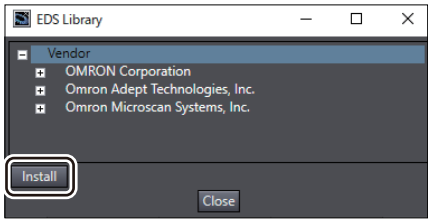
3-2-6 Installing the EDS File

You need to install the EDS file only at the initial use of the device.

1 Right-click the Toolbox and select **Display EDS Library** from the menu.

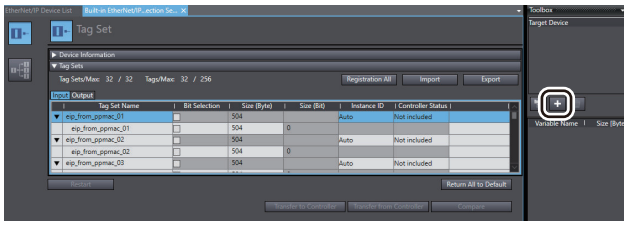


2 Click the **Install** button.



3 Select the check box for the EDS file to install and click the **Open** button.

4 Click the **+** icon in the Toolbox pane.

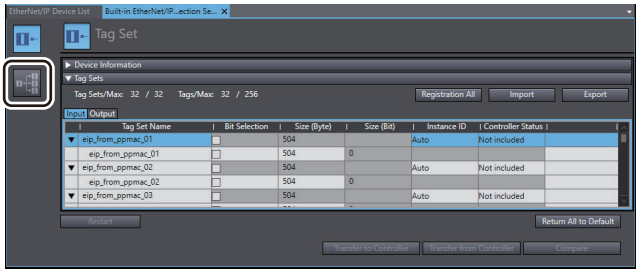


5 Select the IP address and model name of the PMAC to use.
For the revision, select **1**.
When you finished entering the data, click the **Add** button.

- In this document, the default PMAC address (192.168.0.200) is used.

3-2-7 EtherNet/IP (Connection) Setting

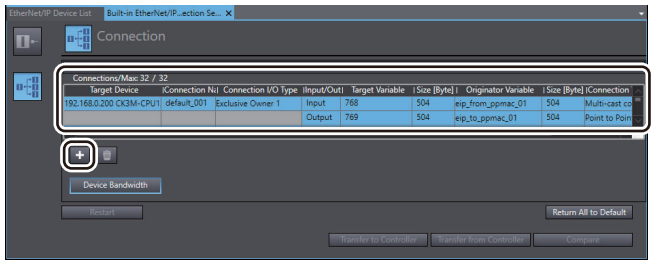
1 Click the **Connection** icon.



2 Setting Connection 1

Next, click the **+** icon.

For the added row, set the items as follows.
Target Device: PMAC to use
Connection I/O Type: Exclusive Owner 1
RPI: 50.0 ms
Target Variable: 768 for inputs and 769 for outputs*1
Size: 504
Originator Variable: eip_from_ppmac_01, eip_to_ppmac_01

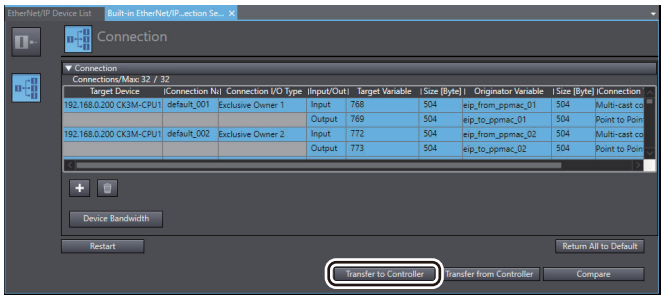


3 Setting Connections 2 to 16

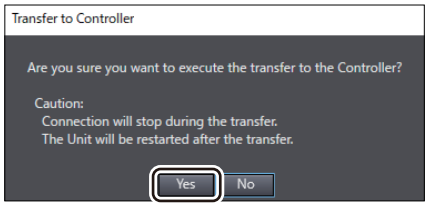
Set connections 2 to 16 in the same way as described above.
For each connection, change the **Exclusive Owner** number and other data from 1 to up to 16.
For the **Target Variable**, set the value in increments of +4, i.e., 768 is followed by 772 for inputs and 769 is followed by 773 for outputs.

