HIWIN MIKROSYSTEM

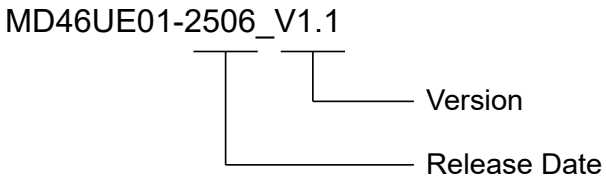
Application Note

E2 EtherNet/IP Drive Complete Setup with Rockwell Studio 5000

www.hiwinmikro.tw
MD46UE01-2506_V1.1

Revision History

The version of the manual is also indicated on the bottom of the front cover.



Release Date	Version	Applicable Product	Revision Contents
Jun. 20th, 2025	1.1	E2 EtherNet/IP Drive	Divide the content of section 4.1 **Execute AOIs** into three categories (Axis communication, Motion instructions, Parameter read/write) and add details to them.
Dec. 31st, 2024	1.0	E2 EtherNet/IP Drive	First edition.

Related Documents

Through related documents, users can quickly understand the positioning of this manual and the correlation between manuals and products. Go to HIWIN MIKROSYSTEM's official website → Download → Manual Overview for details (https://www.hiwinmikro.tw/Downloads/ManualOverview_EN.htm).

Preface

This manual explains the operation of PLC software Studio 5000 when E2 EtherNet/IP drive is used with Allen-Bradley (Rockwell) PLC. The contents in this manual, including project creation of PLC, communication setup, parameters setup, creation and operation of function blocks, are arranged in accordance with the procedure of complete machine setup. For further understanding of E2 EtherNet/IP drive, please refer to “E2 Series Servo Drive EtherNet/IP Communication Command Manual.”

Specifications of Software/Hardware

Name	Version of Software/Firmware
E2 EtherNet/IP Drive	Software (Thunder): 1.11.6.0 or above Firmware: 3.11.6 or above EDS file: HIWINMIKROSYSTEM_ED2F_20240418 or above
Allen-Bradley PLC (CompactLogix 5380)	Software (Studio 5000): V34.01.00 or above Firmware: V34.011 or above

Table of Contents

1. Communication and module setup

1.1 Create new project

1. Open Rockwell Studio 5000 and click **New Project**.

Figure 1.1.1

2. Select controller model, key in project name, and select archive path. Then, click **Next**.

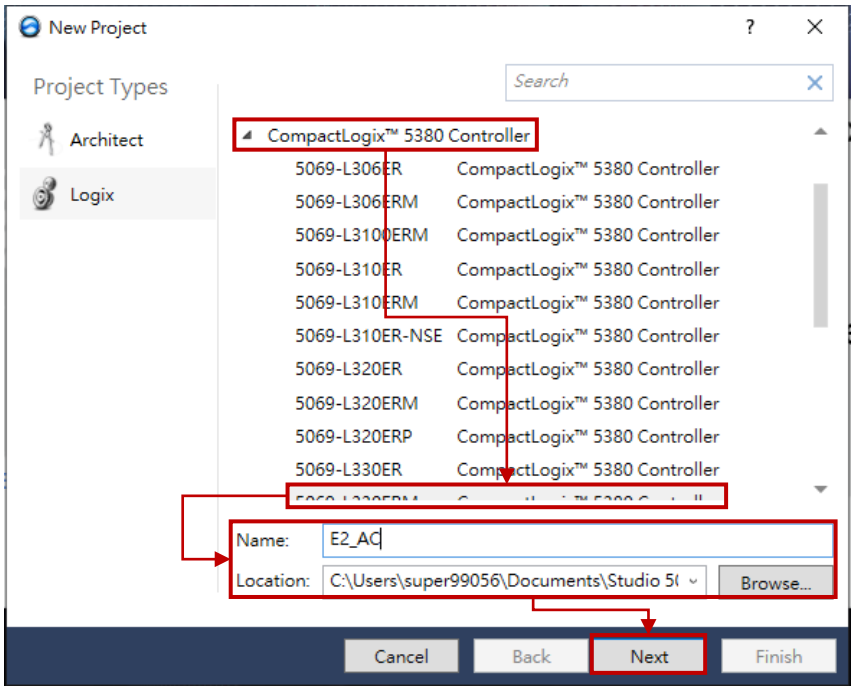


Figure 1.1.2

3. Select controller version and click **Finish**.

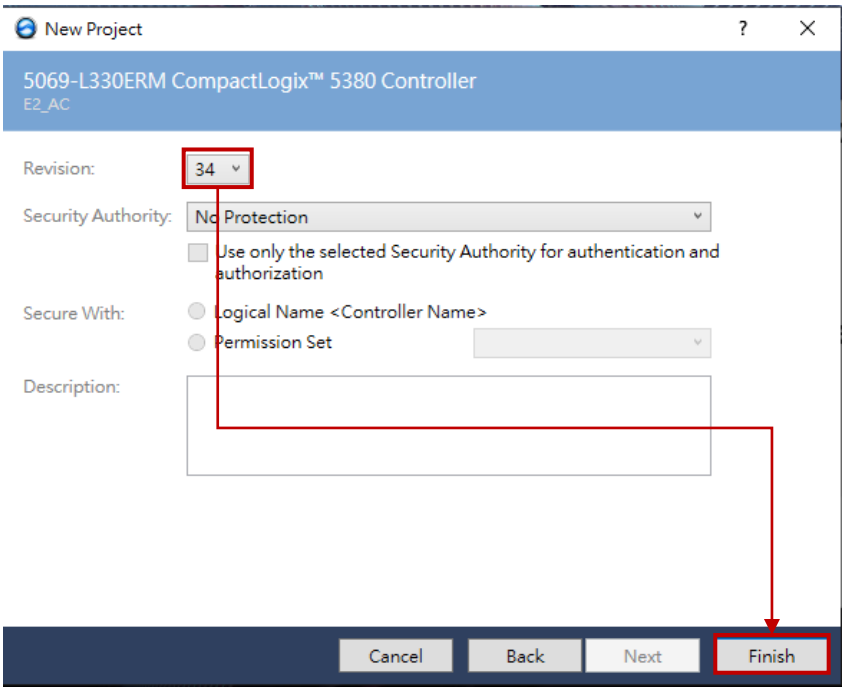


Figure 1.1.3

4. The new project will be successfully created.

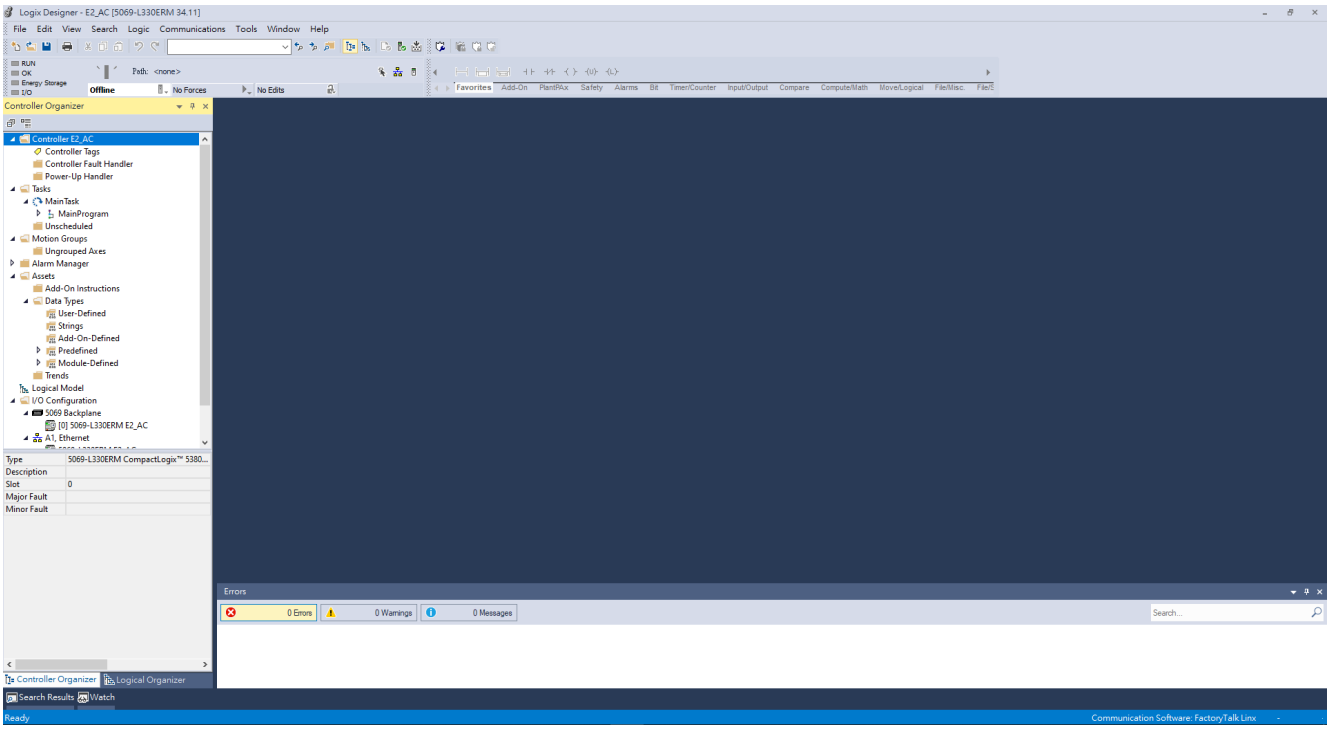


Figure 1.1.4

1.2 IP setting

1. Click “Who Active” icon in the main window.

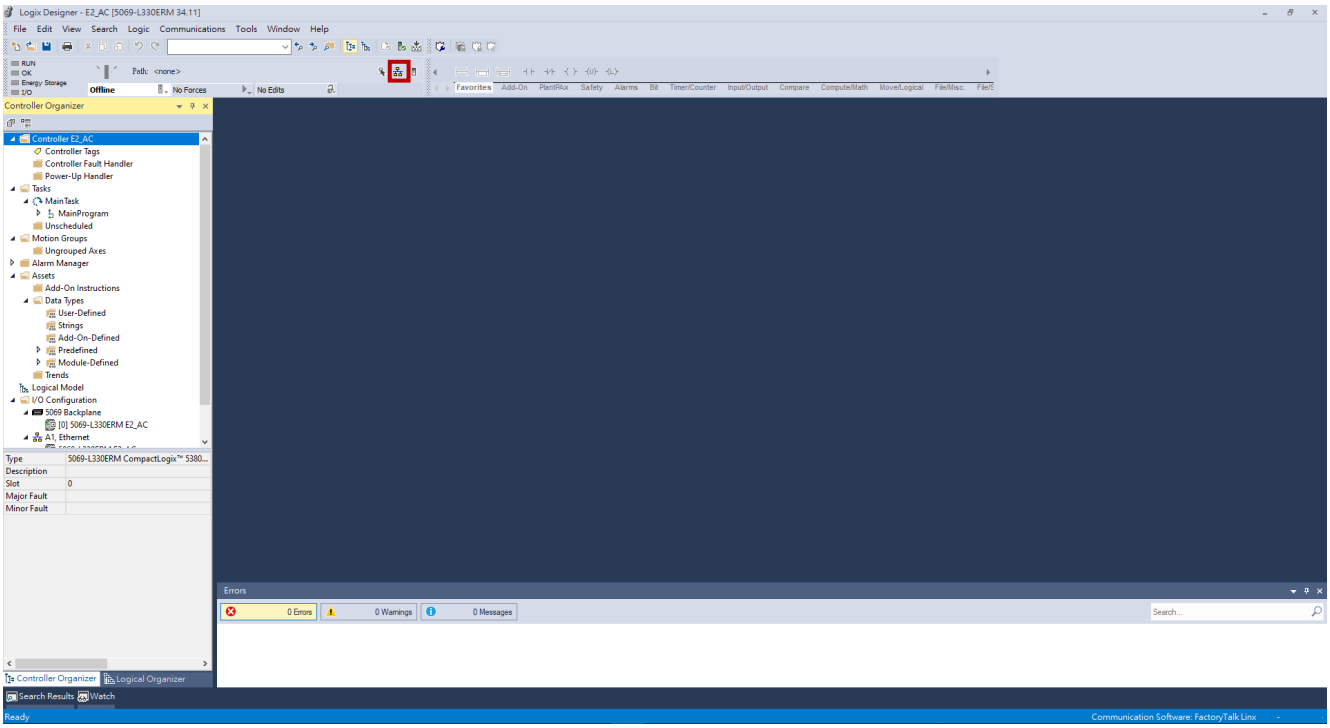


Figure 1.2.1

2. Select the controller setting icon under the USB interface.

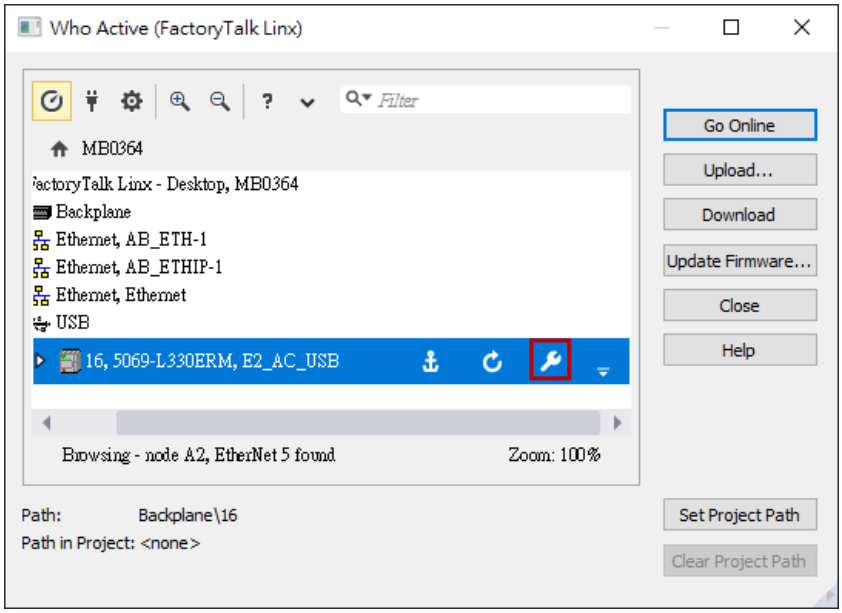


Figure 1.2.2

3. Based on the connecting configuration of network cable, select **Port**, select **Manually configure IP settings**, and complete the settings of **Physical Device IP Address** and **Subnet Mask**. Then, click **Apply**.

