Panasonic®

Servo Drives

Quick Start Guide
MINAS A6 Multi

Position control with Omron host controller over EtherCAT

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Panasonic Electric Works Europe AG (PEWEU)

Caroline-Herschel-Strasse 100

85521 Ottobrunn, Germany

Tel: +49 89 45 354-1000

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1 Introduction

1.1 Before you start

Before operating this product, read the safety instructions in the following manuals:

- "SX-DSV03514, MINAS A6 Multi, Technical Reference – Integrated Safety Part"
- "SX-DSV03508, MINAS A6 Multi, Programming Manual – PANATERM for Safety"

This product is for industrial use only.

Electrical connections must be made by qualified electrical personnel.

1.2 About this document

This "Quick Start Guide" is intended to help you set up a MINAS A6 Multi servo drive system. It is based on information from the MINAS A6 Multi series manuals and the practical experience of our engineers.

Step-by-step instructions will guide you through connecting an Omron NX1P2 host controller to a MINAS A6 Multi servo drive system. You will also learn how to program a simple positioning task in Omron's Sysmac Studio software. Communication is achieved using EtherCAT.

In these instructions we assume that you are using a Windows 10 operating system.

Please refer to the original documentation of our servo drive systems for detailed information. It is available free of charge in our Panasonic Download Center.

1.3 Related documents

Select the following links to download the documents from our Panasonic Download Center.
- Safety specifications:

  "SX-DSV03514, MINAS A6 Multi, Technical Reference – Integrated Safety Part"

- Information on wiring the MINAS A6 Multi servo drive system:

  "SX-DSV03454, MINAS A6 Multi, Reference Specifications – Driver Module"

- Information on wiring the MINAS A6 Multi power supply module:

  "SX-DSV03452, MINAS A6 Multi, Reference Specifications – Power Supply Module"

- Information on EtherCAT communication:

  "SX-DSV03456, MINAS A6 Multi, Technical Reference – EtherCAT Communication Specification"

- Description of the servo driver functions:

  "SX-DSV03455, MINAS A6 Multi, Technical Reference – Functional Specification"

- Information on safety programming:

  "SX-DSV03508, MINAS A6 Multi, Programming Manual – PANATERM for Safety"

- Information on how to reduce electromagnetic interference (EMI):

  "Recommendations for EMC-compliant wiring of servo drivers and motors"

- Related Quick Start Guides:

  "QS10000, MINAS A6 Multi, Position control with Beckhoff host controller over EtherCAT"

  "QS10001, MINAS A6 Multi, Ethernet over EtherCAT with PANATERM"

  "QS10002, MINAS A6 Multi, Safe Torque Off (STO)"

  "QS10003, MINAS A6 Multi, Safe Stop 1 (SS1)"

  "QS10004, MINAS A6 Multi, Safe Speed Monitoring (SSM)"

  "QS10006, MINAS A6 Multi, Position control with TRIO host controller over EtherCAT"

1.4   Available software

The following software is available free of charge in our Panasonic Download Center:

- PC configuration software PANATERM for MINAS A6 Multi, 32 bit, or PC configuration software PANATERM for MINAS A6 Multi, 64 bit

- Panasonic ESI file

The following software can be downloaded from Omron's Web site (https://www.omron.eu./en/home):

- Sysmac Studio software

2   Functional overview

A Panasonic MINAS A6 Multi servo drive system includes a power supply module, one or more 400V driver modules, and one or two motors connected to each driver module. Communication can be achieved through EtherCAT with any host controller that supports the CAN application protocol over EtherCAT (CoE).

Example

A servo drive system, consisting of a 15kW power supply module, an A-size 1.5kW two-axis driver module, and two servo motors with a rated power of 1.0kW and 1.5kW, is connected to an Omron NX1P2 host controller by an Ethernet cable to communicate via EtherCAT.

Use the following accessories:

- 1 x 400V AC power supply cable

  Connects the MINAS A6 Multi power supply module to the main power supply (400V AC).

- 1 x 24V DC power supply cable

  Connects the power supply unit (24V DC) and the host controller.

- 1 x grounding wire (M4 round terminal)

  Connects the PE terminals of the power supply module and the driver module.