4 Select **Device Bandwidth** and make sure that the bandwidth used by the device is within the specification range of the PMAC.

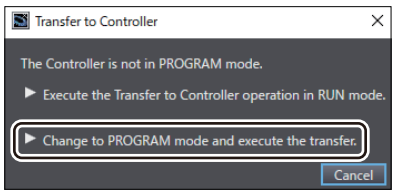
5 Click the **Transfer to Controller** button.



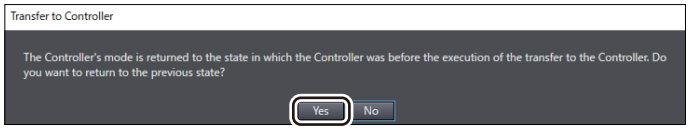
- If the message shown on the right appears, click the **Yes** button.



- If the message shown on the right appears, select **Change to PROGRAM mode and execute the transfer**.



6 If the message shown on the right appears after completion of transfer, click the **Yes** button.



*1. This value specifies the instance ID of the Assembly object. Refer to *A-7-2 Assembly Object (Class ID: 04 Hex)* in the *CK3M-series Programmable Multi-Axis Controller Hardware User's Manual (Cat. No. O036)* or *A-3-2 Assembly Object (Class ID: 04 Hex)* in the *CK3E-series Programmable Multi-Axis Controller Hardware User's Manual (Cat. No. I610)* for details.

3-3 Preparations for Setting the PMAC

Perform the preparations for setting the PMAC.

3-3-1 Creating a New Project

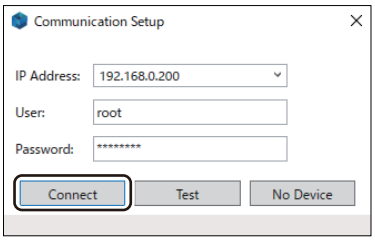
1 Turn ON the power supply to the PMAC.

2 Start up Power PMAC IDE.

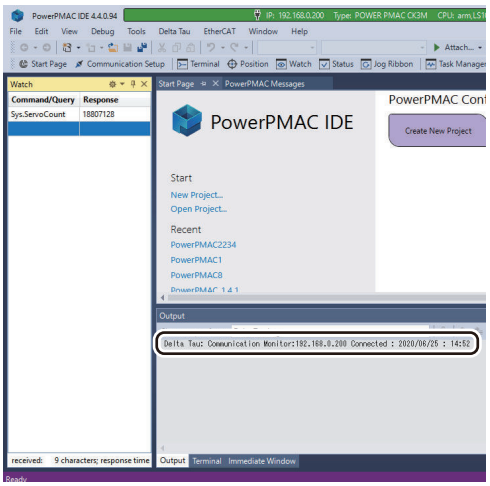
- If a dialog box for checking access rights is displayed at the time of start-up, select the option for starting up.

3 The Communication Setup dialog box is displayed, so specify the IP address of the PMAC to connect to, and click the **Connect** button.

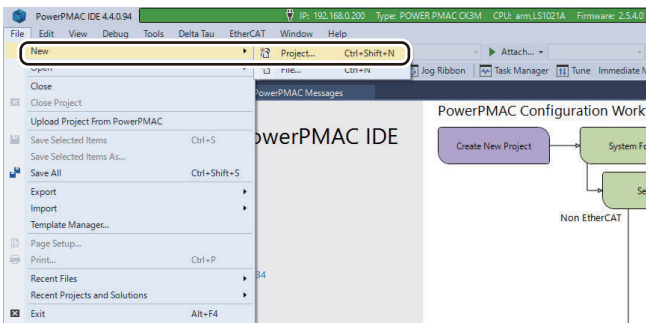
- The default IP address for the PMAC is "192.168.0.200".
- If necessary, change the Windows IP address to "192.168.0.X".