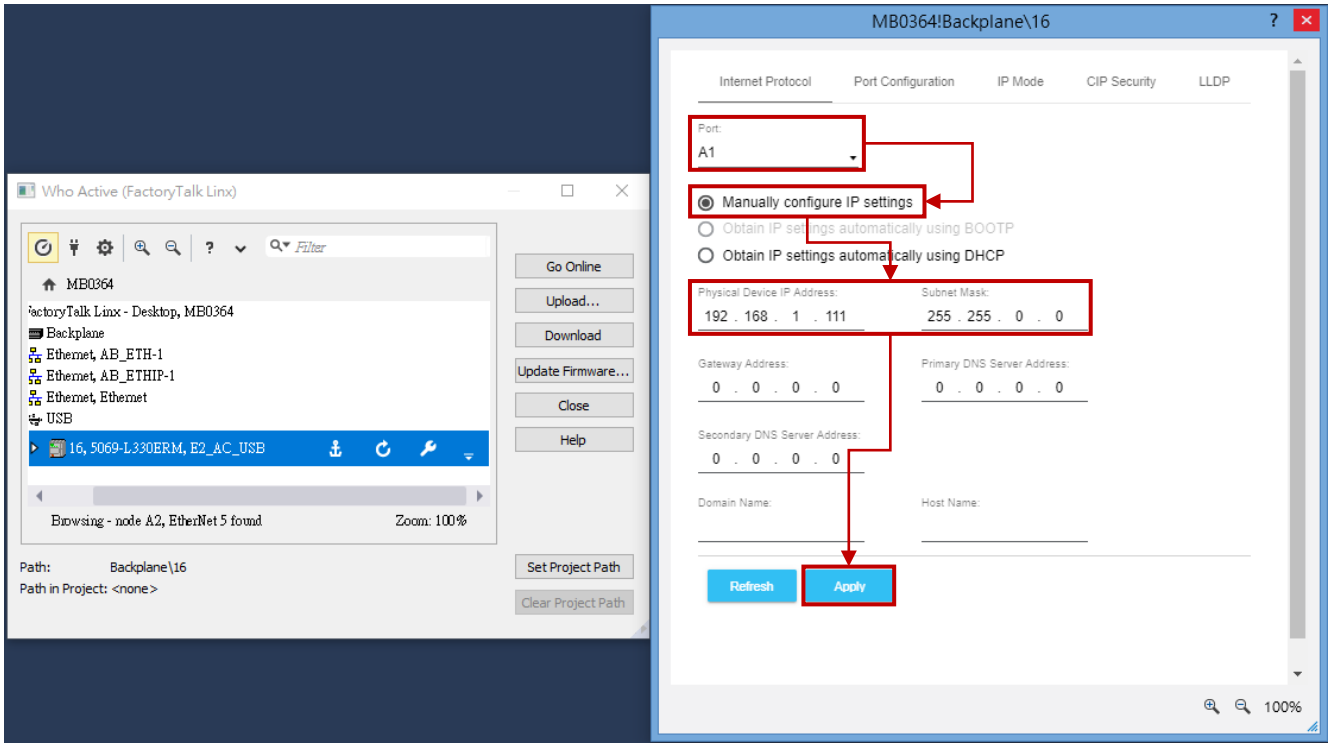


Figure 1.2.3

1.3 Install EDS file

1. Click **Tools→EDS Hardware Installation Tool** in the main window to install EDS file.

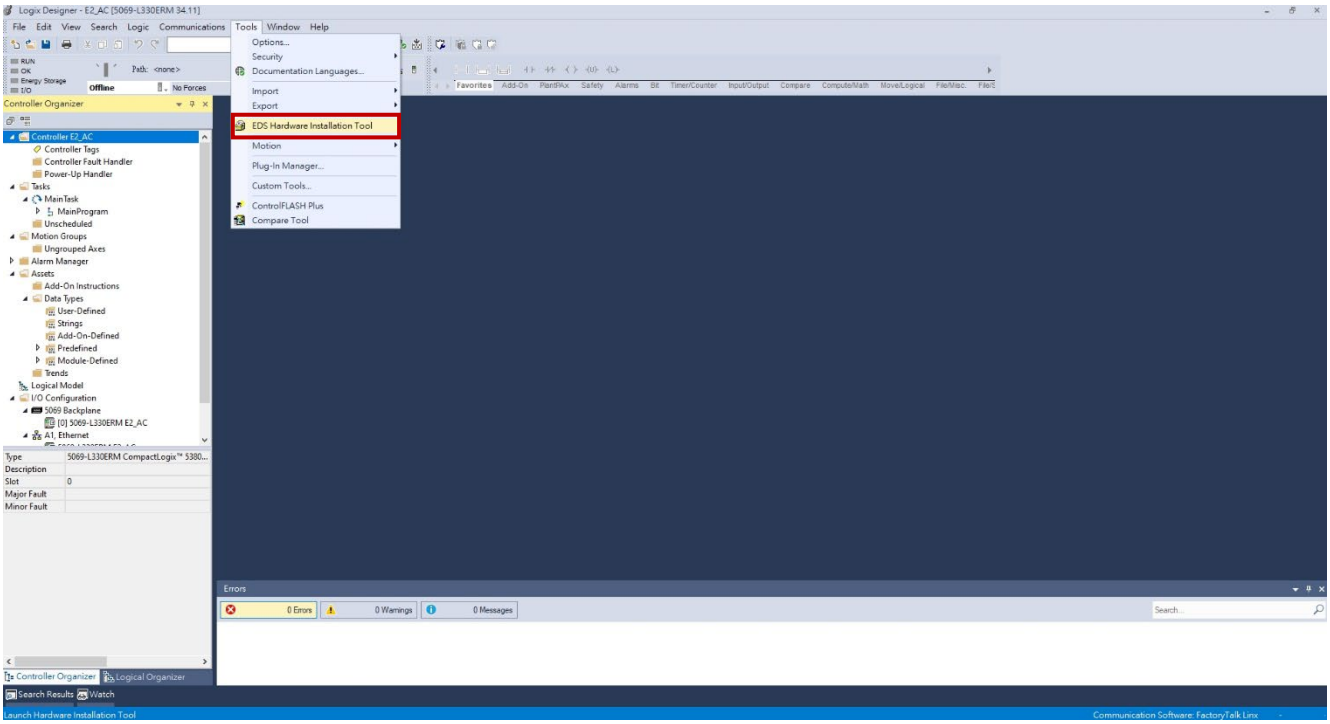


Figure 1.3.1

2. Start installing EDS file. Click **Next**.

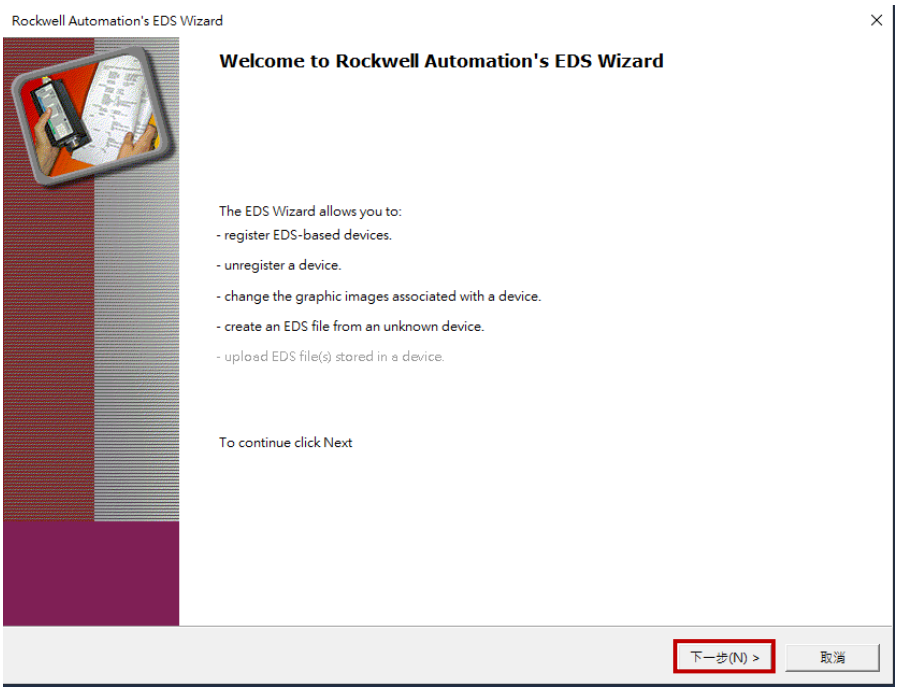


Figure 1.3.2

3. Select **Register an EDS file(s)** and click **Next**.

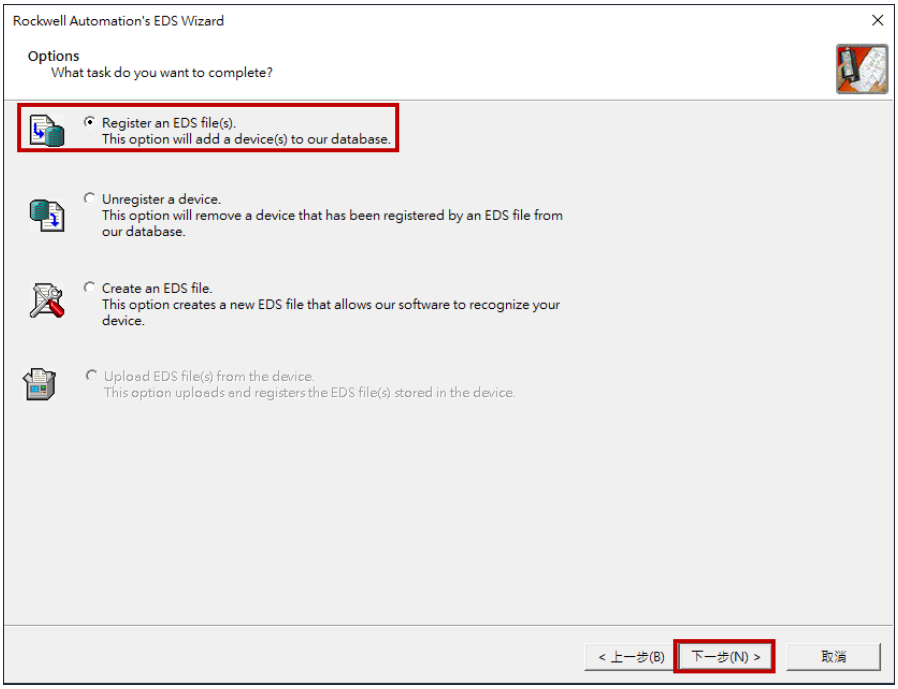


Figure 1.3.3

4. Select **Register a single file** and click **Browse…** to select the source path for EDS file.

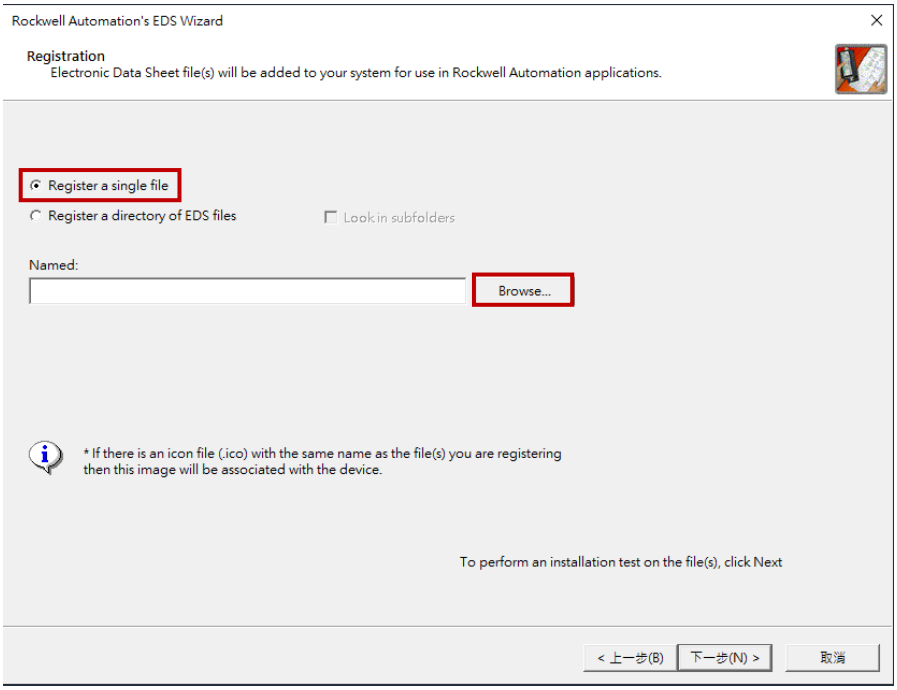


Figure 1.3.4

The source path for E2 EtherNet/IP drive's EDS file is **C:\Thunder\doc\EDS Files**.

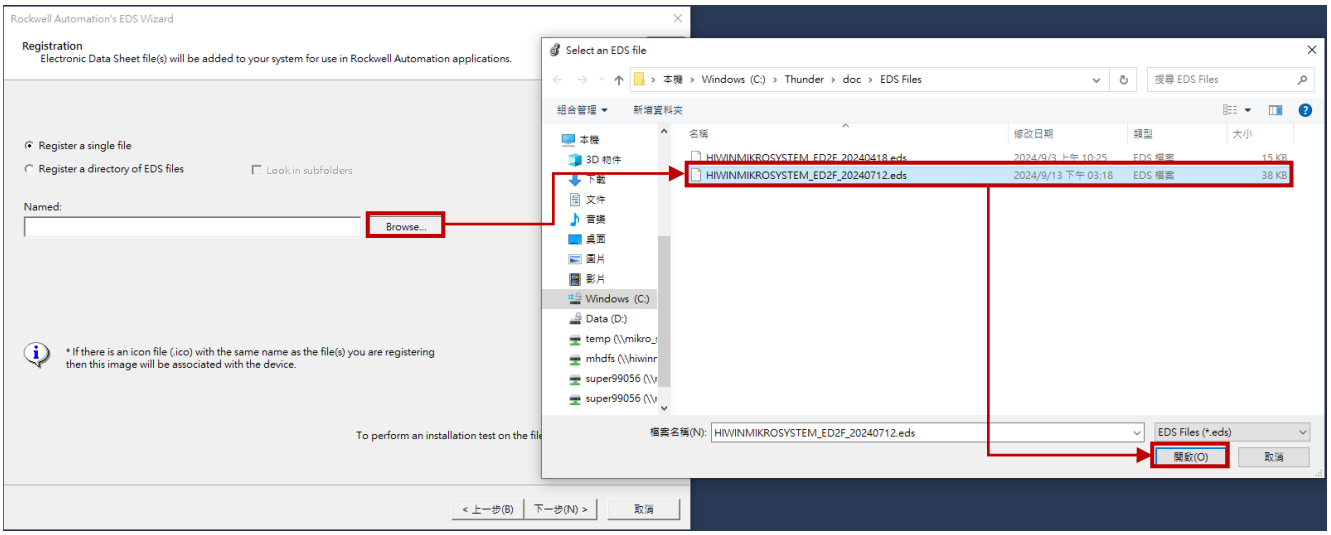


Figure 1.3.5

Select the EDS file with the latest firmware version and click **Next**.

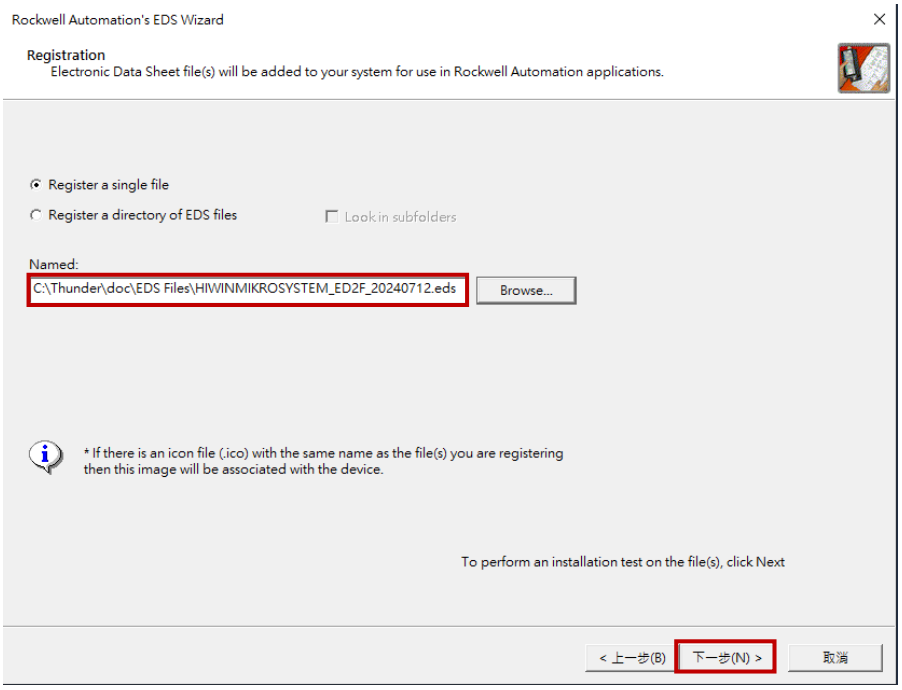


Figure 1.3.6

5. Confirm the EDS file to be loaded and click **Next**.

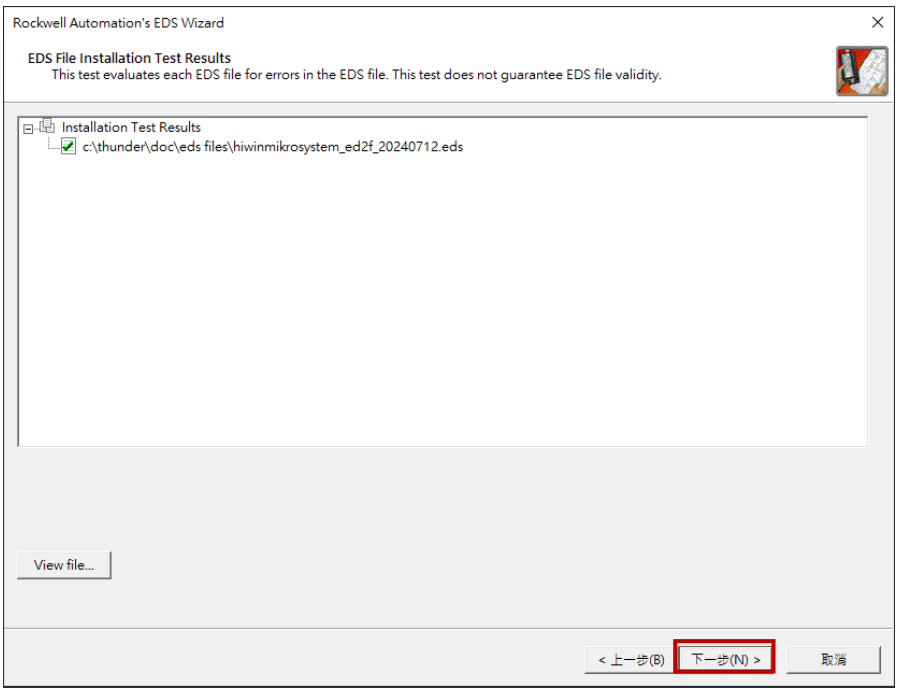


Figure 1.3.7

6. After the EDS file is loaded, E2 drive will be recognized. Click **Next**.

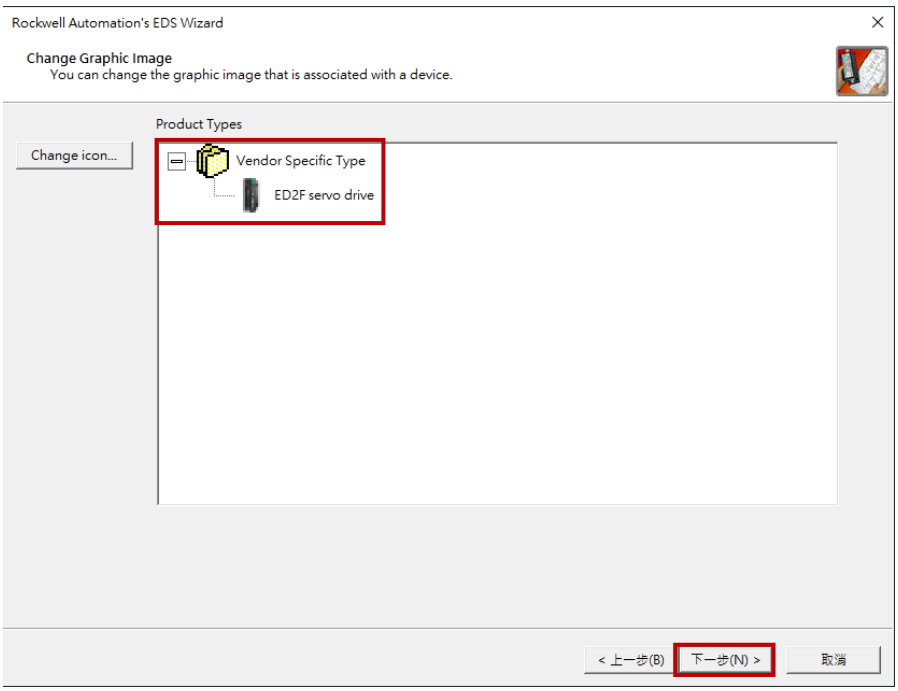


Figure 1.3.8

7. After confirming that E2 drive is recognized, click **Next**.

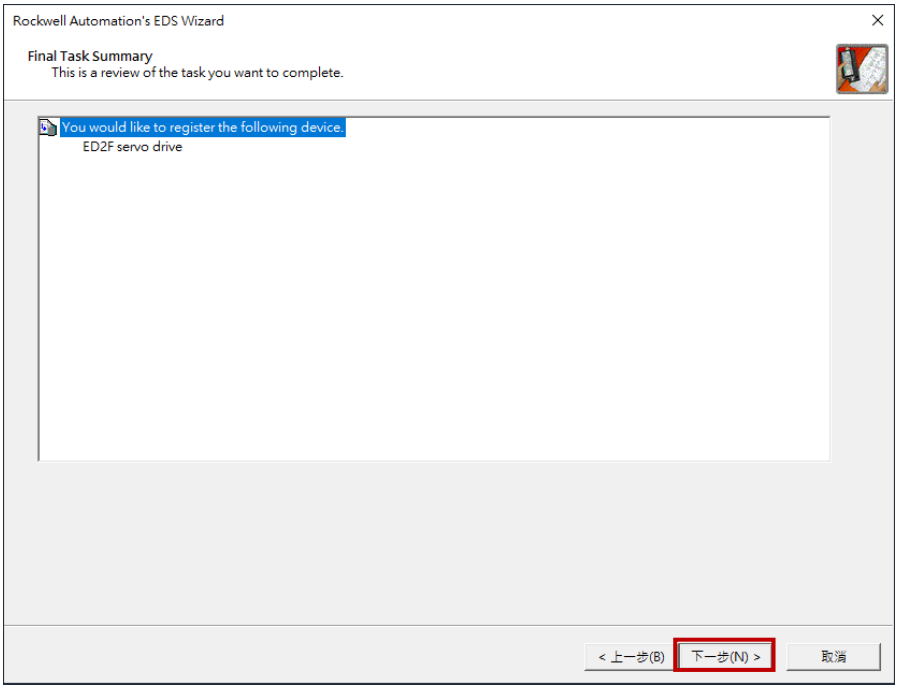


Figure 1.3.9

8. The EDS file is successfully installed.

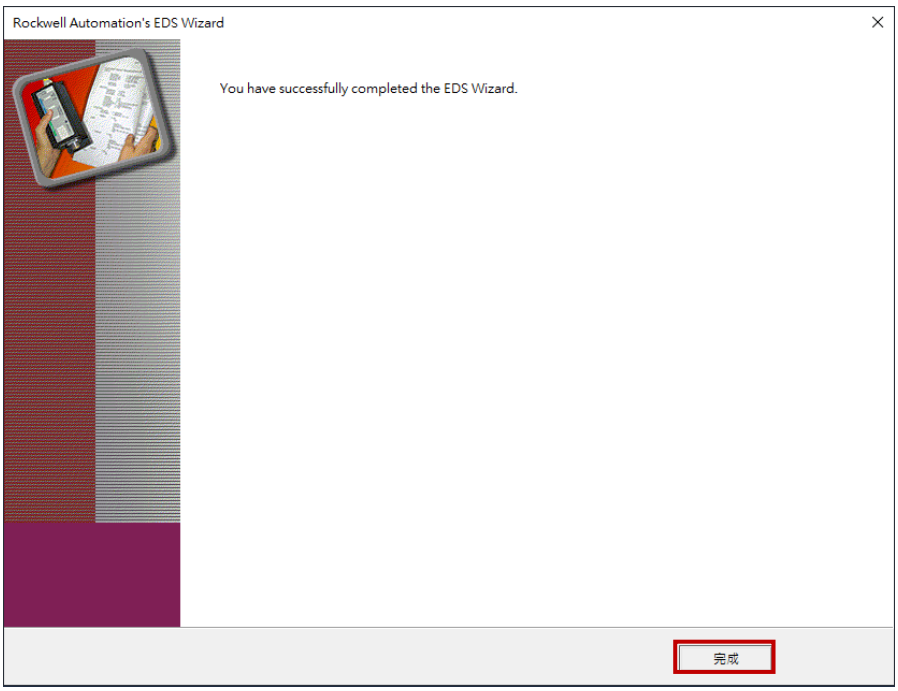


Figure 1.3.10

1.4 Set Thunder's EtherNet/IP setup window

1. Select **Tools** in Thunder's menu bar and click **EtherNet/IP setup** to open "EtherNet/IP setup" window.

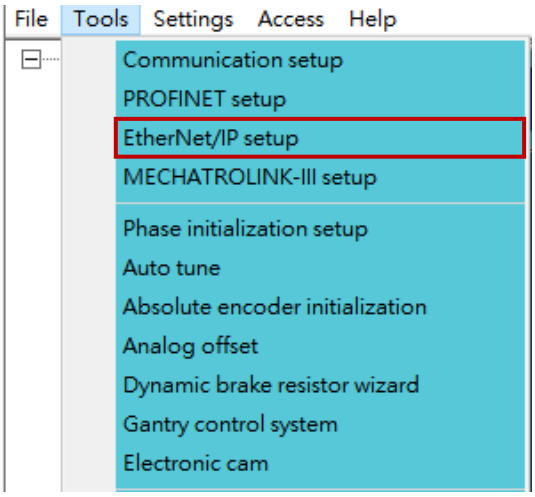


Figure 1.4.1

2. Set IP address, set Subnet mask, select IP mode as **Static**, and click **Apply**. If the information in "Status" column is the same as that in "Configuration" column, the setting is done.