- 2 x Panasonic motor cable

  Connects the motor and the driver module.

- 2 x Panasonic encoder cable

  Connects the encoder and the driver module.

- 1 x Ethernet cable

  Connects the PC and the host controller.

- 1 x Ethernet cable (used for EtherCAT communication)

  Connects the host controller and the driver module.

- 1 x RJ11 communication cable (2 x RJ11 plug)

  Connects the power supply module and the driver module.

- 1 x feed bus bar (50mm) with end cap for the DC link bus (535V DC to 675V DC)

  Connects the power supply module and the driver module.

- 1 x feed bus bar (50mm) with end cap for the control bus (24V DC)

  Connects the power supply module and the driver module.
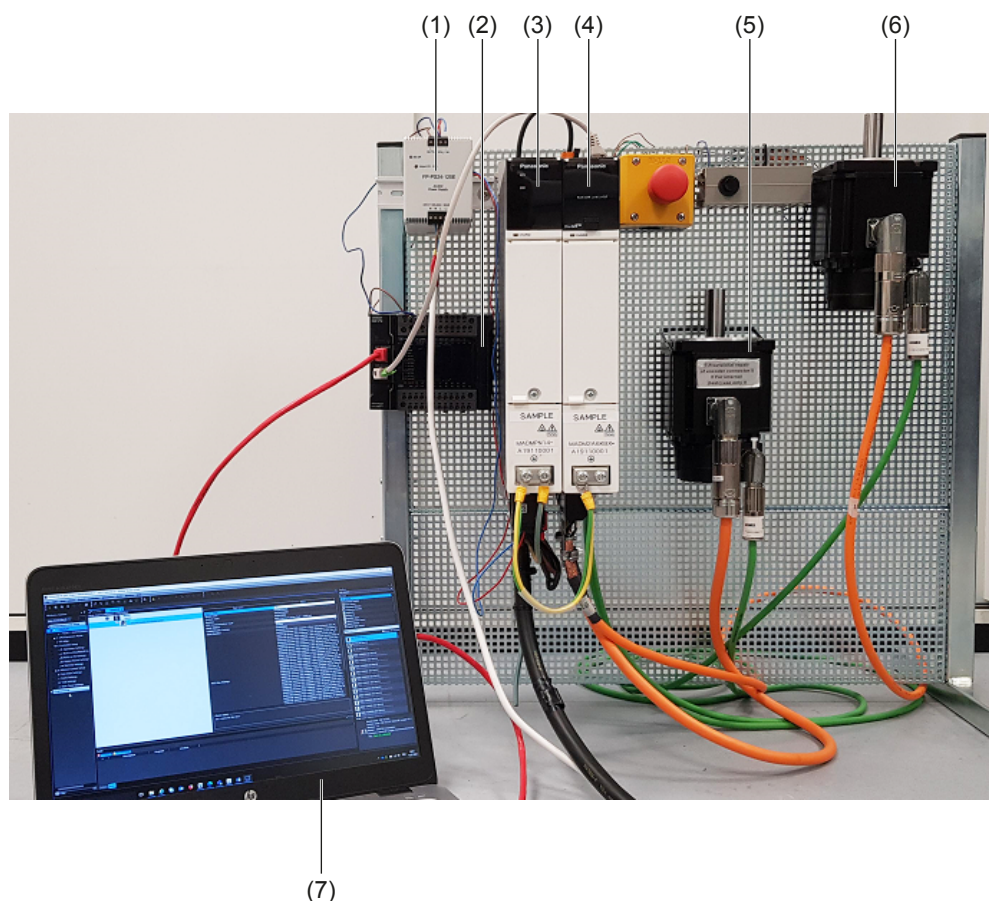
(1) Power supply unit (24V DC)

(2) Omron NX1P2 host controller

(3) MINAS A6 Multi power supply module (400V AC, 15kW)

(4) Two-axis MINAS A6 Multi driver module (1.5kW)

(5) MINAS A6 servo motor B (1.5kW)

(6) MINAS A6 servo motor A (1kW)

(7) PC with Sysmac Studio

Set-up of a MINAS A6 Multi servo drive system - Position control with Omron NX1P2 host controller and EtherCAT

3 Wiring

3.1 Recommendations for wiring

It is the customer's responsibility to apply the countermeasures that they consider necessary to comply with current regulations on wiring, safety and reducing EMI.