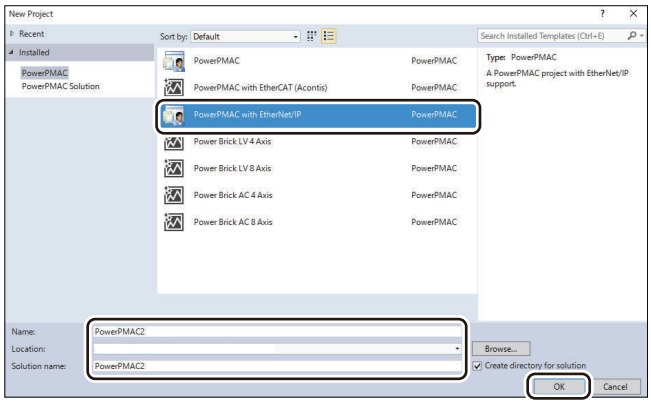
4 Power PMAC IDE starts up, and the PMAC goes online.



5 From the **File** menu, select **New** – **Project**.



6 Enter the type of project for which EtherNet/IP can be set, desired project name, and the save destination, and click the **OK** button.



3-3-2 Performing the Initial Settings for the PMAC

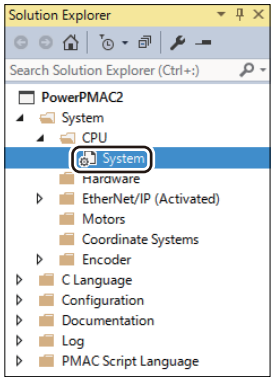
Perform the initial settings for the PMAC.

Precautions for Correct Use

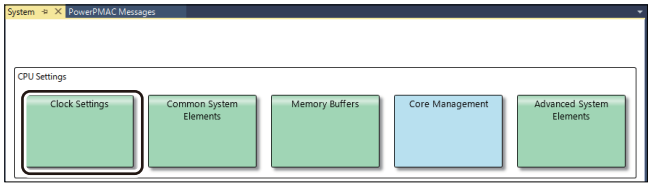
Since all memory is cleared by the initial settings, be sure to save any data remaining in the PMAC that you may need.

1 Execute the **$$$*** command from the Terminal to set the PMAC to the factory default state.

2 In the Solution Explorer, select **System** – **CPU** – **System**.



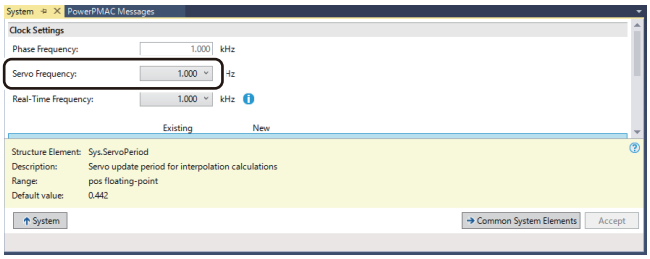
3 Select **Clock Settings**.



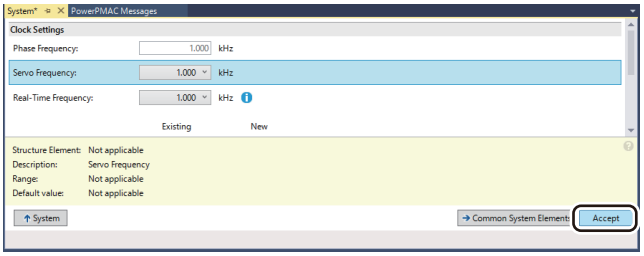
4 Set the servo frequency.