   Note: Set drive's IP address and controller's IP address in the same domain, or communication cannot be normally established.

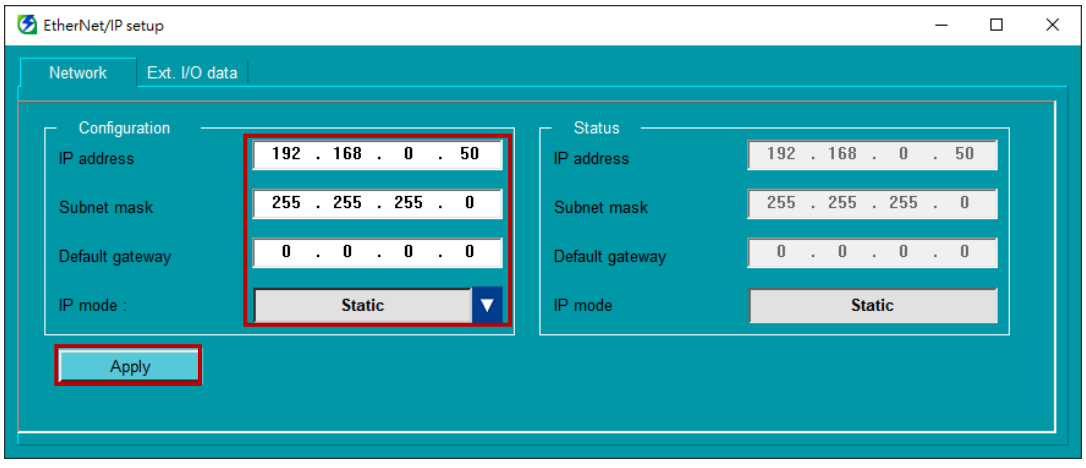


Figure 1.4.2

1.5 Connect device to PLC

1. Click “Who Active” icon in the main window to select the way of connecting device to PLC.

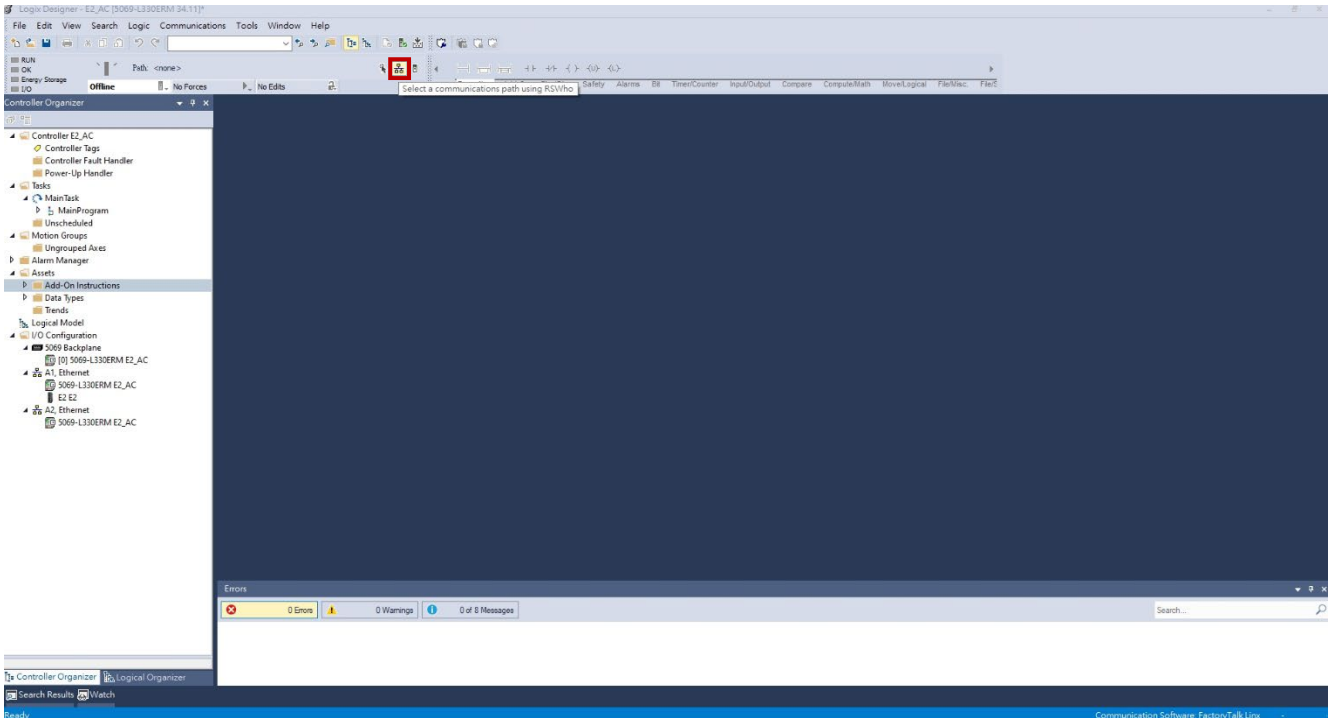


Figure 1.5.1

2. Select the controller under the USB interface and click **Go Online**.

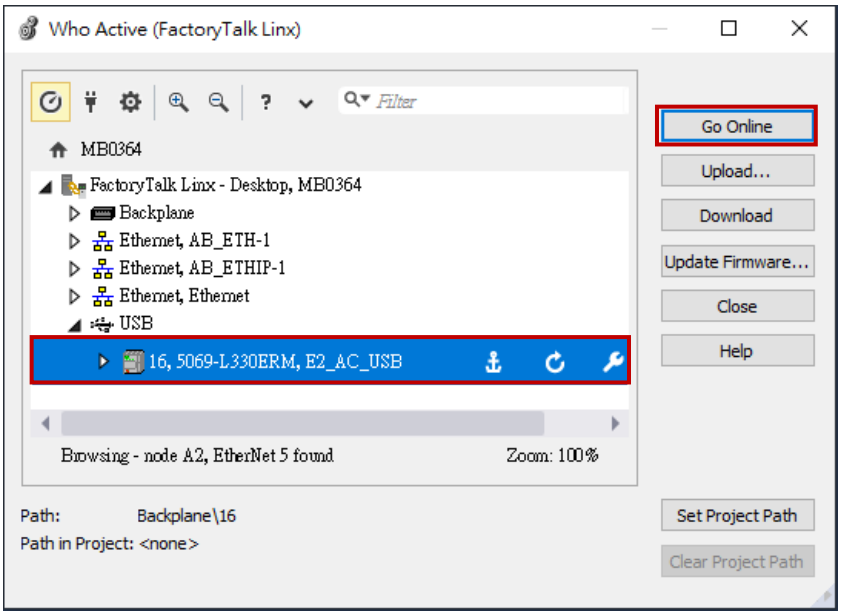


Figure 1.5.2

3. Click **Download**.

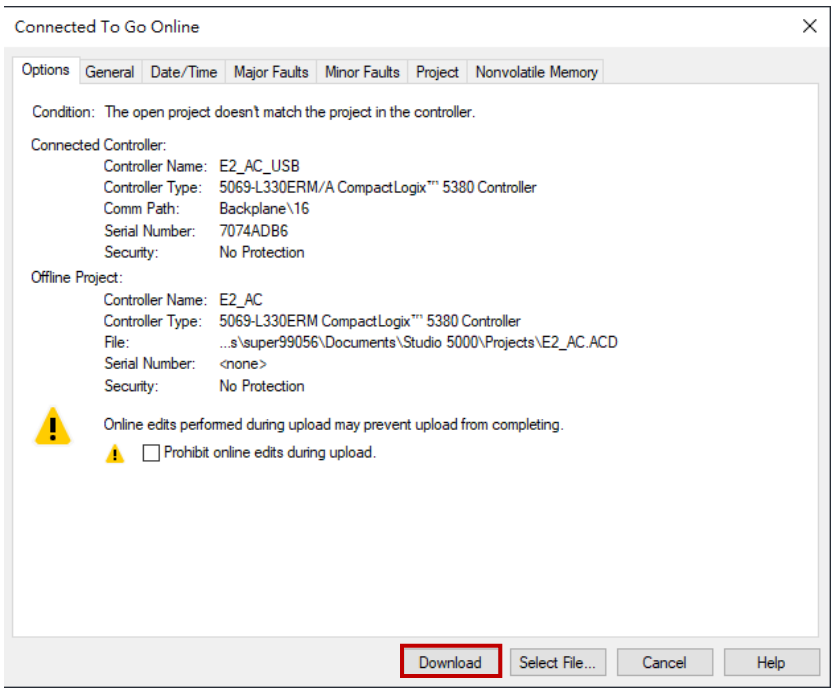


Figure 1.5.3

4. Click **Download** in “Download” window.

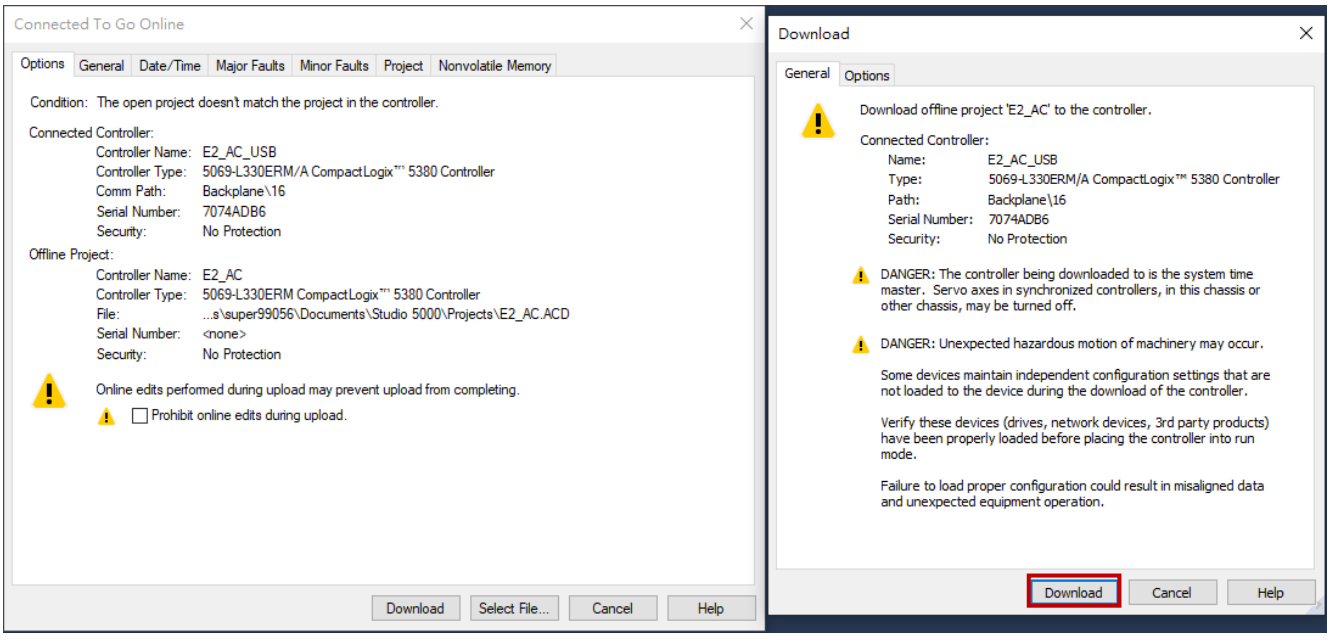


Figure 1.5.4

5. If the statuses in the main window light up, the connection is successfully built.

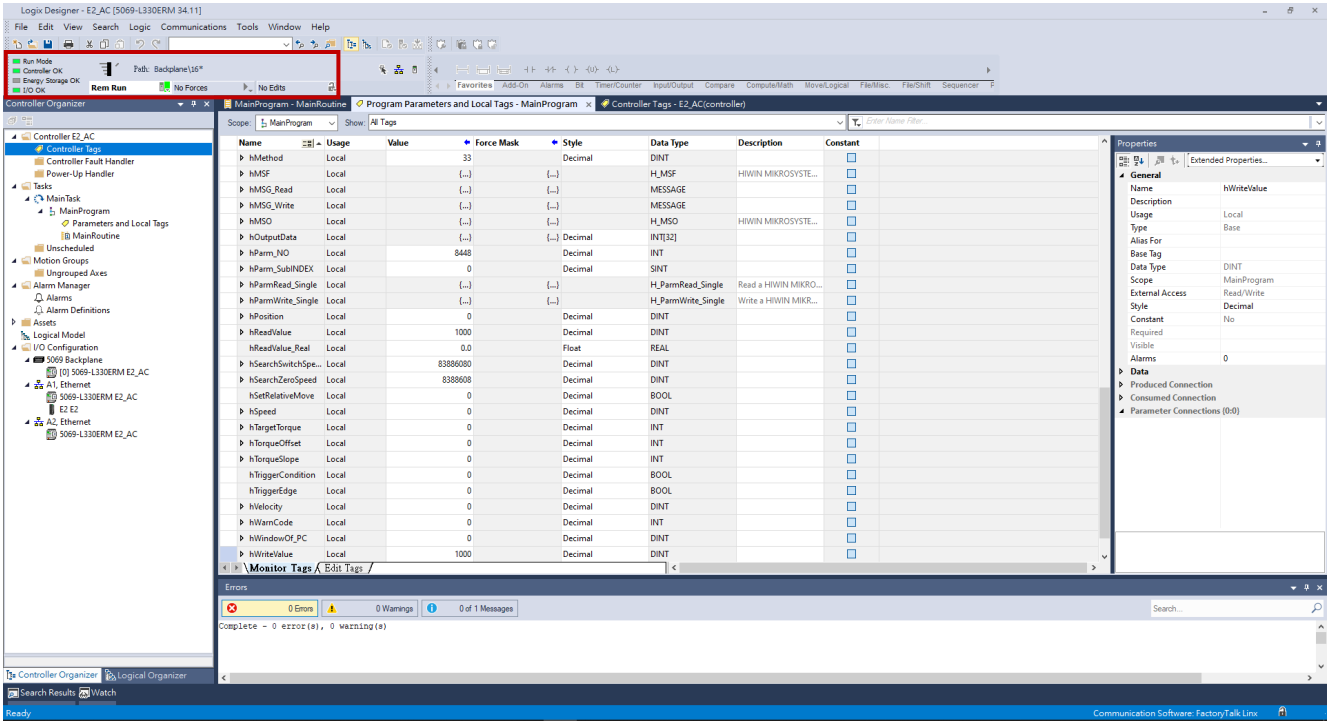


Figure 1.5.5

2. Parameters setup

2.1 Create an axis

1. In the main window, right-click **A1, Ethernet** and select **New Module…**.

   Note: Create the axis on A1 or A2 based on the actual connecting configuration.