Do not forget to meet the specifications indicated in the hardware manual for each of the devices being wired. If any specifications in the manual conflict with the information in this document, the manufacturer's manual takes preference.

For detailed information on reducing EMI, please refer to "Recommendations for EMC-compliant wiring of servo drivers and motors".

3.2 Bottom side connectors of the servo drive system

The image shows the most important connectors of a power supply module (left) and a driver module (right). Please refer to the technical documentation for details about other connectors.
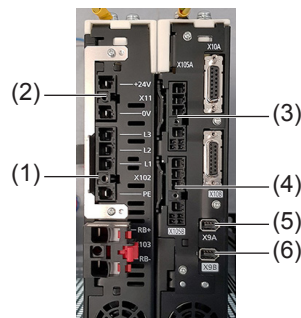
(1) X102: Main power supply (400V AC)
(2) X11: Control power supply (24V DC)
(3) X105A: Motor A
(4) X105B: Motor B
(5) X9A: Encoder A
(6) X9B: Encoder B

Bottom view of power supply module (left) and driver module (right)

X11 connector (control power supply)

Connect the 24V DC control power supply to X11.
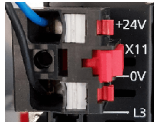
Wiring of the X11 connector

X102 connector (main power supply)

Connect the 400V AC main power supply cable to X102.
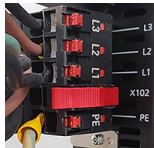
Wiring of the X102 connector

X105A and X105B connectors (motor connectors)

Connect the motor cable for servo motor A to X105A and the motor cable for servo motor B to X105B.

Wiring of the X105A and X105B connectors

X9A and X9B connectors (encoder connectors)

Connect the cable of encoder A to X9A and the cable of encoder B to X9B.

Wiring of the X9A and X9B connectors

3.3   Top side connectors of the servo drive system

The image shows the most important connectors of a power supply module (left) and a driver module (right). Please refer to the technical documentation for details about other connectors.
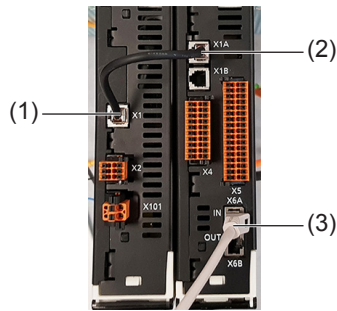
(1) X1: Internal communication connector on power supply module

(2) X1A: Internal communication connector on driver module

(3) X6A: EtherCAT communication connector on driver module

Top view of power supply module (left) and driver module (right)

X1, X1A connectors (internal communication connectors)

Connect X1 and X1A with the RJ11 communication cable.

X6A connector (EtherCAT connector)

Connect an Ethernet cable between the EtherCAT connector of the host controller and X6A of the driver module.

3.4   Front side connectors of the servo drive system

The image shows the most important connectors of a power supply module (left) and a driver module (right). Please refer to the technical documentation for details about other connectors.
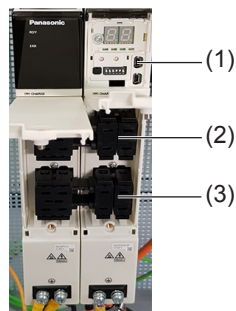
(1) X7: USB connector (for driver configuration) on driver module

(2) X104: DC link bus connectors on power supply module and driver module (535V DC to 675V DC)

(3) X12: Control bus (24V DC) connectors on power supply module and driver module

Front view of power supply module (left) and driver module (right) with bus bars

X104 and X12 connectors (DC bus)

Attach the bus bars to X104 and X12 to connect the DC circuits of the power supply module and the driver module.
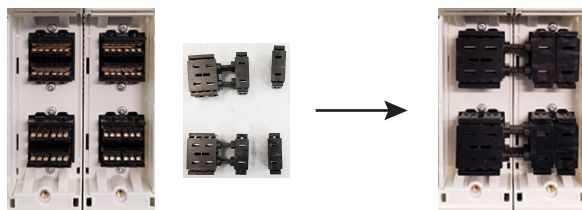
Connectors for DC circuits with and without bus bars

X7 connector (for driver configuration)

The driver module is configured using the PC configuration software PANATERM. Use a commercially available USB A to mini-B cable to connect the PC to the driver module.