In **Servo Frequency**, select 4 kHz, 2 kHz, or 1 kHz.

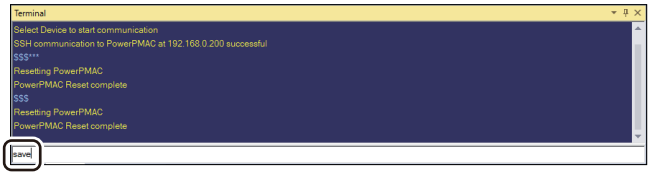
- This document gives an example of setting this to 1 kHz.



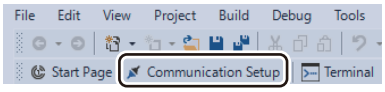
5 Click the **Accept** button.



6 If you change the servo frequency setting, execute the **save** command from the Power PMAC IDE Terminal.
When the save command is completed, "Save Completed" is displayed in the Terminal.

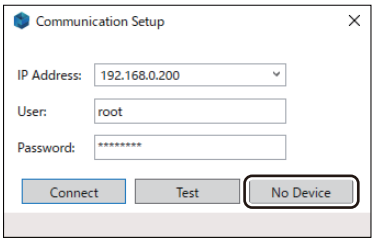


7 Click the **Communication Setup** icon in the toolbar to display the Communication Setup dialog box.



8 In the Communication Setup dialog box, click the **No Device** button.

The Terminal goes offline.

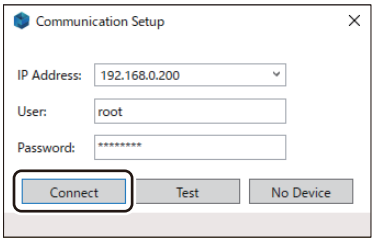


9 Start up the PMAC.

The set servo frequency is reflected.

10 Wait until the PMAC starts up, and click the **Communication Setup** icon in the toolbar to display the Communication Setup dialog box.
In the Communication Setup dialog box, click the **Connect** button.

The Terminal goes online.



3-4 PMAC EtherNet/IP Settings

Perform the EtherNet/IP settings.

Precautions for Correct Use

Check that devices are connected with Ethernet cables before you perform the following procedures. If devices are not connected, turn OFF the power supply to them, and then connect Ethernet cables.

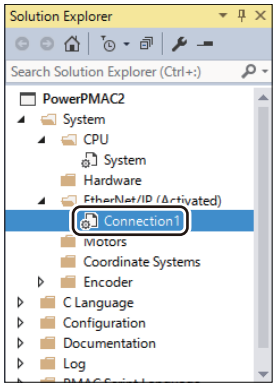
3-4-1 Setting Connection 1

1 Connect the PMAC and devices with Ethernet cables.

- For the settings of connected devices, refer to the manuals for the connected devices.

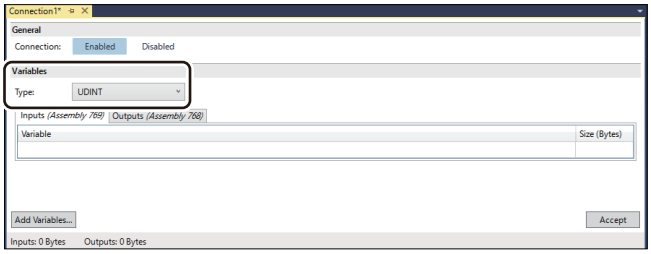
2 Setting Connection 1

In the Solution Explorer, select **System** – **EtherNet/IP(Deactivated)** – **Connection1**.