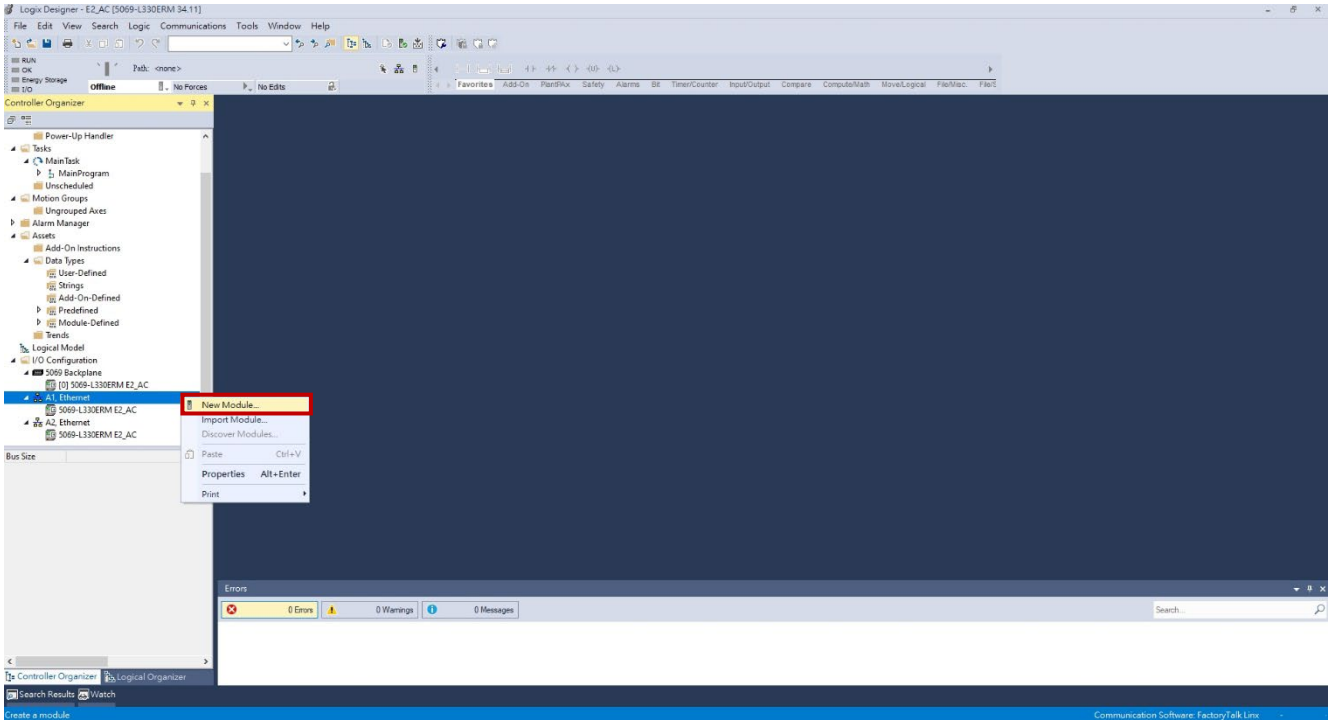


Figure 2.1.1

2. At this time, “Select Module Type” window will pop up. Uncheck all the options in the right column.

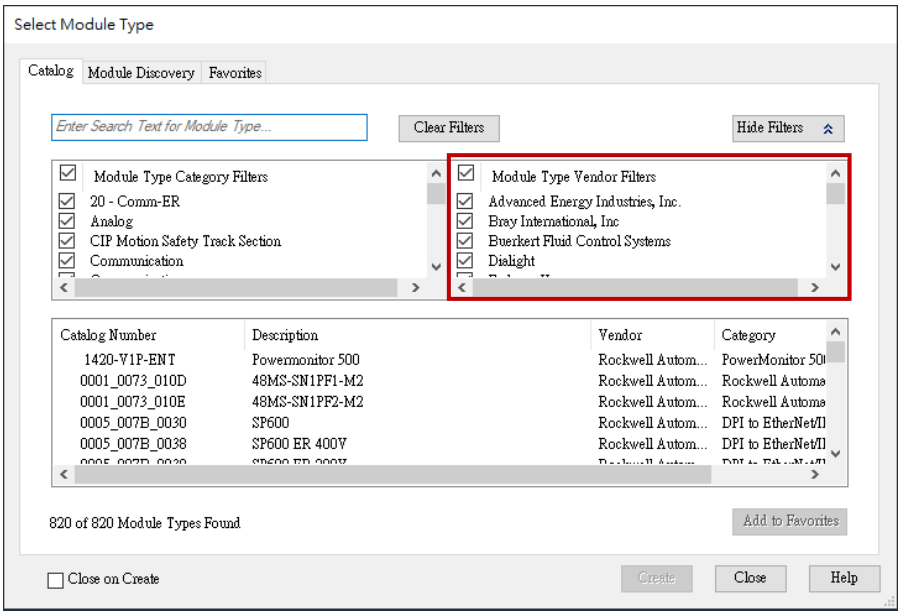


Figure 2.1.2

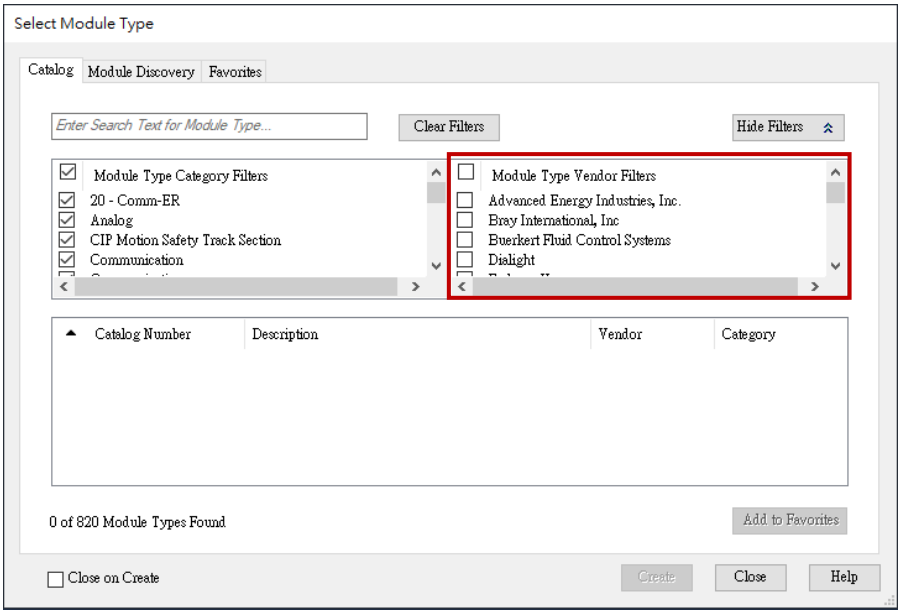


Figure 2.1.3

3. Select **HIWIN MIKROSYSTEM CORP.**, and then E2 drive will be displayed.

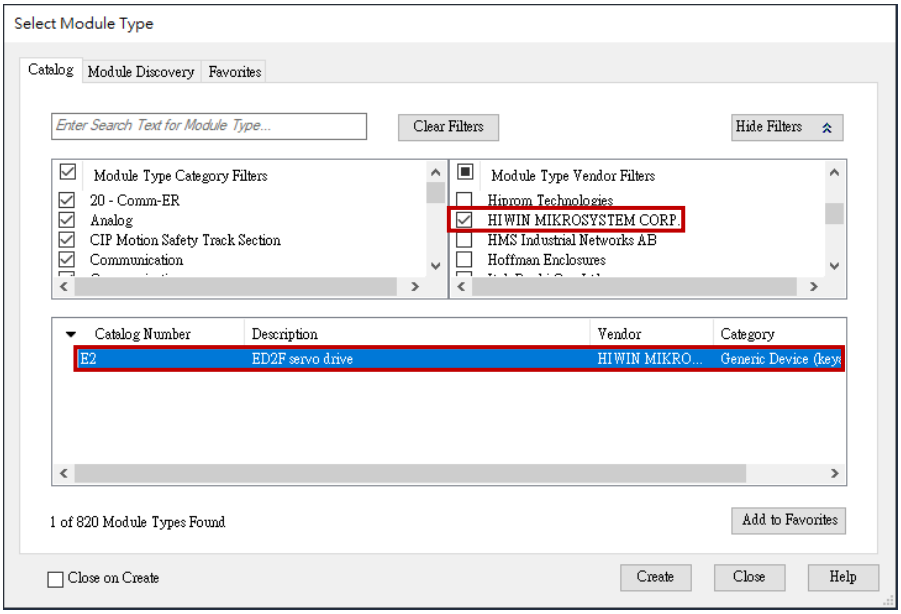


Figure 2.1.4

4. Click **Create** and complete the settings of **Name** and **Private Network** in “New Module” window. The IP setting of Private Network must be the same as that of drive, or communication cannot be normally established.

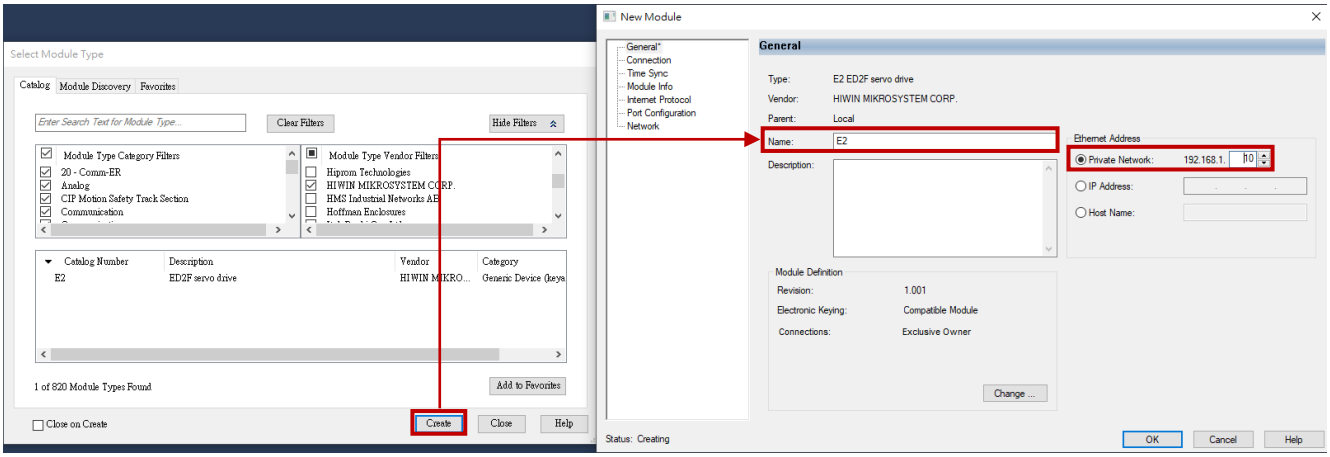


Figure 2.1.5

5. Click **Change** in “New Module” window, select **INT** for **Size** in “Module Definition” window, and click **OK**.

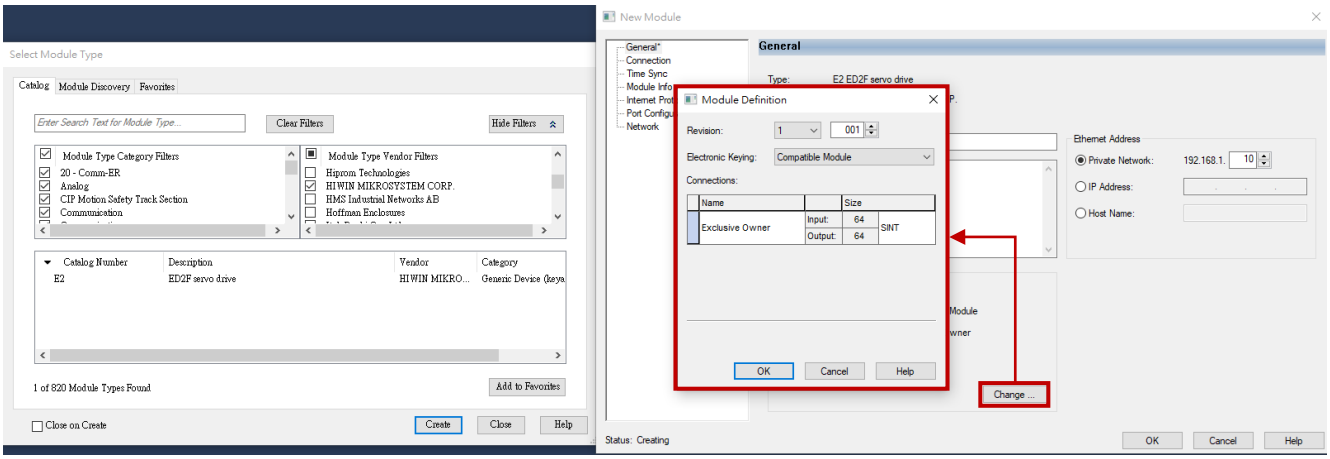


Figure 2.1.6

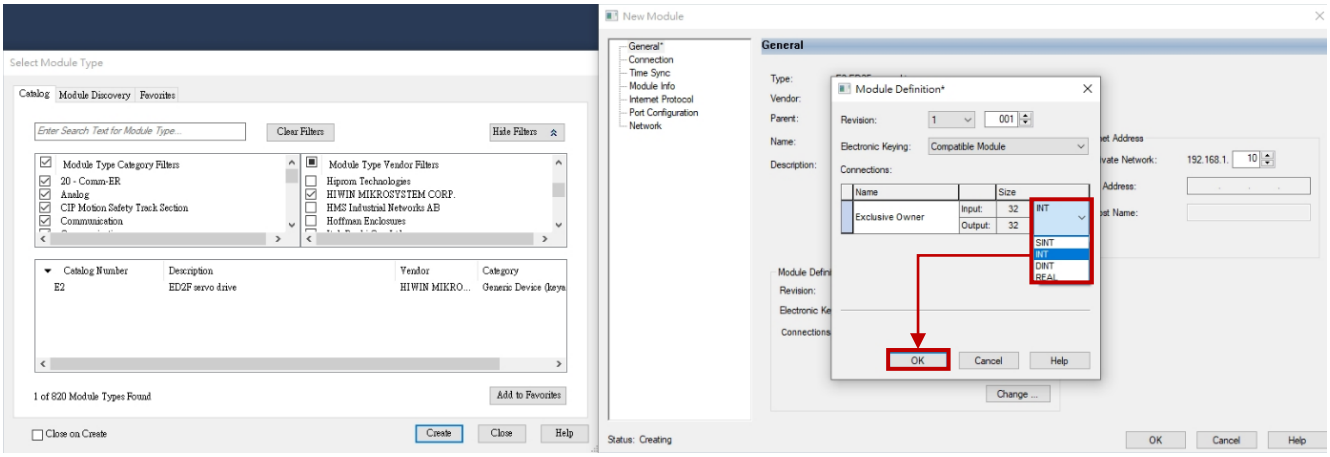


Figure 2.1.7

6. Click **Yes** in “Logix Designer” window and click **OK** in “New Module” window.

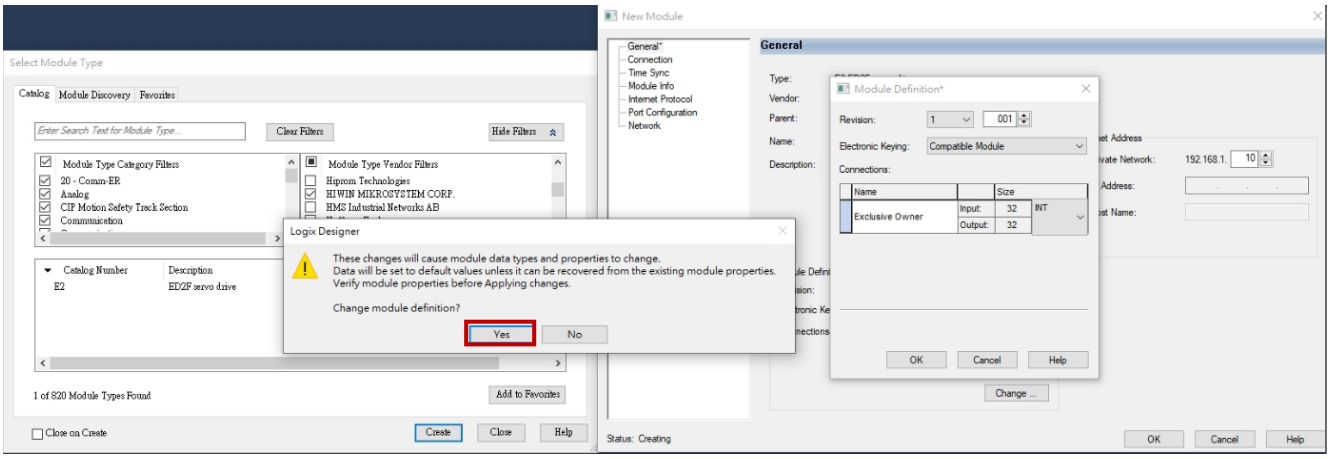


Figure 2.1.8

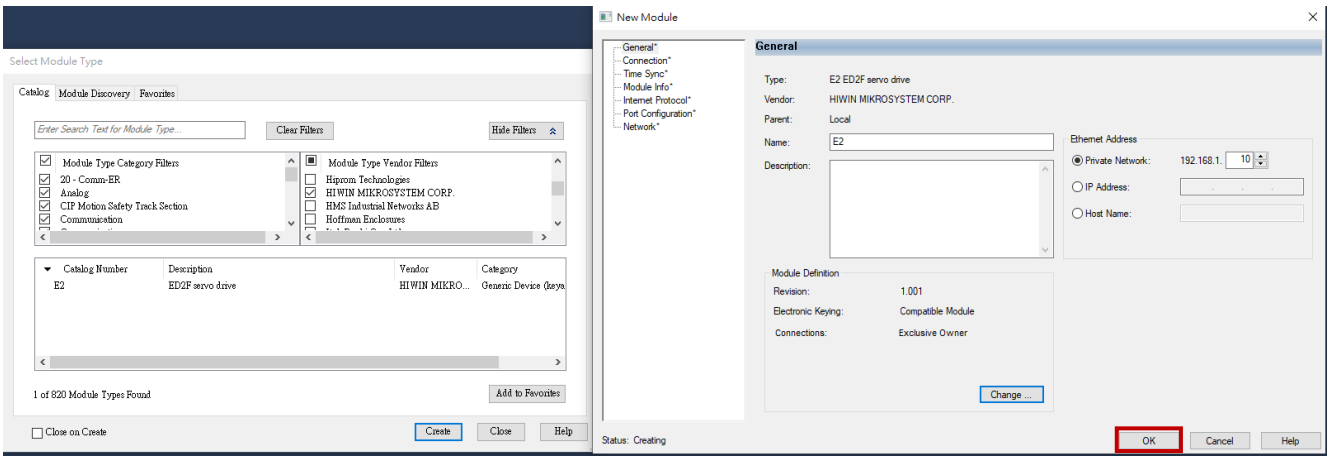


Figure 2.1.9

7. Click **Close** in “Select Module Type” window.
   The axis E2 will be successfully created in the main window.

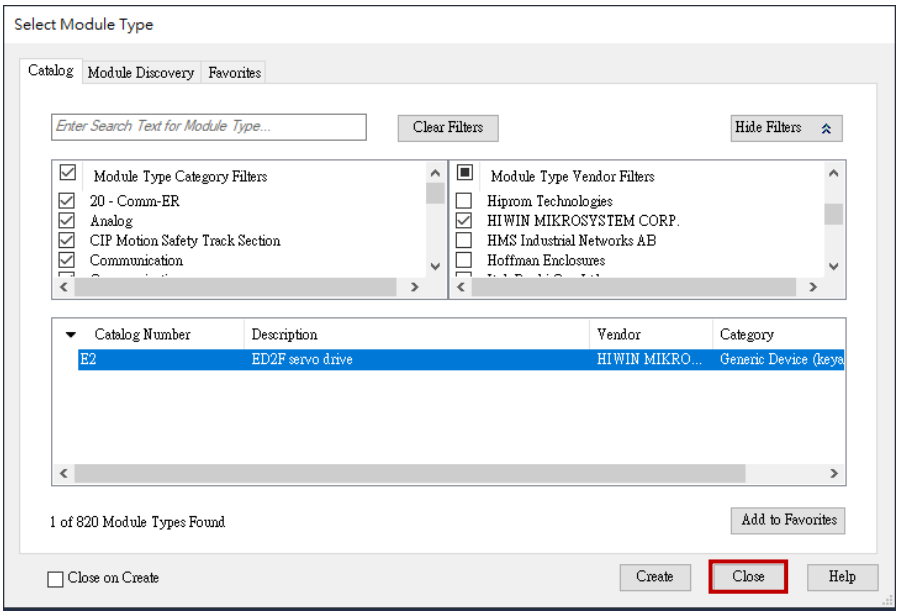


Figure 2.1.10

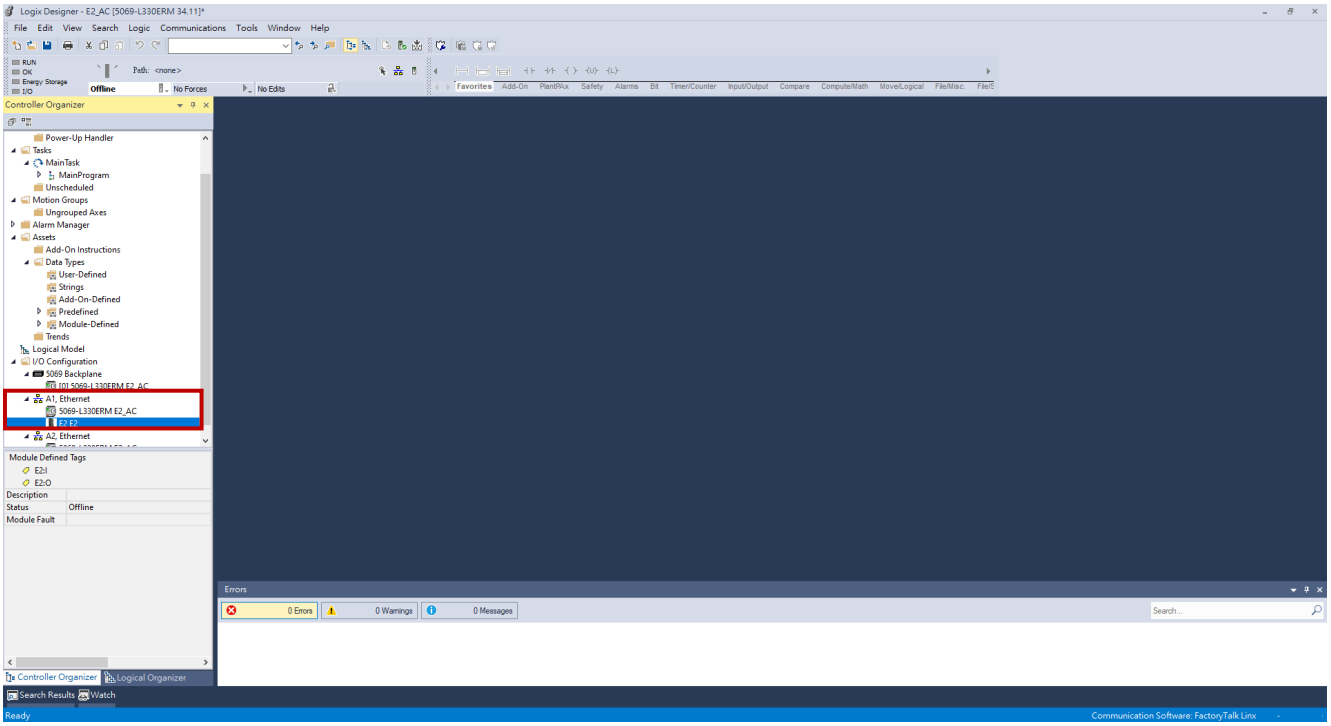


Figure 2.1.11

3. Create function blocks

3.1 Import Add-On Instructions (AOIs)

1. Download EtherNet/IP's function blocks and its manual from HIWIN MIKROSYSTEM's official website: Function Blocks (AOIs)：EtherNet IP with Rockwell Studio 5000

2. In the main window, expand **Assets**, right-click **Add-On Instructions**, and select **Import Add-On Instruction…**.