(1)   X7: USB connector on driver module

Connector X7 for PC connection

3.5   Connectors of the Omron NX1P2 host controller

The image shows the front view of the host controller.
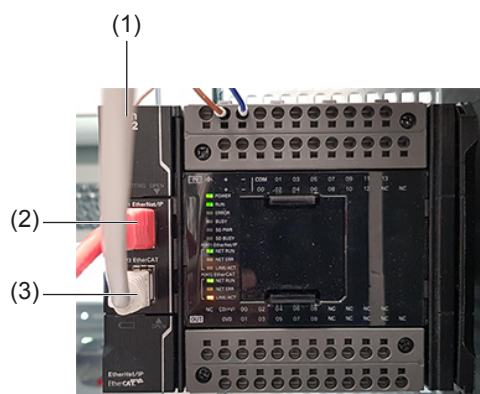
(1)   24V DC power supply
(2)   PORT1 EtherNet/IP connector
(3)   PORT2 EtherCAT connector

Front view of Omron NX1P2 host controller

24V DC power supply

Connect this connector to 24V DC.

PORT1 EtherNet/IP connector

Connect an Ethernet cable between this connector and the Ethernet port of your PC.

PORT2 EtherCAT connector

Connect an Ethernet cable between this connector and the X6A connector of the driver module.

4 Create a project in Sysmac Studio

4.1 Install Sysmac Studio on your PC

The servo drive system is controlled with Omron's Sysmac Studio software. Install this software and the Panasonic ESI file on your PC.

1. Download the Sysmac Studio software from Omron's website and execute the installation file.

2. Copy the Panasonic ESI file (`Panasonic_MINAS_A6Multi_V*.xml`) to `C:\Program Files (x86)\OMRON\Sysmac Studio\IODeviceProfiles\EsiFiles\ UserEsiFiles` on your PC.

3. Restart Sysmac Studio.

The download links can be found under Available software (page 5).

4.2 Create a new project in Sysmac Studio

Before you can connect your PC to the Omron NX1P2 host controller, you must create a new project in Sysmac Studio.