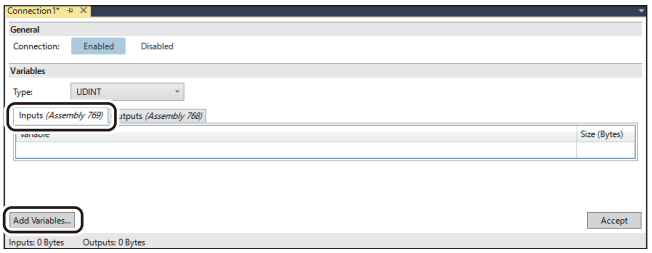
3 Selecting the type of variables to add to Connection 1 (Input)

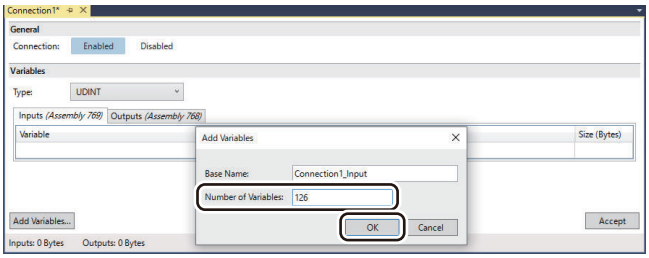
Select the data type of variables to add to **Connection1**.



4 Add variables as many as the specified number to Connection 1 (Input).

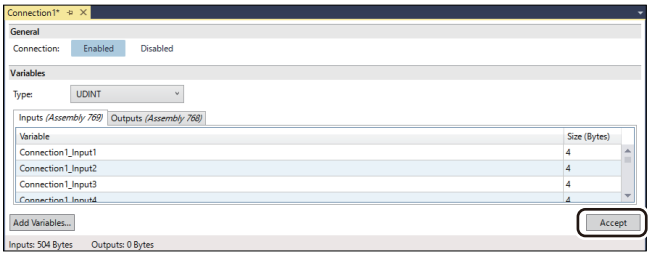
Select the **Inputs** tab page for **Connection1**. Click the **Add Variables** button, specify the number of variables to add, and click the **OK** button.





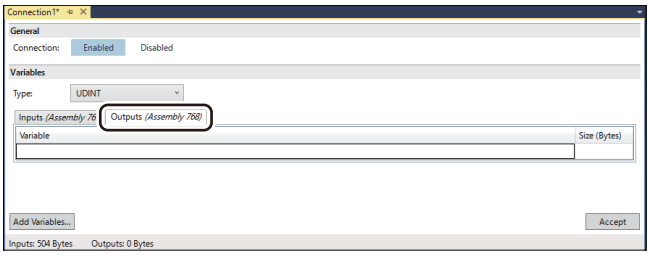
5 Checking and completing Connection 1 (Input)

Check the size of the **Connection1** input settings and click the **Accept** button.



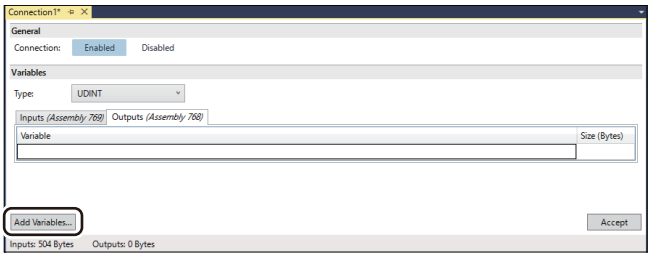
6 Selecting Connection 1 (Output)

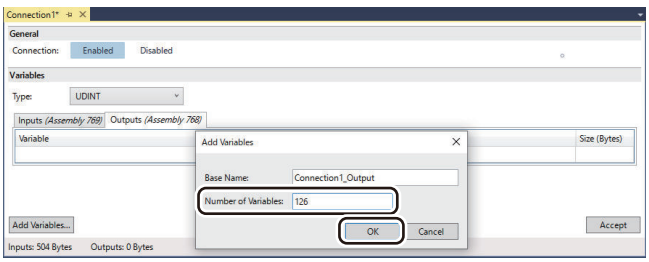
Select the **Outputs** tab page for **Connection1**.