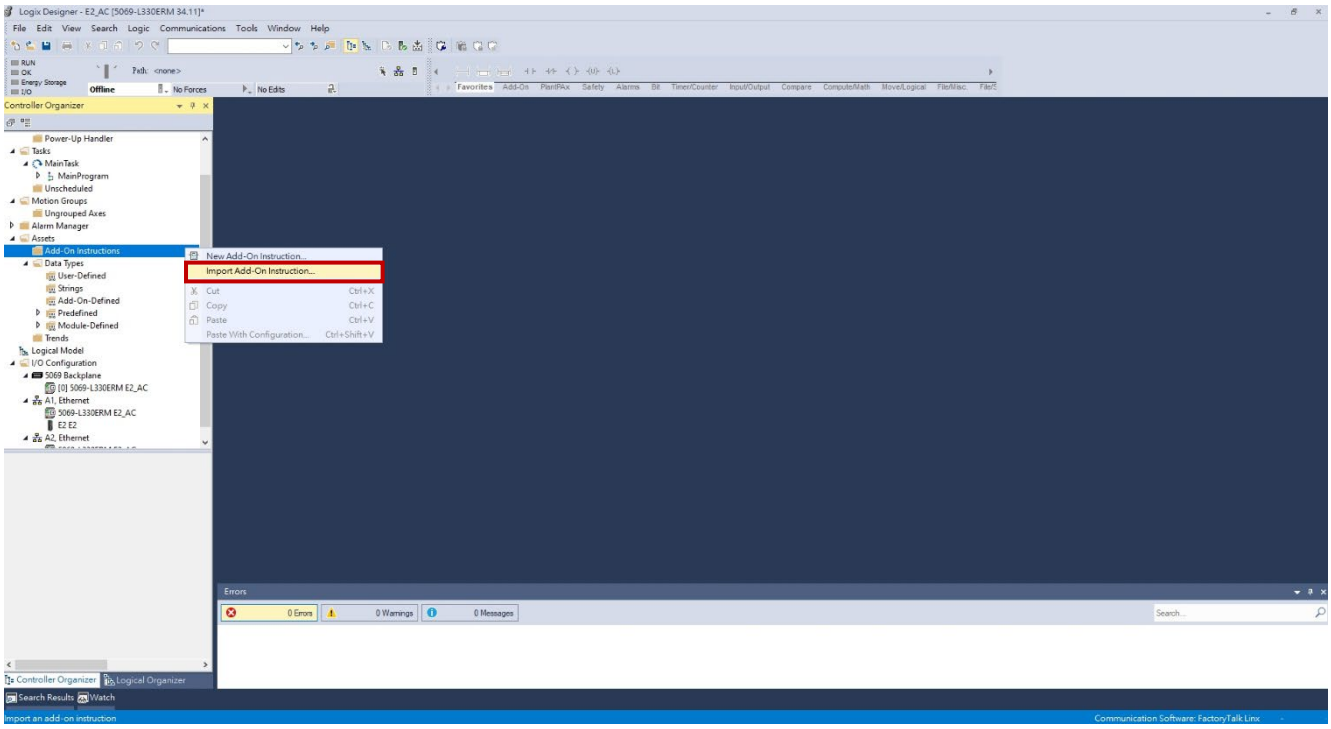


Figure 3.1.1

3. Select the file with the name of **HIWIN_MIKROSYSTEM_AOIs_vx.x.L5X** and click **Open**.

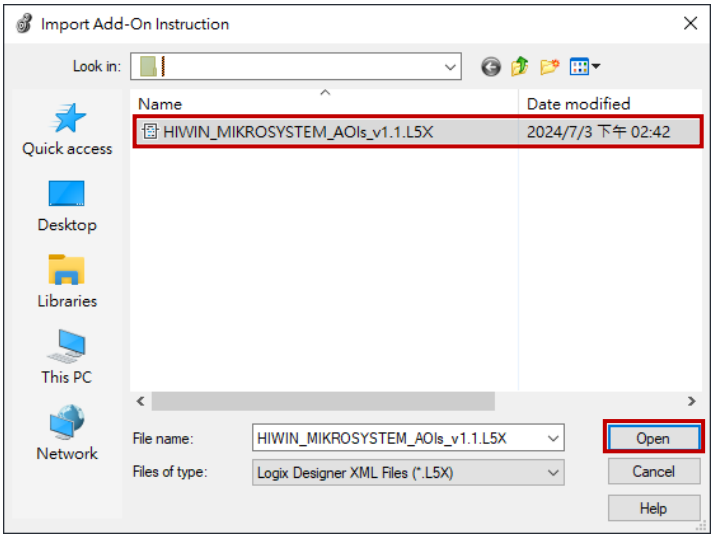


Figure 3.1.2

4. Click **OK** to import AOIs.

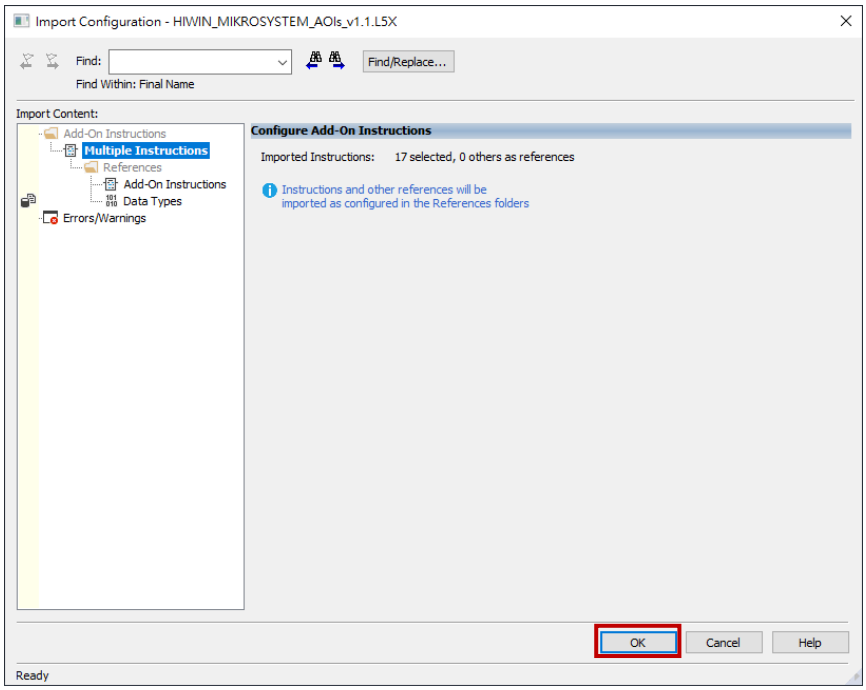


Figure 3.1.3

5. As the import is completed, the supported AOIs will be displayed under **Add-On Instructions** of the main window.

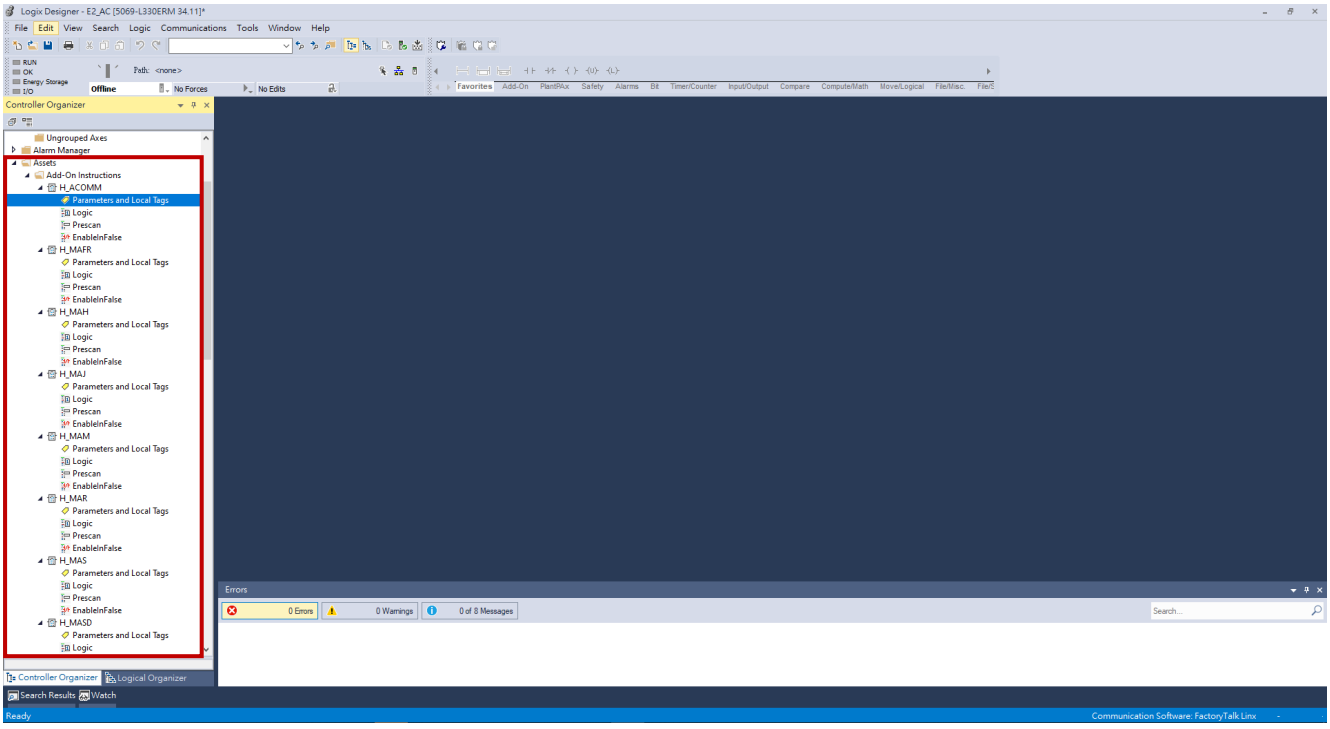


Figure 3.1.4

3.2 Set up procedure for controller

3.2.1 Axis communication

This function block is used for data transmission of drive motion and parameter IO.

(1) Before using each function block, complete the axis communication setup first and ensure the instruction is at enabled state.

(2) For each axis, the transmission channel must be created via axis communication (H_ACOMM) instruction.

Note:

For the detailed instruction description and configuration precautions of AOIs, please refer to “Function Block (AOIs) Application Manual E2 EtherNet/IP Drive with Rockwell Studio 5000.”

1. Expand main window’s **Tasks→MainTask→MainProgram** and double-click **MainRoutine** to start editing the procedure.

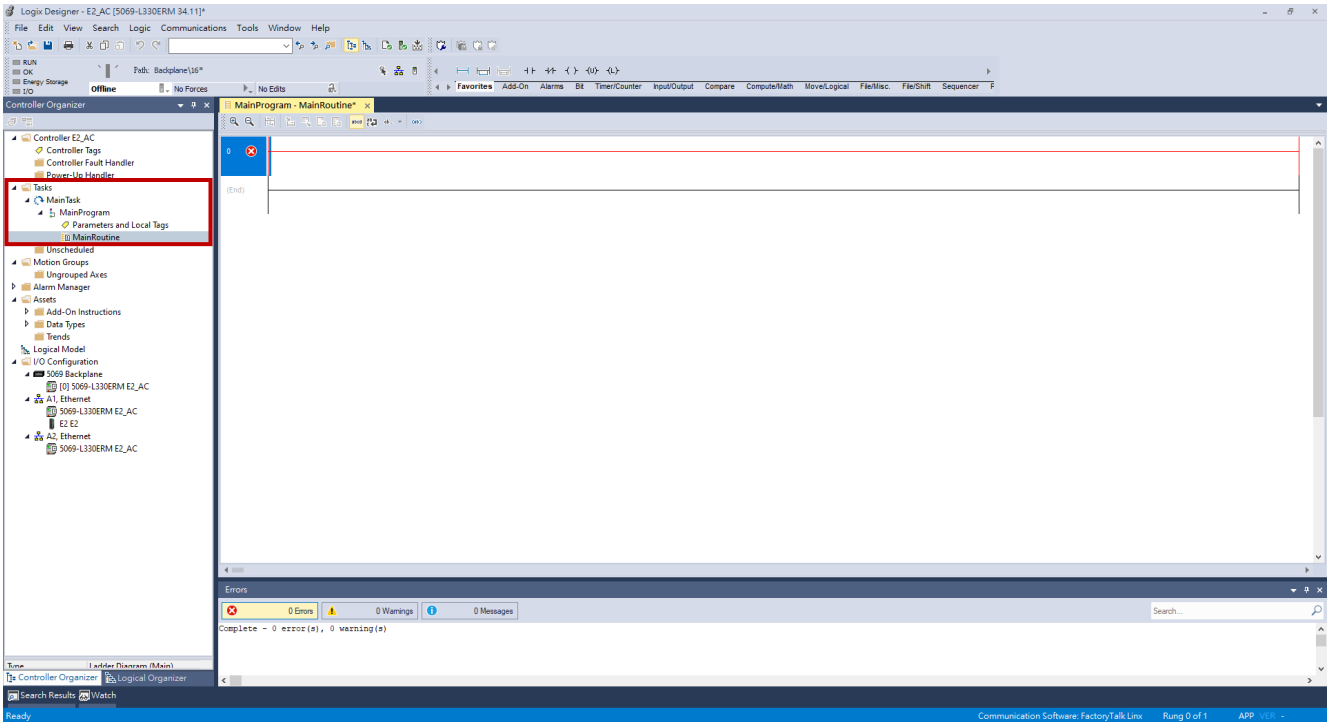


Figure 3.2.1.1

2. Right-click **MainRoutine** procedure and select **Add Ladder Element…**.

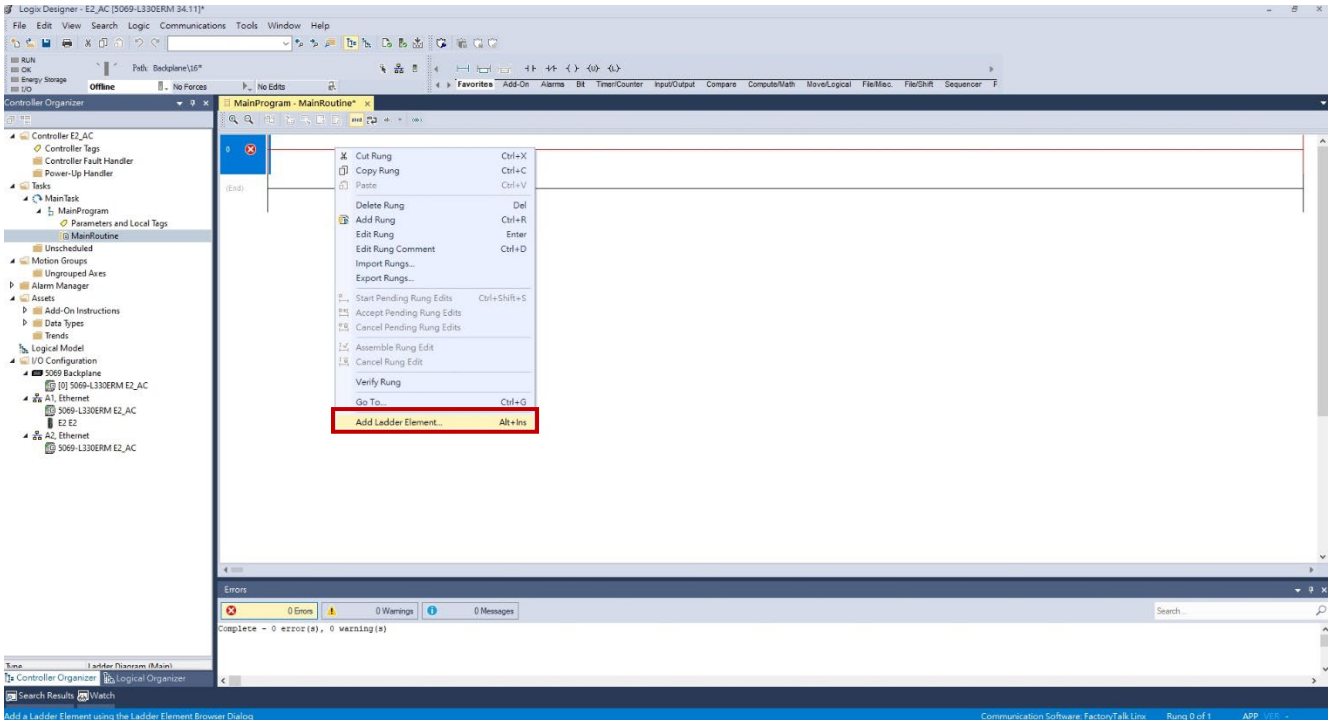


Figure 3.2.1.2

In “Add Ladder Element” window, select **H_ACOMM** instruction and click **OK**.