1. Select the Sysmac Studio by icon on your desktop to start the software.
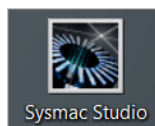
2. On the "Start Page", select "New Project".
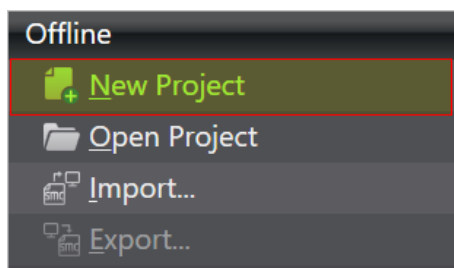
3. Select the device and version number (see label of the host controller) and then "Create".
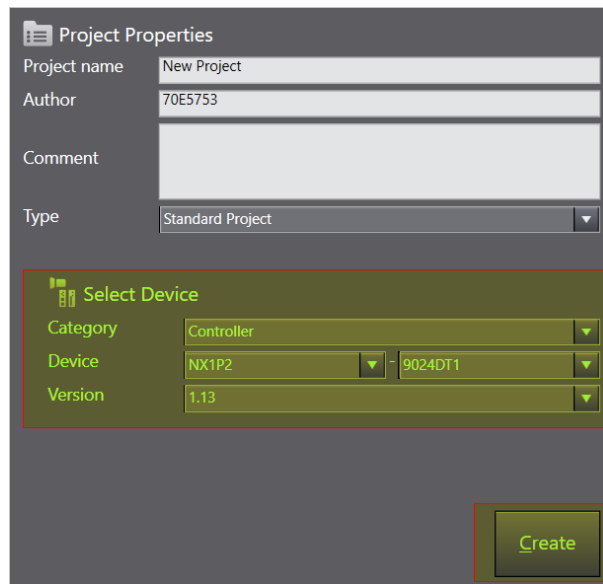
4. Select "Configuration and Setup" > "EtherCAT" > "AC Servo Driver". Then double-click on the driver module to be connected.
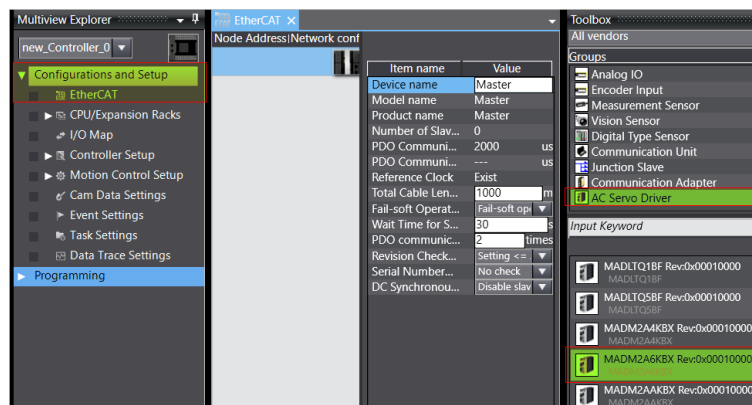
The driver module is now connected to the master (host controller).
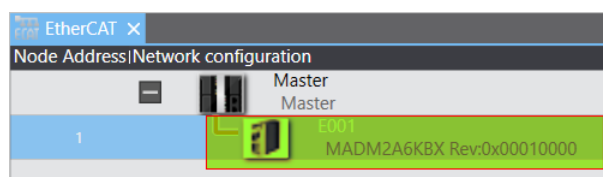
5. Select "Controller" > "Communications Setup…" to establish an Ethernet connection.
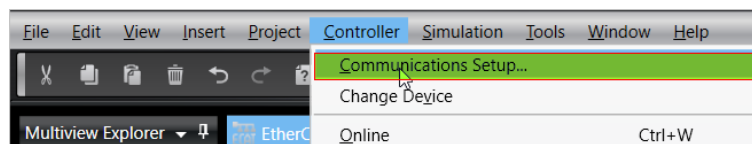
6.   Select the connection method "Ethernet connection via a hub" and enter the default IP address 192.168.250.001 for the host controller.
Make sure your PC uses an IP address in the same subnet, e.g. 192.168.250.50.

To check the communication, select "Ethernet Communication Test". If "Test OK" is displayed, the communication is active.

Select "OK" to save your settings.
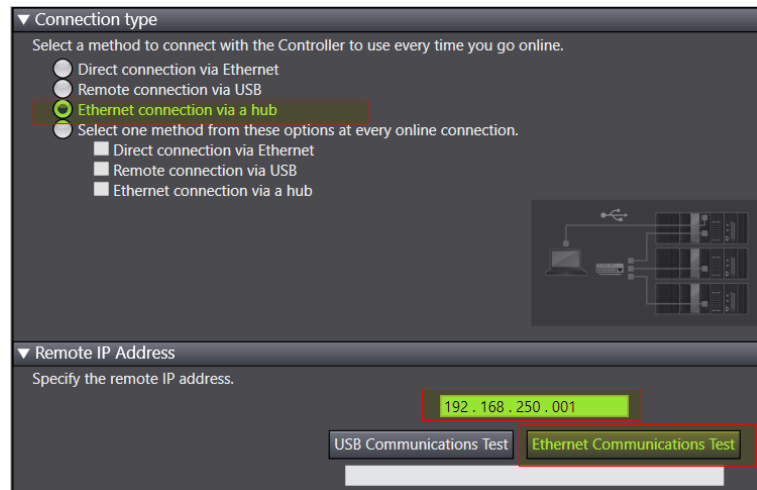
7.   Select the yellow triangle in the tool bar to go online.