7 Add variables as many as the specified number to Connection 1 (Output).

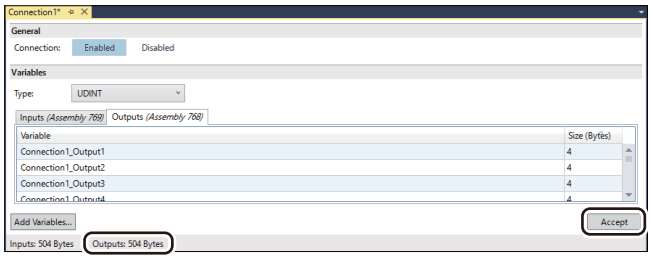
Select the **Add Variables** button for **Connection1**, specify the number of variables to add, and click the **OK** button.





8 Checking and completing Connection 1 (Output)

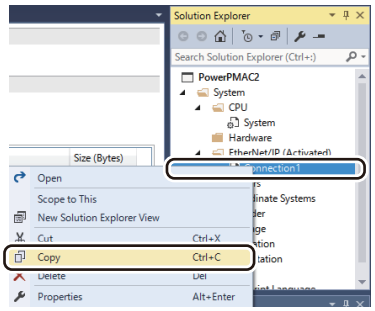
Check the size of the **Connection1** output settings and click the **Accept** button.



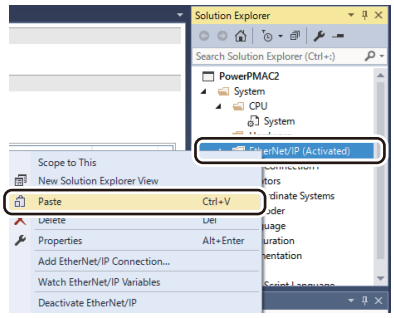
3-4-2 Setting Connections 2 to 16

1 Copy the settings of Connection 1 to other connections.

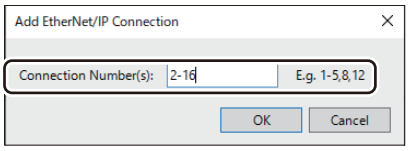
In the Solution Explorer, right-click **Connection1** under **System** – **EtherNet/IP(Deactivated)** and select **Copy** from the menu.



2 In the Solution Explorer, right-click **EtherNet/IP(Deactivated)** under **System** and select **Paste** from the menu.



To add the settings to Connections 2 to 16, enter as shown on the right and click the **OK** button.

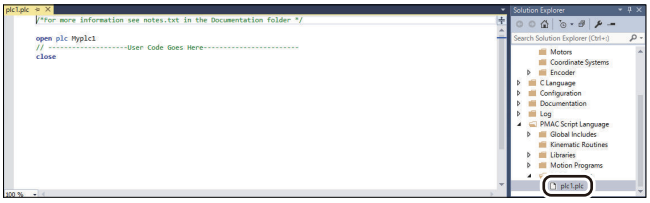


3-5 PMAC Settings

3-5-1 Creating a User Program

Create a program for the operations check.
The operations check program uses the special language. For details, refer to the *Power PMAC User's Manual (Cat. No. O014)* and *Power PMAC Software Reference Manual (Cat. No. O015)*.

1 In the Solution Explorer, select **PMAC Script Language** – **PLC Programs** – **plc1.plc**.



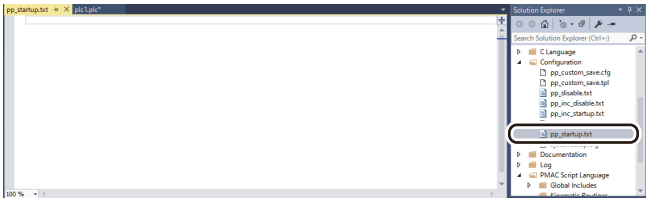
2 In the programming area of the **plc1.plc** tab page, write the program as shown on the right.