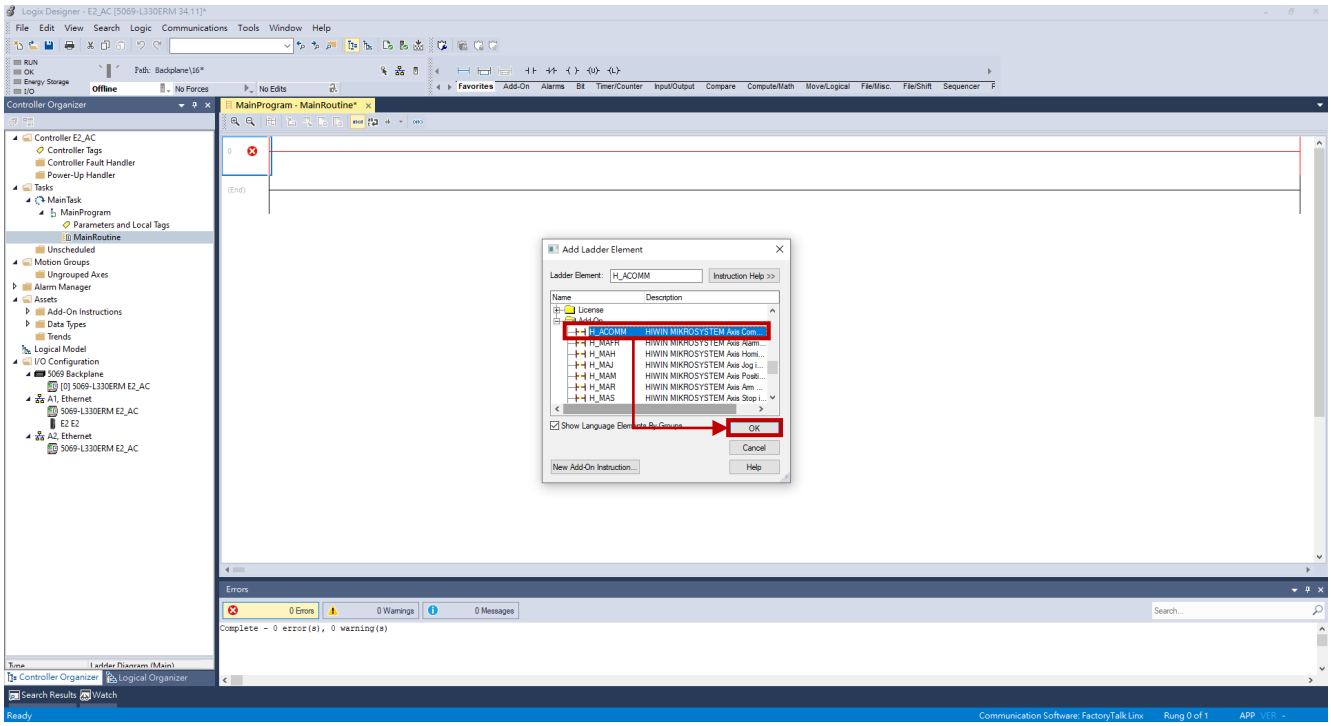


Figure 3.2.1.3

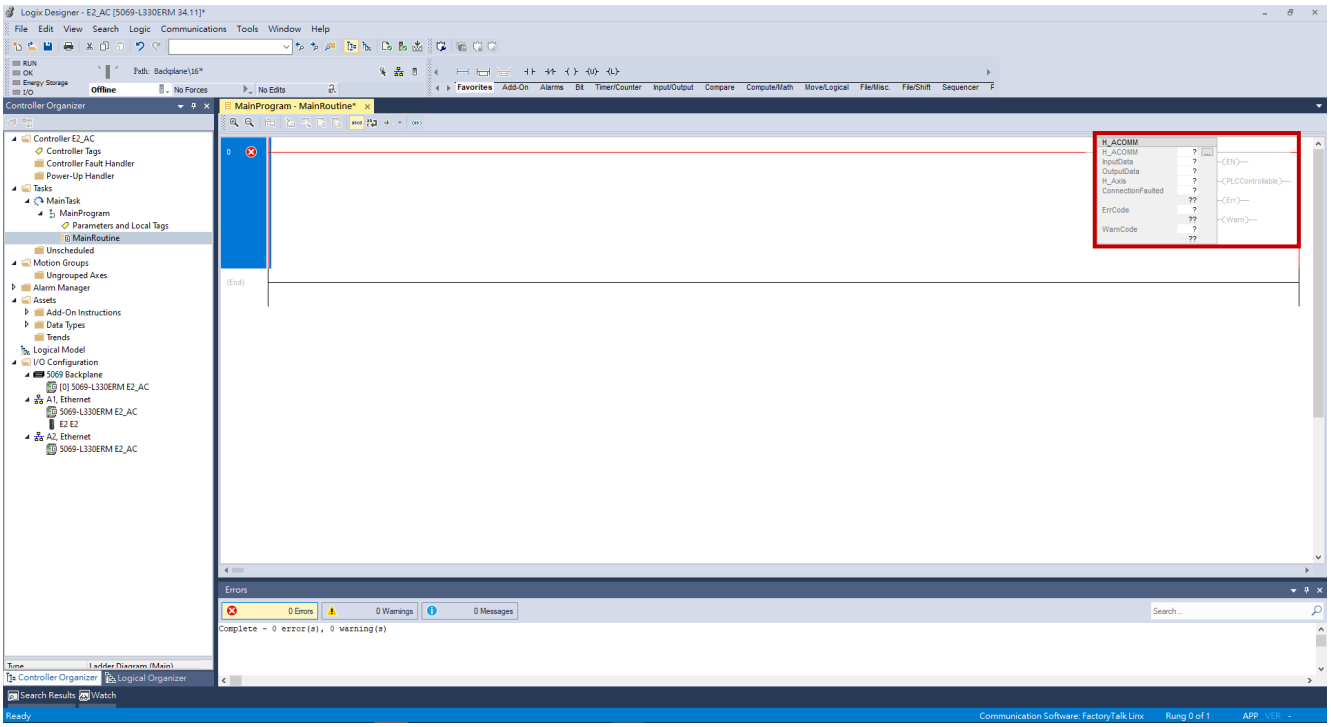


Figure 3.2.1.4

3. Create H_ACOMM instruction. Double-click the items that display a single question mark to set the variable names.

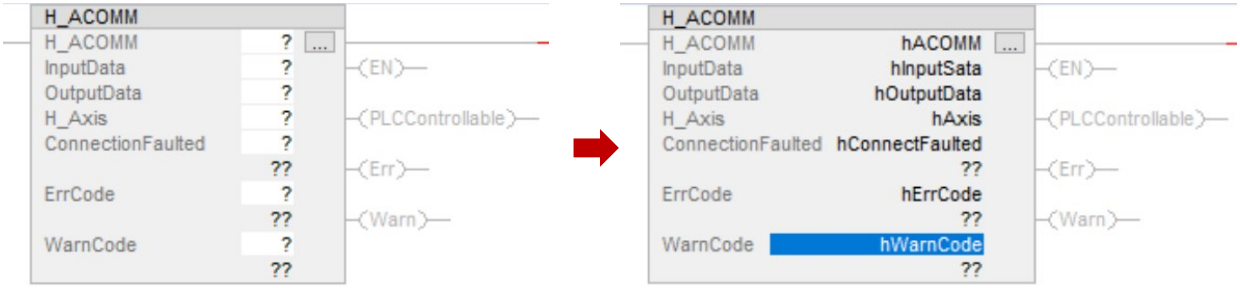


Figure 3.2.1.5

4. Right-click the variables with set names and select **New** to define them. (Every variable with set name must execute this step.)

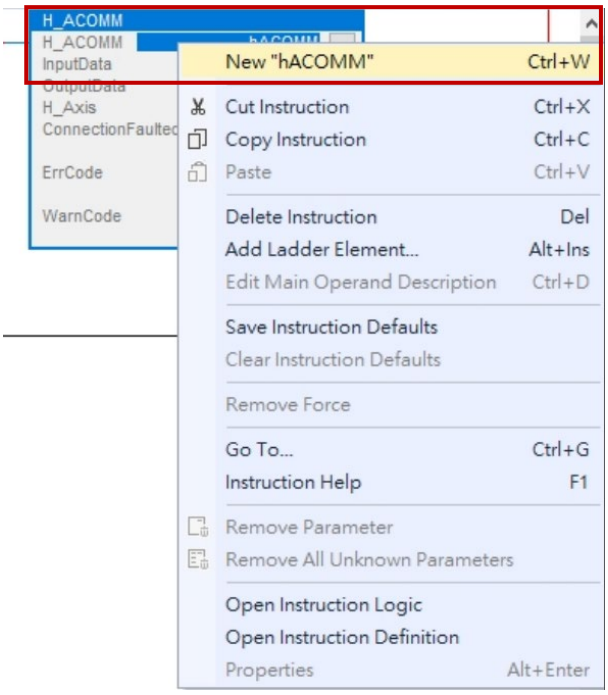


Figure 3.2.1.6

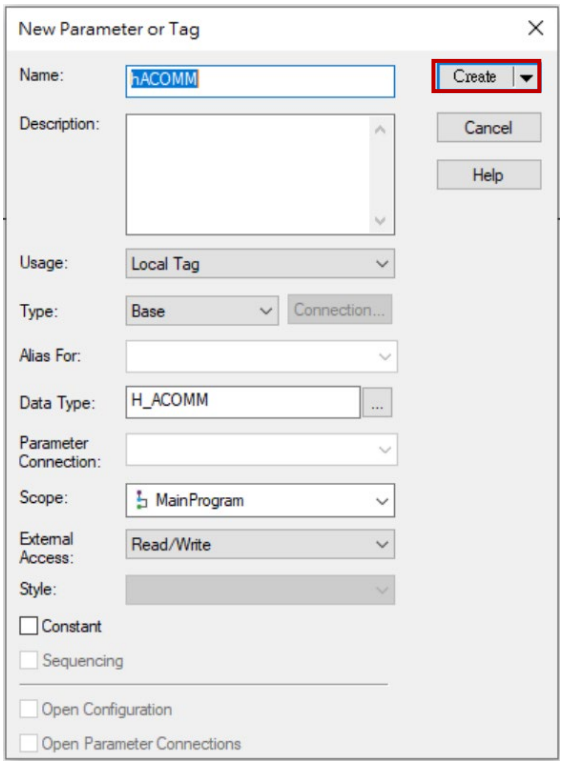


Figure 3.2.1.7

5. After the configuration of variables is completed, the following figure will be displayed.

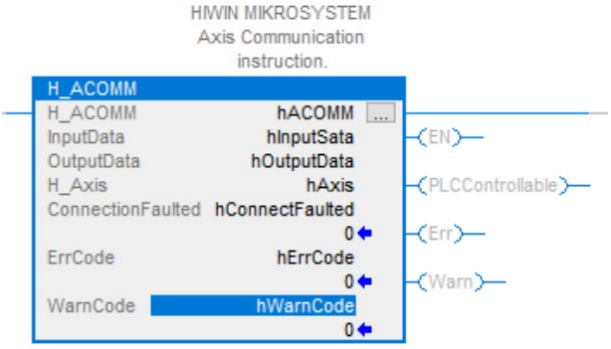


Figure 3.2.1.8

6. H_ACOMM instruction's **InputData**, **OutputData**, and **ConnectionFaulted** must be linked to E2 drive module's tags **I.Data**, **O.Data**, and **I.ConnectionFaulted**. Double-click the variables and refer to the configuration in Figure 3.2.1.9 ~ Figure 3.2.1.11.

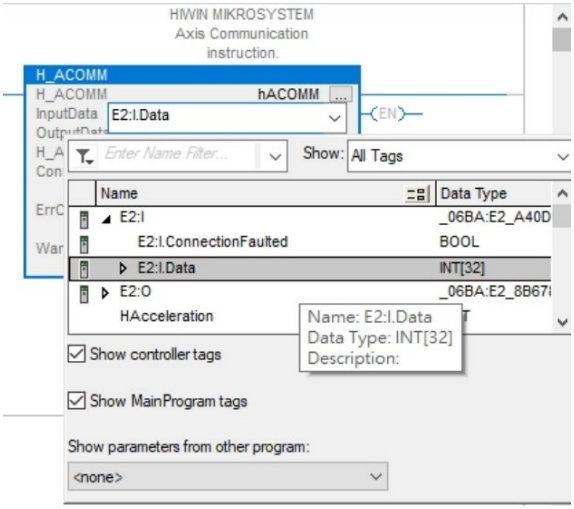


Figure 3.2.1.9

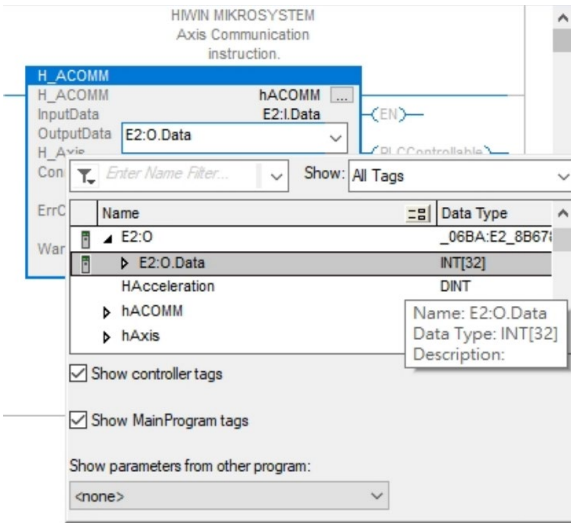


Figure 3.2.1.10

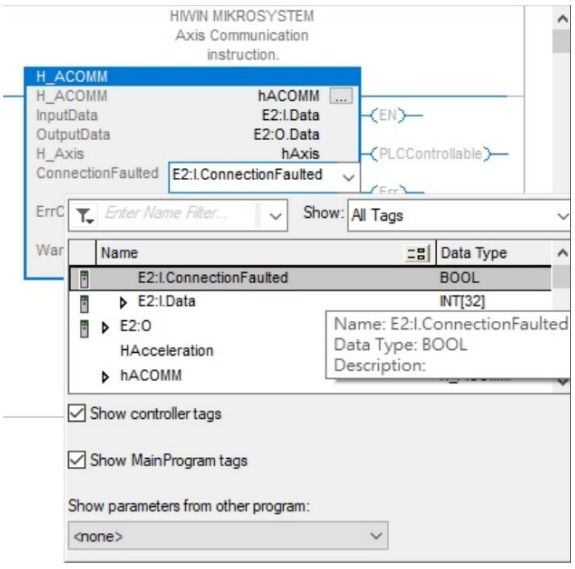


Figure 3.2.1.11

3.2.2 Motion instructions

Function blocks in this section support the functions including axis shutdown, axis enabling, axis moving, axis homing, axis error clearing, axis torque control, axis arm registration and axis arm watch. Please create the function blocks based on the actual requirement. Here takes enabling and homing as setup examples.

Note:

For the detailed instruction description and configuration precautions of AOIs, please refer to “Function Block (AOIs) Application Manual E2 EtherNet/IP Drive with Rockwell Studio 5000.”

1. Refer to the configuration steps of function block in section 3.2.1 to complete the configuration of instructions **H_MSO** and **H_MAH**. The variable of **H_Axis** must be the same as H_ACOMM instruction’s H_Axis, or the controller cannot normally give instructions to the axis.

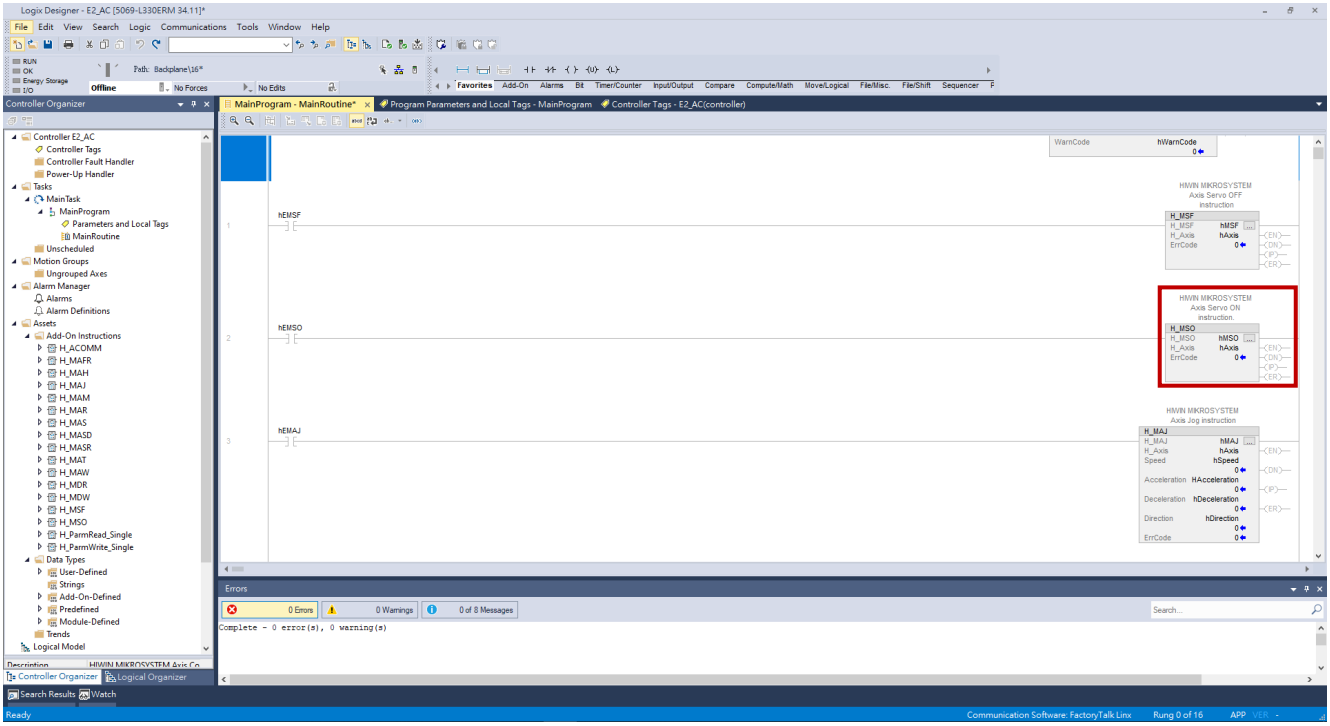


Figure 3.2.2.1

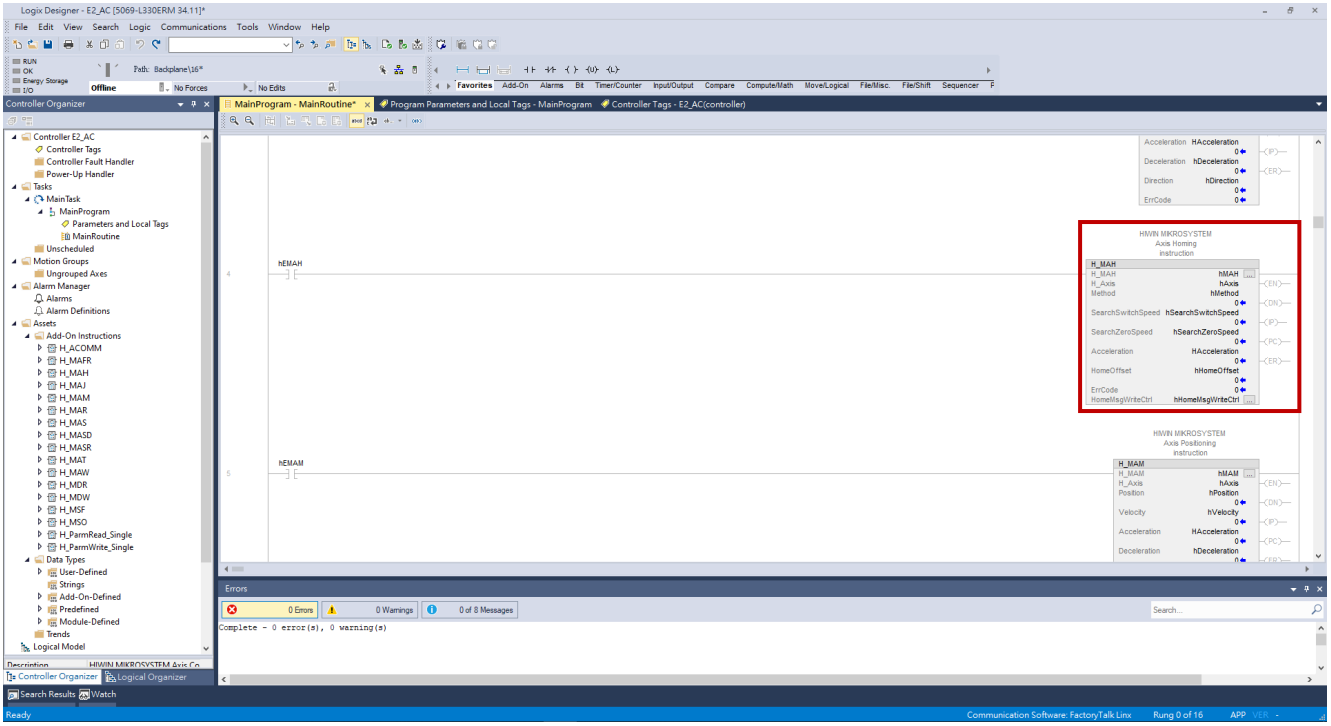


Figure 3.2.2.2

2. Refer to the following configuration for **H_MAH** instruction's **hHomeMsgWriteCtrl**.
   Click the box on the right of **hHomeMsgWriteCtrl**. "Message Configuration" window will pop up.
   Select **Set Attribute Single** and **hMAH.MsgWriteData**, and set **Class**, **Instance** and **Attribute** to 0.