When the host controller is in RUN mode, the new status is displayed on the lower right.
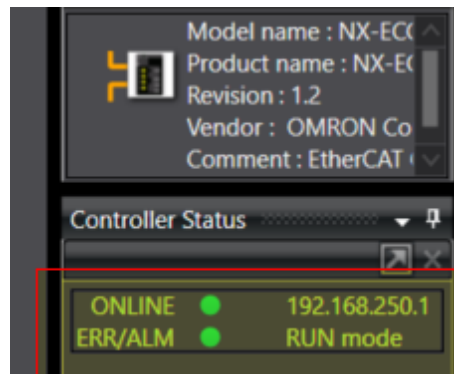
8. Right-click on the master and select "Write Slave Node Address" to set the node address of the driver module.
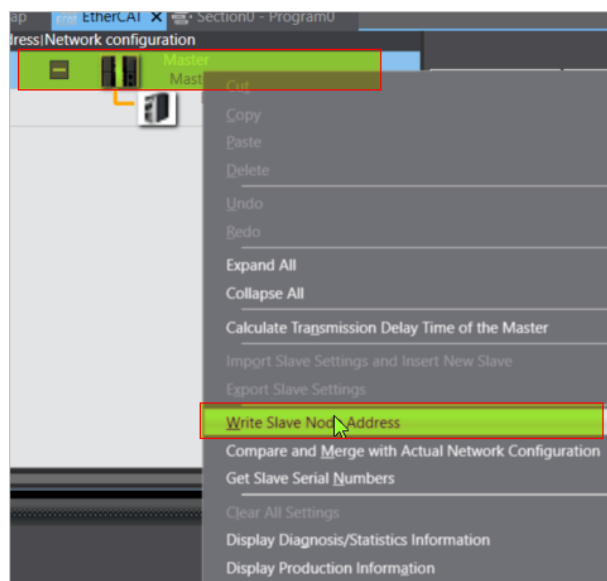
9. Set a slave node address, e.g. 1, and select "Write".
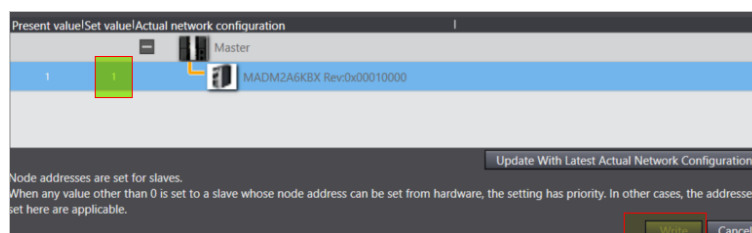
10. Reboot the driver module to update the node address.