This program example adds 1 to the first, middle, and last input variables for Connections 1 to 16 and outputs the values to the first, middle, and last output variables for Connections 1 to 16. The values are counted up because the program is set to turn back the values at each connected device.

```
open plc Myplc1

L0 = P0

Eip[L0].Output.Udata[0] = Eip[L0].Input.Udat
a[0] + 1
Eip[L0].Output.Udata[62] = Eip[L0].Input.Udat
a[62] + 1
Eip[L0].Output.Udata[125] = Eip[L0].Input.Uda
ta[125] + 1

P0 = P0 + 1
if ( P0 >= 16 ) P0 = 0

close
```

3 Configuring the startup settings of the user program

In the Solution Explorer, select **Configuration** – **pp_startup.txt**.



4 In the programming area of the **pp_startup.txt** tab page, add the program given on the right to the last line.

The **pp_startup.txt** is automatically executed when the PMAC starts up. In this example, the PLC1 script is executed.

```
enable plc 1;
```

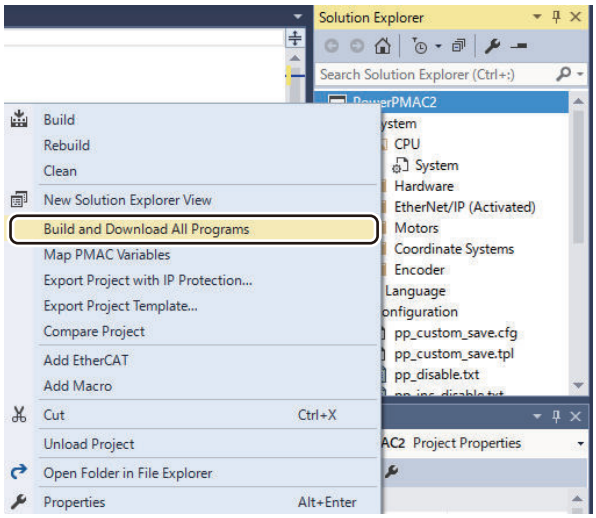
3-5-2 Transferring Project Data and Checking the Operation

Transfer the created project data to the PMAC.

1 Downloading the project

In the Solution Explorer at the upper right of the Power PMAC IDE window, right-click the project name and select **Build and Download All Programs** to build and download all programs.

- Transfer alone will not save the project to the PMAC.
  If the power to the PMAC is switched OFF, the transferred project is discarded.



2 Make sure that there are no errors in the Output tab page.

- If the transfer failed, check the error information in the Output tab page.
  If there is a program error, review the program.
  If the error is caused by the EtherNet/IP settings, return to *3-4 PMAC EtherNet/IP Settings* on page 3-16 and check the settings to see if they are correct.

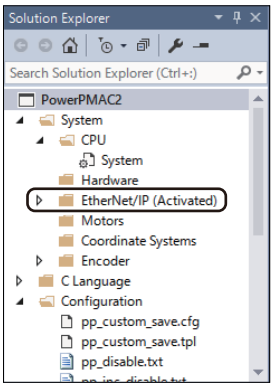
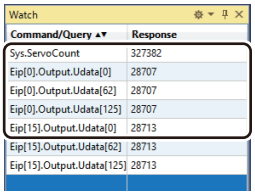
3 Confirm that there are no errors, and then save the project to the PMAC.

Execute the **save** command from the Terminal.

- By executing the save command, the downloaded project is stored in the PMAC. Use this operation to save the settings that are executed automatically when the power supply to the PMAC is turned ON.

4 Enabling EtherNet/IP (Restart)

Execute the **$$$** command from the Terminal. The EtherNet/IP settings are enabled when the PMAC restarts using the downloaded project.