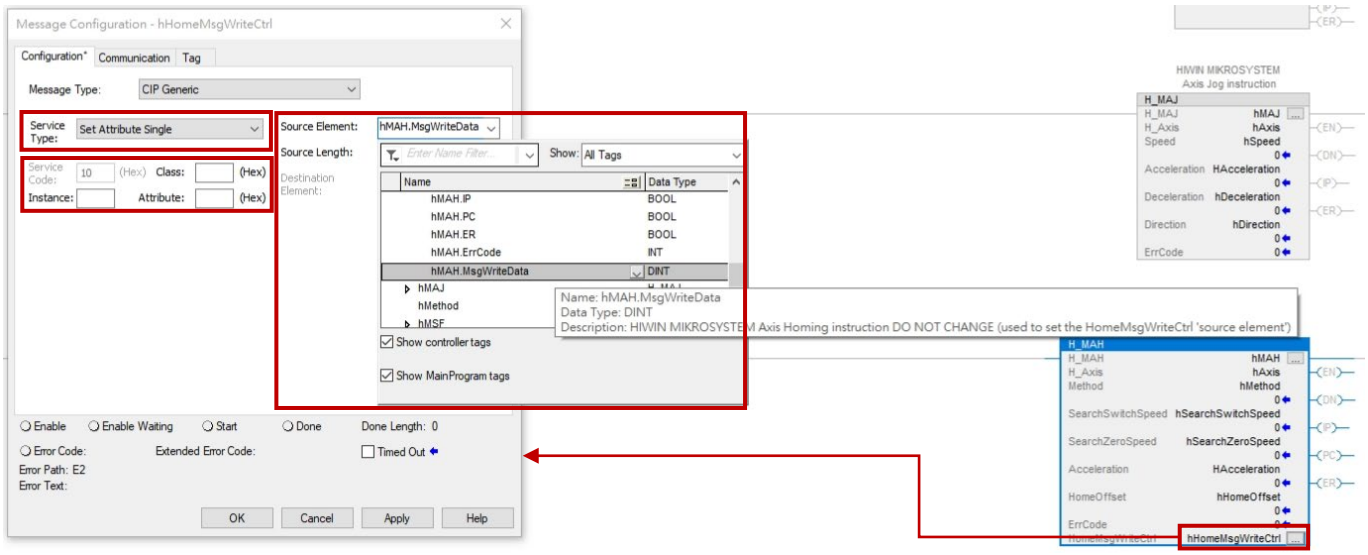


Figure 3.2.2.3

3. Switch to **Communication** tag, click **Browse…** to select the corresponding axis (E2), and click **OK**.

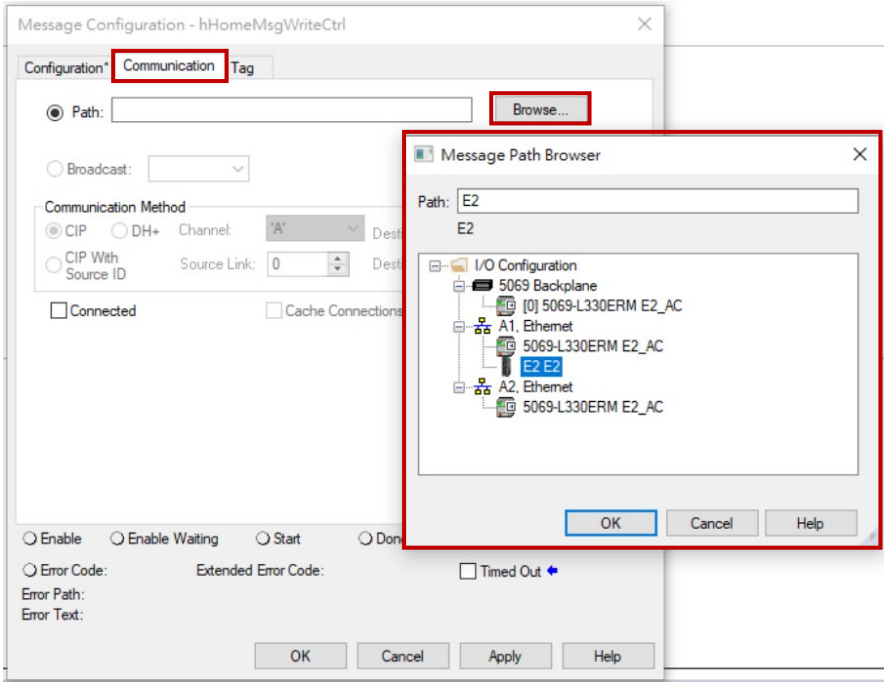


Figure 3.2.2.4

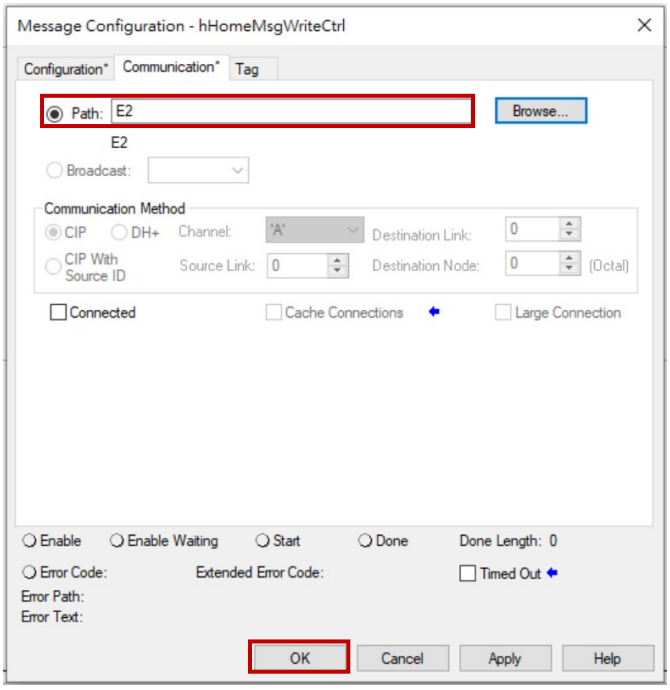


Figure 3.2.2.5

3.2.3 Parameter read/write

Function blocks in this section support the read/write function of drive.
Refer to the following example to complete the setup.

Note:
For the detailed instruction description and configuration precautions of AOIs, please refer to “Function Block (AOIs) Application Manual E2 EtherNet/IP Drive with Rockwell Studio 5000.”

1. Refer to the configuration steps of function block in section 3.2.1 to complete the configuration of instructions **H_ParmRead_Single** and **H_ParmWrite_Single**. The variable of **H_Axis** must be the same as H_ACOMM instruction’s H_Axis, or the controller cannot normally give instructions to the axis.

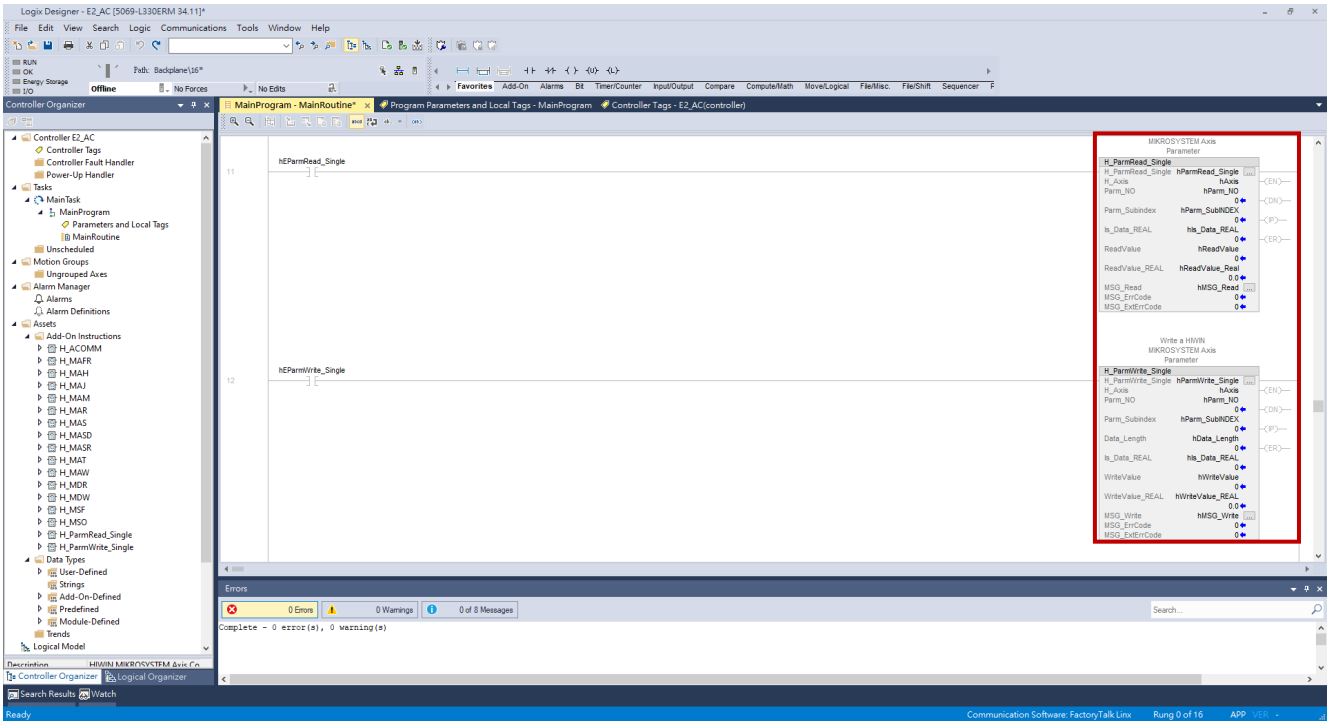


Figure 3.2.3.1

2. Refer to the following configuration for **H_ParmRead_Single** instruction's **hMSG_Read**.
   Click the box on the right of **hMSG_Read**. "Message Configuration" window will pop up.
   Select **Get Attribute Single** and **hParmRead_Single.MsgReadData**, and set **Class**, **Instance** and **Attribute** to 0.

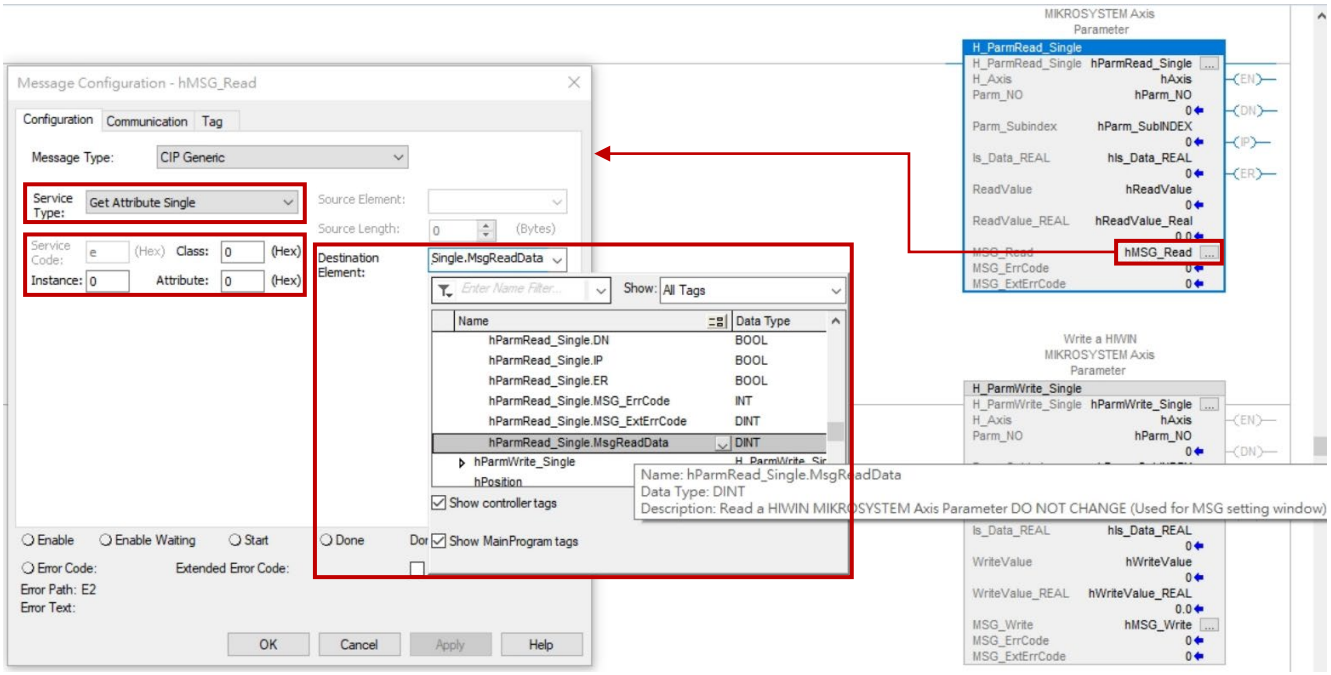


Figure 3.2.3.2

3. Switch to **Communication** tag, click **Browse…** to select the corresponding axis (E2), and click **OK**.

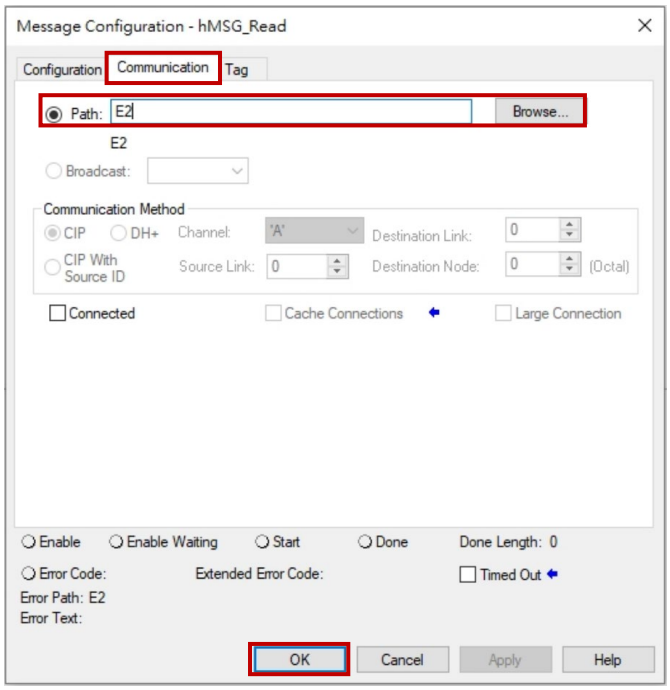


Figure 3.2.3.3

4. Refer to the following configuration for **H_ParmWrite_Single** instruction's **hMSG_Write**. Click the box on the right of **hMSG_Write**. "Message Configuration" window will pop up. Select **Set Attribute Single** and **hParmWrite_Single.MsgWriteData**, and set **Class**, **Instance** and **Attribute** to 0.