11. After rebooting, stay in offline mode. Select the driver module and then "Edit PDO Map Settings" to select the PDO mappings for your application.
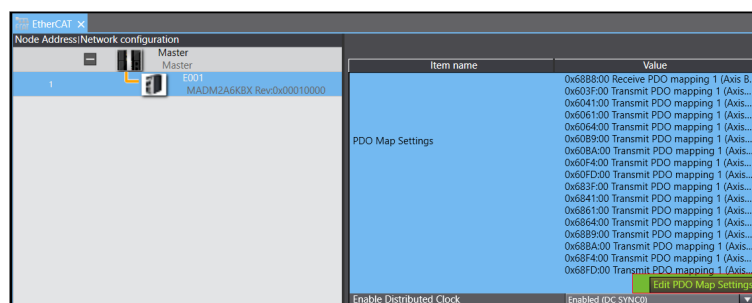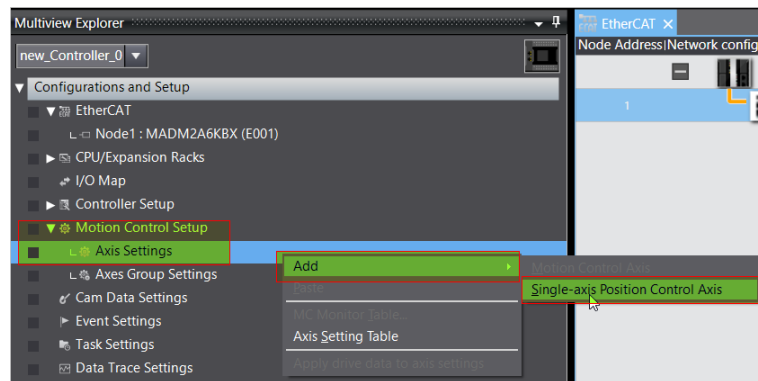
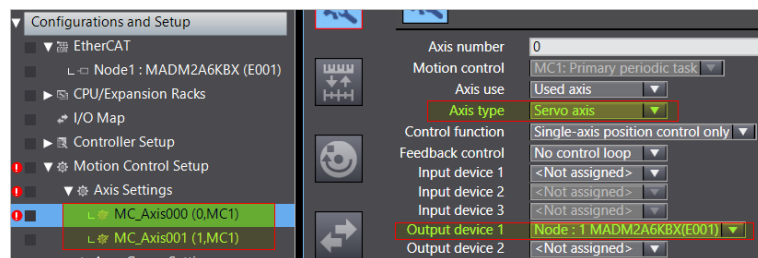12. For example, select PDO mapping 4 and then "Apply" and "OK".
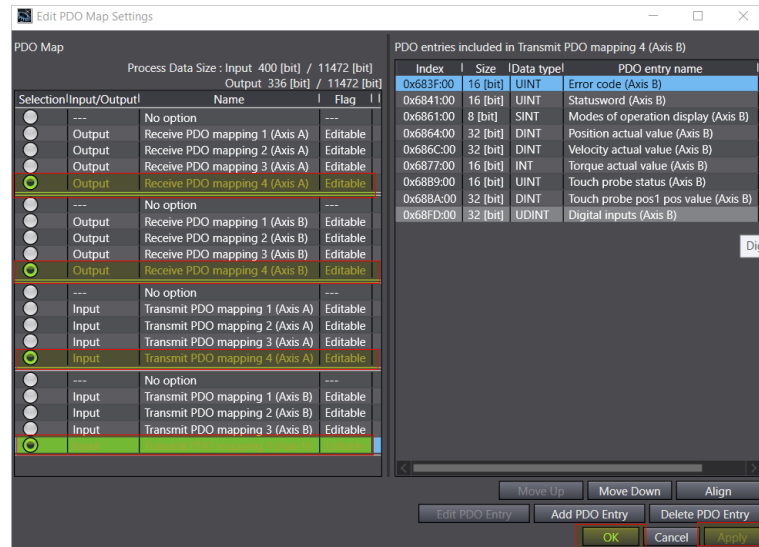
4.3 Axis configuration

The driver module is a dual axis module. The steps below describe the configuration of MC_Axis000. Use the same procedure to configure MC_Axis001.

1. Select "Motion Control Setup" > "Axis Settings" > "Add" > "Single-axis Position Control" to add an axis.

2. For "Axis type", select "Servo axis" and for "Output device 1", select "MADM2A6KBX(E001)".

3. Go to the "Detailed Settings" tab to make map the process data objects (PDO) to the NX1P2 variables.


4. Set the command pulse and travel distance per motor revolution.

   The motors of the MINAS A6 Multi series have an encoder resolution of 23 bits (8388608 pulses).
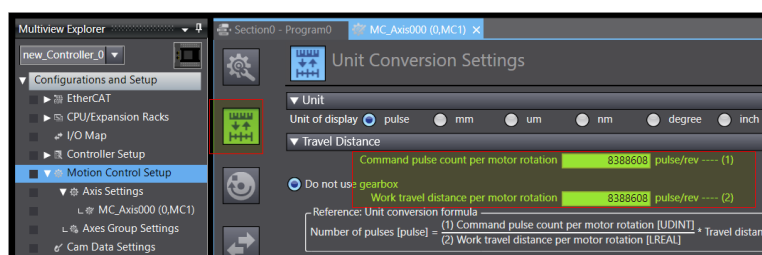
4.4 Program a simple positioning task

This small demo program will show you how to start the positioning of the axis.