5	Checking that EtherNet/IP is enabled In the Solution Explorer, check that there is **EtherNet/IP** (**Activated**) folder under **System**. This indicates that the EtherNet/IP settings are enabled.	
6	Checking that EtherNet/IP is operating Check that the variables shown on the right are added and counted up in the Watch window. This indicates that EtherNet/IP is operating normally. If EtherNet/IP is not operating, you can use the Network Configurator's Device Monitor function to perform trouble-shooting. Refer to *16-2 Checking Status with the Network Configurator* in the *NJ/NX-series CPU Unit Built-in EtherNet/IP™ Port User's Manual (Cat. No. W506)* for details.	

A

Appendices

A-1 Saving and Reading the Project A-2
A-1-1 Saving the Project A-2
A-1-2 Reading and Downloading the Project A-2

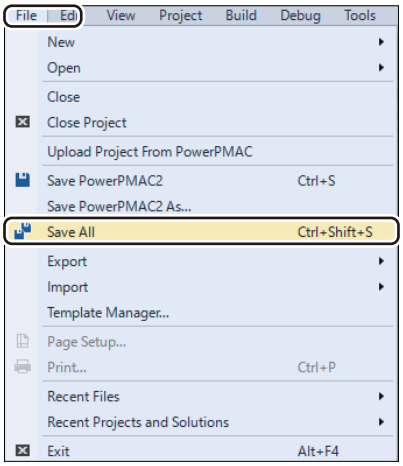
A-1 Saving and Reading the Project

This appendix describes the procedure to save the Power PMAC IDE project to the computer for the purpose of reuse.

A-1-1 Saving the Project

1 Saving the Project

Select **Save All** from the **File** menu to save the project to the computer.

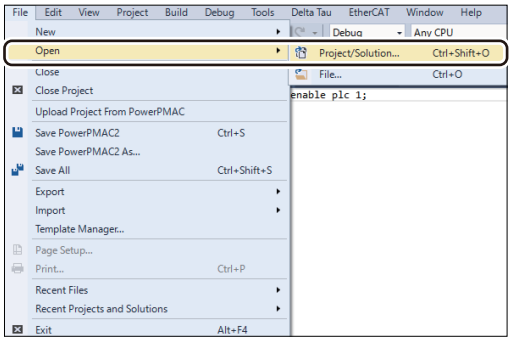


A-1-2 Reading and Downloading the Project

1 Start up and connect Power PMAC IDE to the Controller.

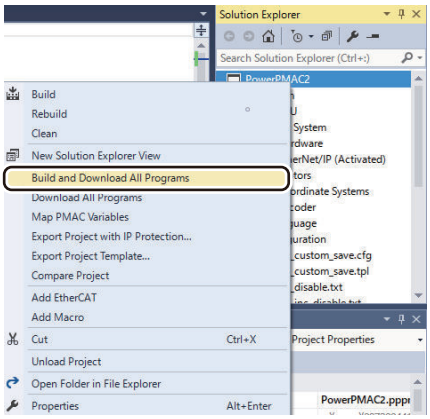
2 Execute the **$$$*** ** command from the Terminal to revert the PMAC to the factory default settings.

3 From the **File** menu, select **Open** – **Project/Solution** to read the saved project.



4 In the Solution Explore, right-click the project name and select **Build and Download All Programs** to build and download all programs.

After the download is completed, make sure that there are no errors in the Output tab page.



5 Saving the downloaded settings and programs

After the download is completed and you make sure that there are no errors in the Output tab page, execute the **save** command from the Terminal.

- By executing the save command, the downloaded project is stored in the PMAC. Use this operation to save the settings that are executed automatically when the power supply to the PMAC is turned ON.

6 Restarting the PMAC after download

Execute the **$$$** command from the Terminal and use the downloaded project to restart the PMAC.

OMRON Corporation **Industrial Automation Company**
Kyoto, 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
2895 Greenspoint Parkway, Suite 200
Hoffman Estates, IL 60169 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:

© OMRON Corporation 2020 All Rights Reserved.
In the interest of product improvement,
specifications are subject to change without notice.

Cat. No. O903-E1-01 0920