Select "Programming" > "POUs" > "Programs" > "Program0" > "Section0" and add the function blocks **MC_Power** and **MC_MoveRelative** from the "Toolbox" window. Define the variables as shown below.
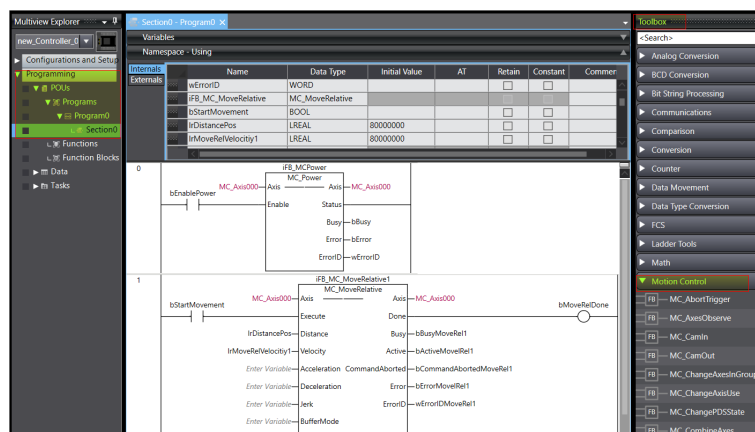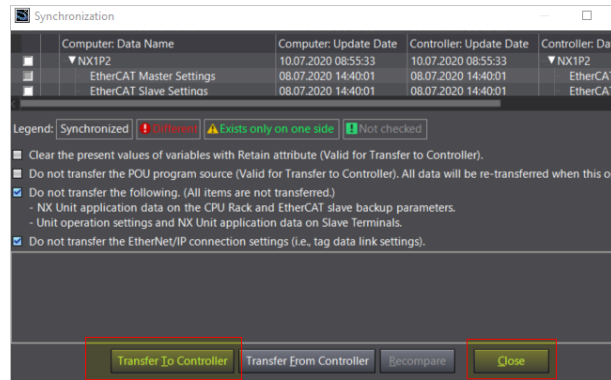

4.5 Download and run the project

The project is now ready to be downloaded to the Omron NX12P host controller.

1. Select the yellow triangle in the tool bar to go online, and then select "Synchronize" to synchronize the project.
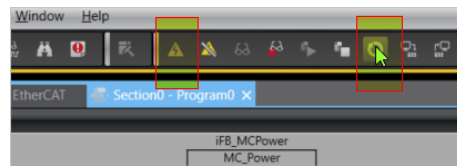
2. Select "Transfer to Controller " and "Close" when the transfer is completed.

3. Select "I/O Map" and set a maximum torque of 5000 (unit 0.1%) for axis A.
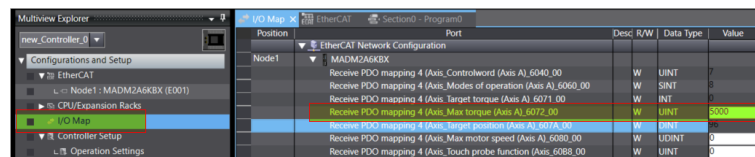
4. Turn the variable **bEnablePower** to TRUE to enable servo control. Turn **bStartMovement** to TRUE to start the relative positioning of the axis.
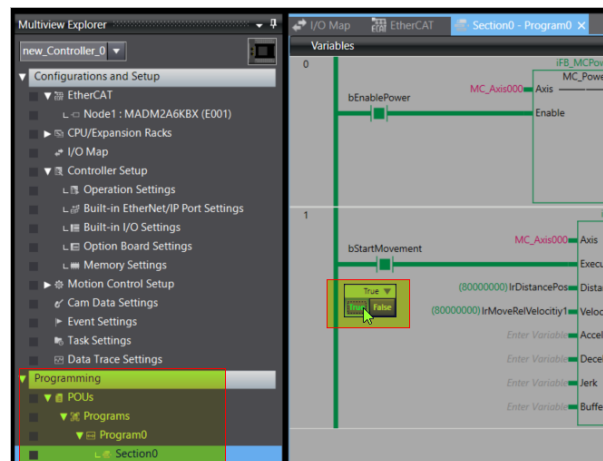
5   Help us improve

Please feel free to contact us if you have any questions, or if you have any suggestions for improvement. In that case, we ask you to include the Quick Start Guide number in the email subject line. You can find the number starting with "QS" on the cover page.

servo.peweu@eu.panasonic.com

+49 (0) 8945354-2750

6   Record of changes

QS10005_V1.0_EN, 2020.11

First edition

7 Panasonic hotline

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North & South America

USA:	1 877 / 624 7872, iasupport@us.panasonic.com

Asia

China:	400-920-9200, https://industrial.panasonic.cn/ea/
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