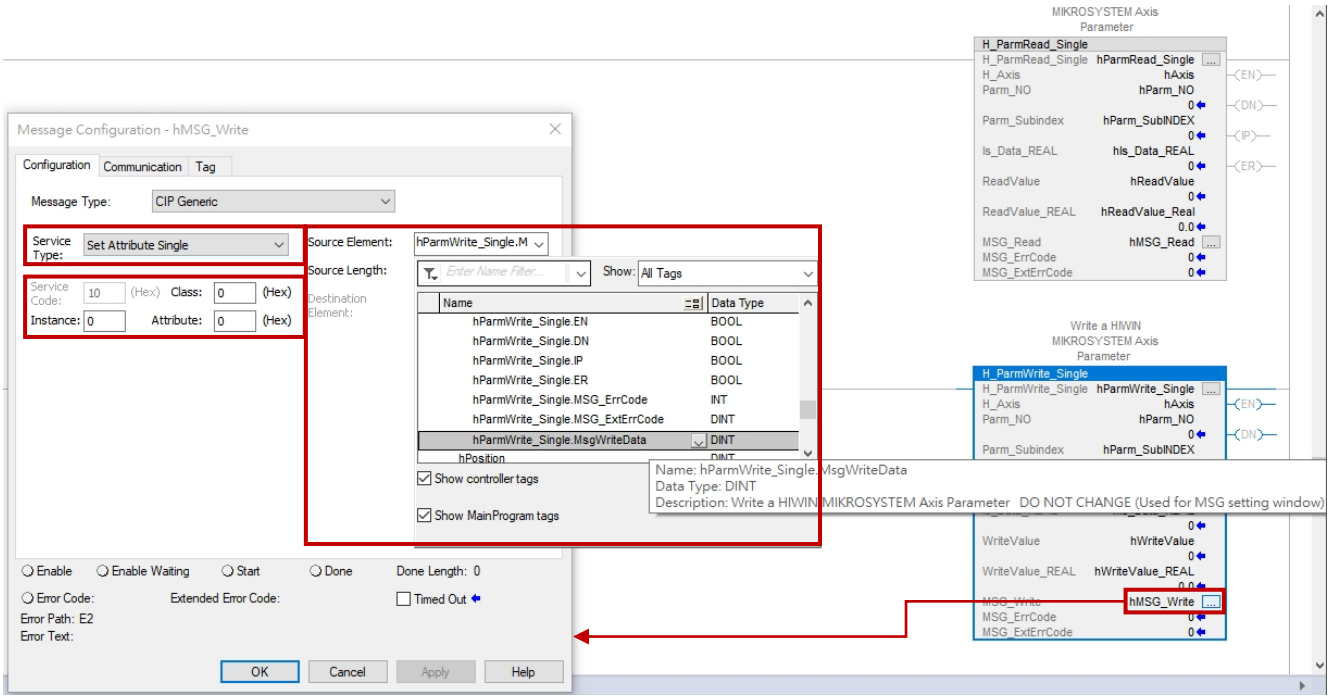


Figure 3.2.3.4

5. Switch to **Communication** tag, click **Browse…** to select the corresponding axis (E2), and click **OK**.

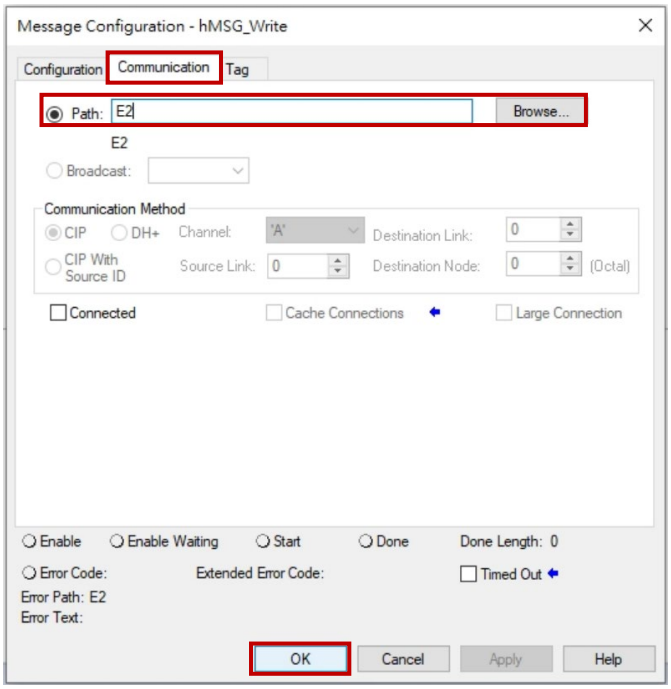


Figure 3.2.3.5

3.3 Download software setup to PLC

1. Click “Build Controller” icon in the main window to confirm that the compilation result is error-free.

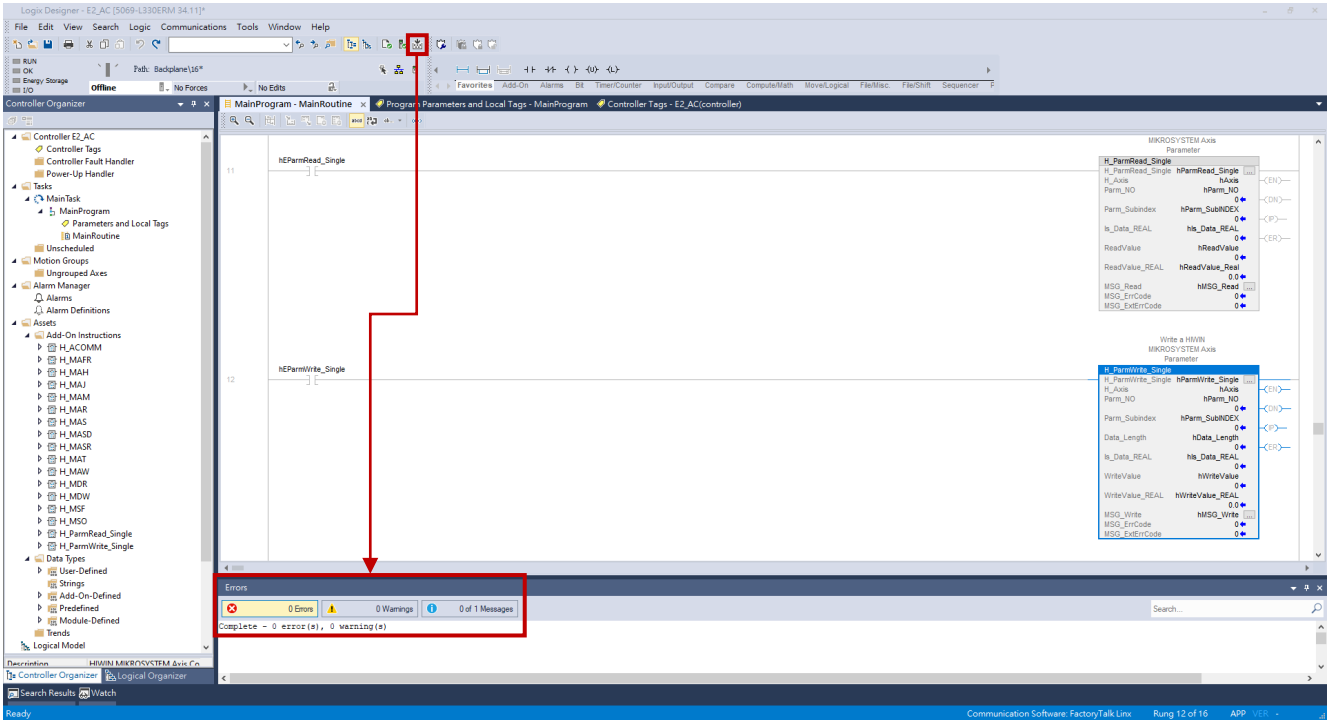


Figure 3.3.1

2. Right-click **Offline** menu and select **Download**.

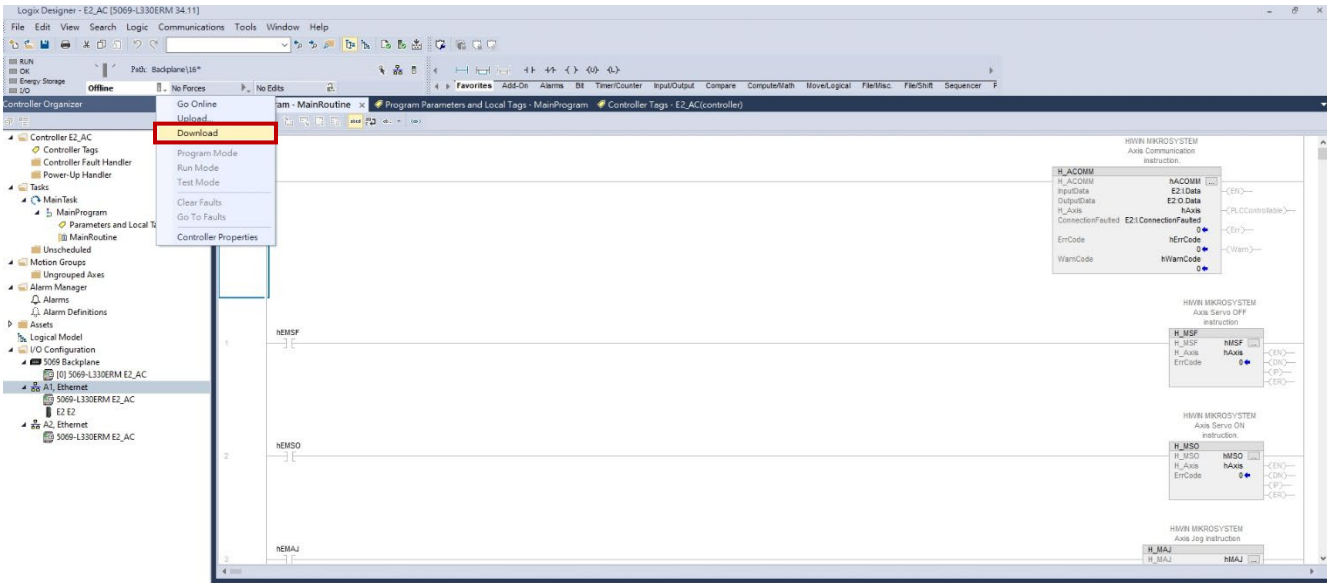


Figure 3.3.2

3. Click **Download** in “Download” window.

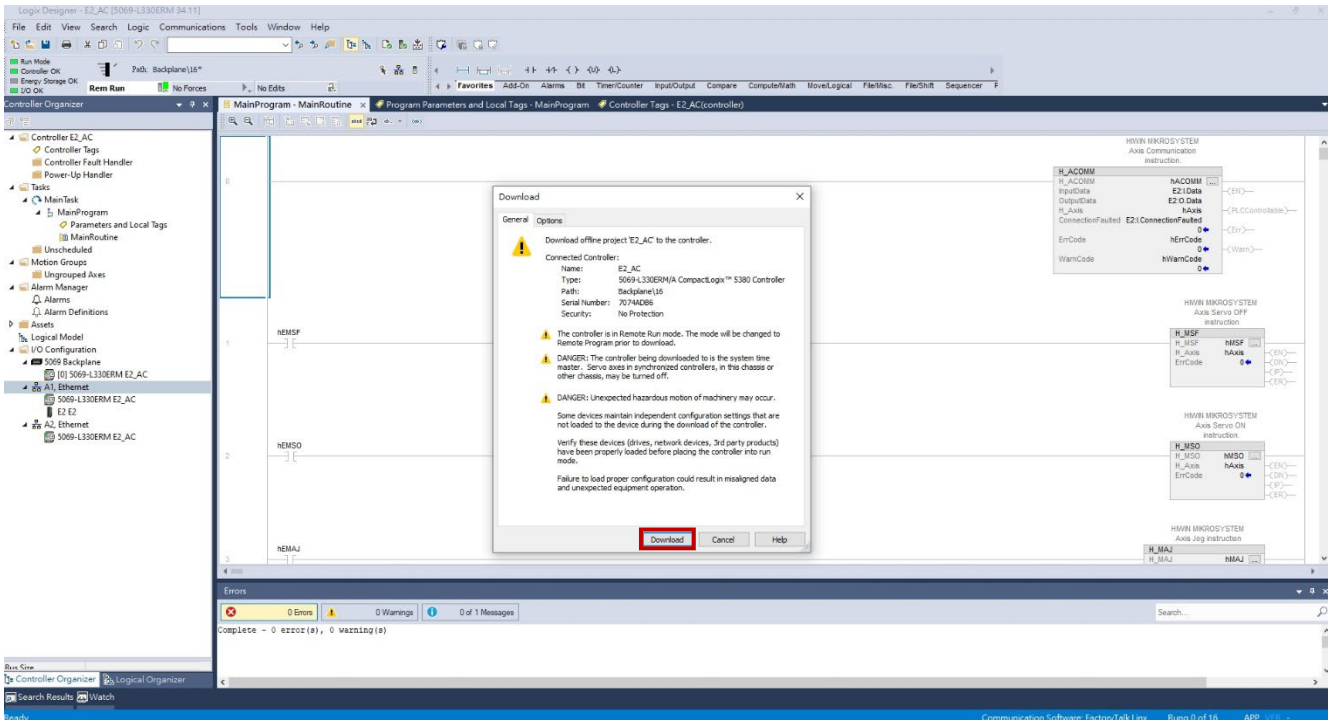


Figure 3.3.3

4. After the loading procedure is completed, click **Yes** in “Logix Designer” window to switch the controller to Run mode.

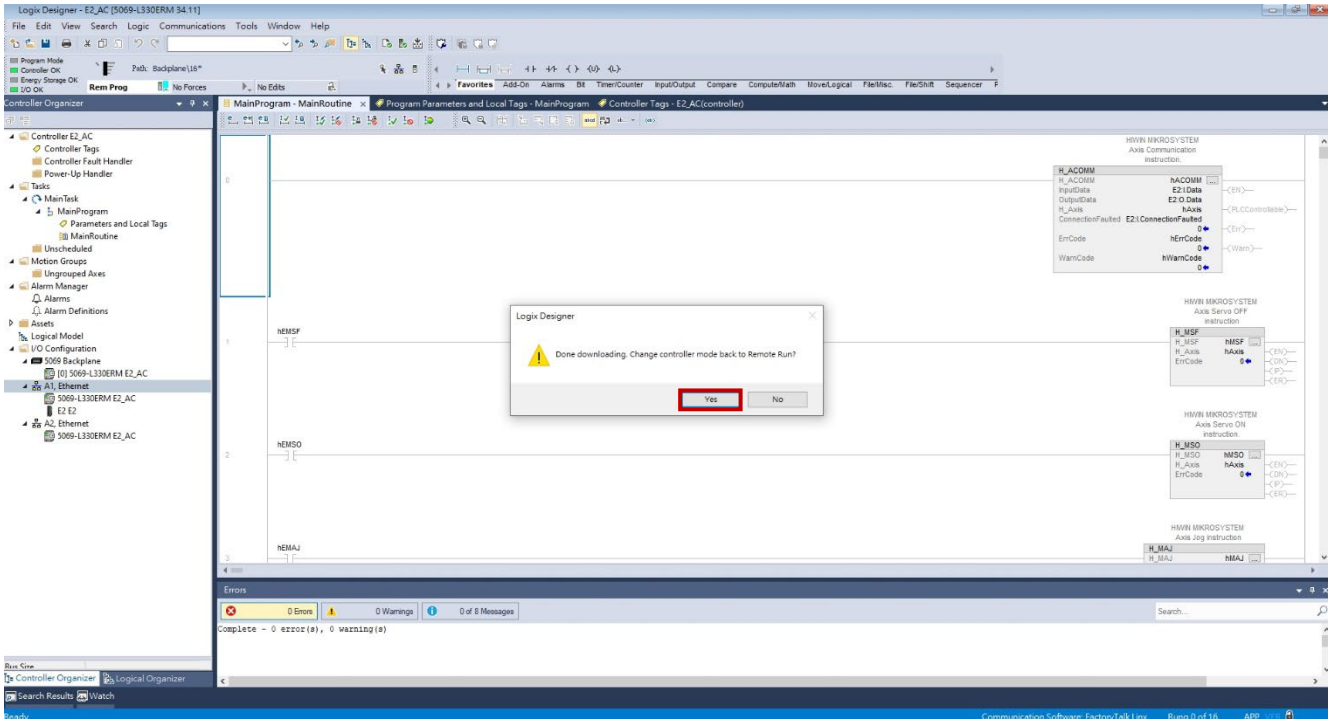


Figure 3.3.4

5. After the device is successfully connected, the statuses in the main window will display green lights.

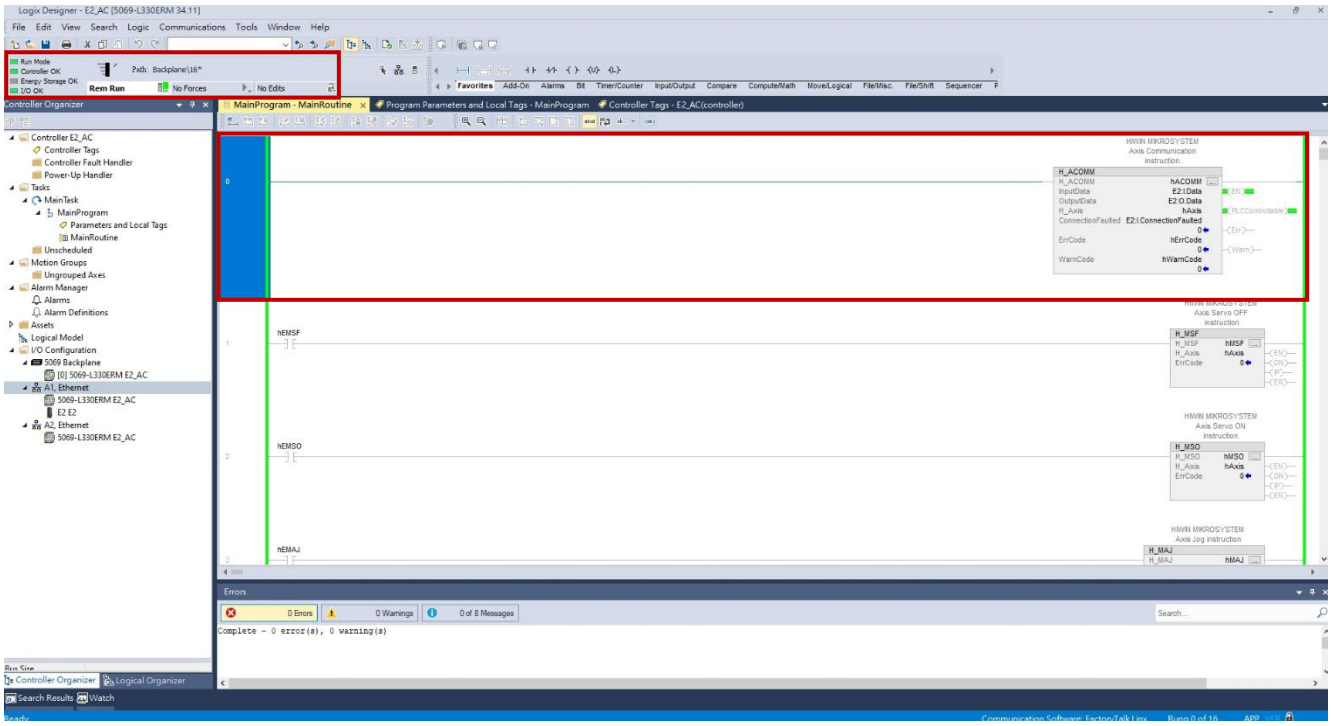


Figure 3.3.5

4. Operate function blocks

4.1 Execute AOIs

This section will sequentially explain the execution of axis communication, motion instructions, and parameter read/write. The operation examples include H_ACOMM, H_MSO, H_MSF, H_MAH, H_MAM, H_MAT, H_ParmRead_Single, and H_ParmWrite_Single. Users can refer to the same operation steps for other function blocks.

Note:

Download EtherNet/IP's function blocks and its manual from HIWIN MIKROSYSTEM's official website:

Function Blocks (AOIs)：EtherNet IP with Rockwell Studio 5000

4.1.1 Axis communication

1. Right-click **H_ACOMM** and select **Monitor "hACOMM"** to open "Program Parameters and Local Tags" window.

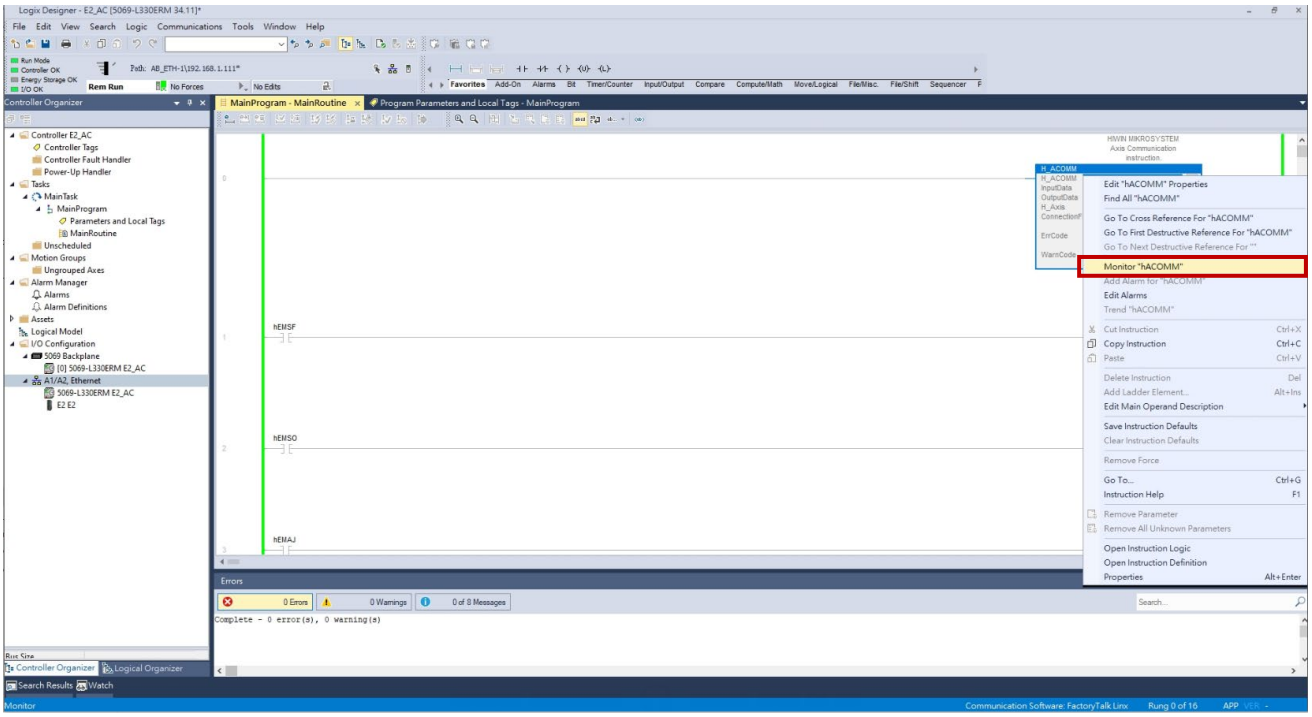


Figure 4.1.1.1

2. In “Program Parameters and Local Tags” window, ensure hACOMM.ConnectionFaulted is 0 and hACOMM.PLCControllable is 1, which indicates that axis communication is successfully established and that PLC is controllable.

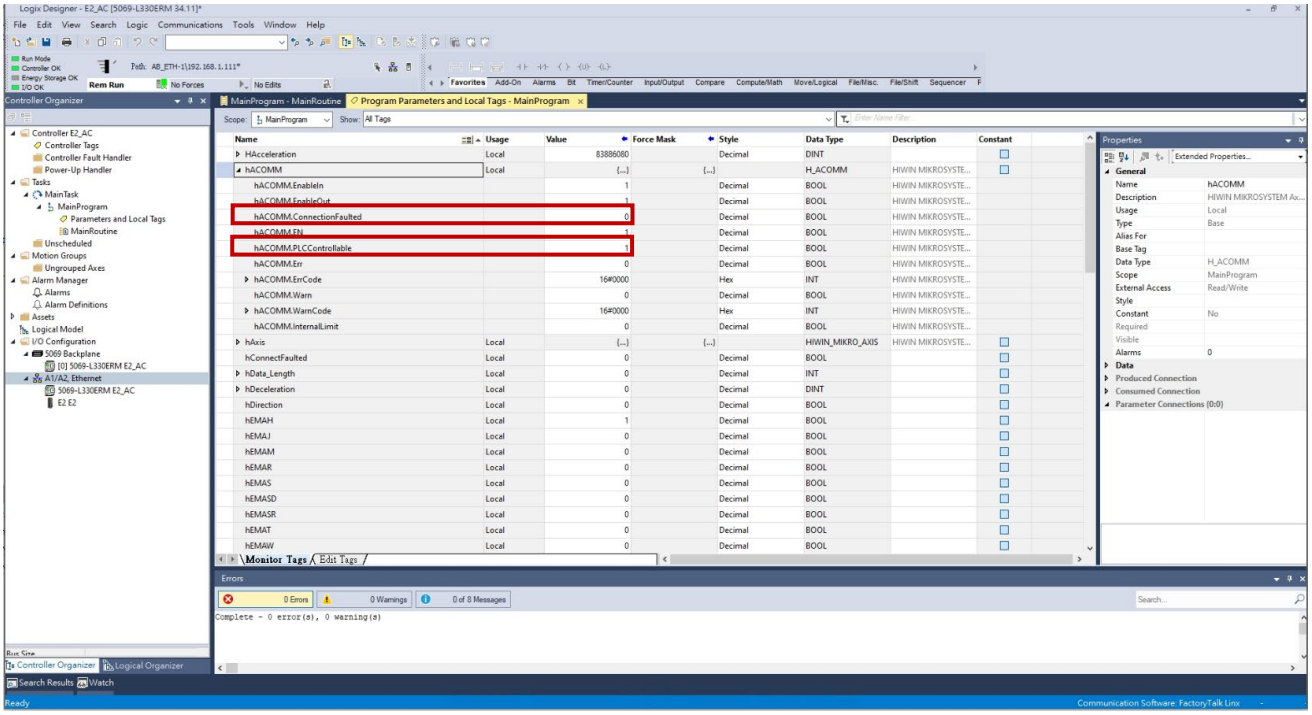


Figure 4.1.1.2

Note:

H_ACOMM instruction must remain at enabled state.

4.1.2 Motion instructions

■ Enable / Disable

1. In “MainProgram” window, right-click the contact switch of **H_MSO** or **H_MSF** and select **Toggle Bit** to enable or disable the motor.

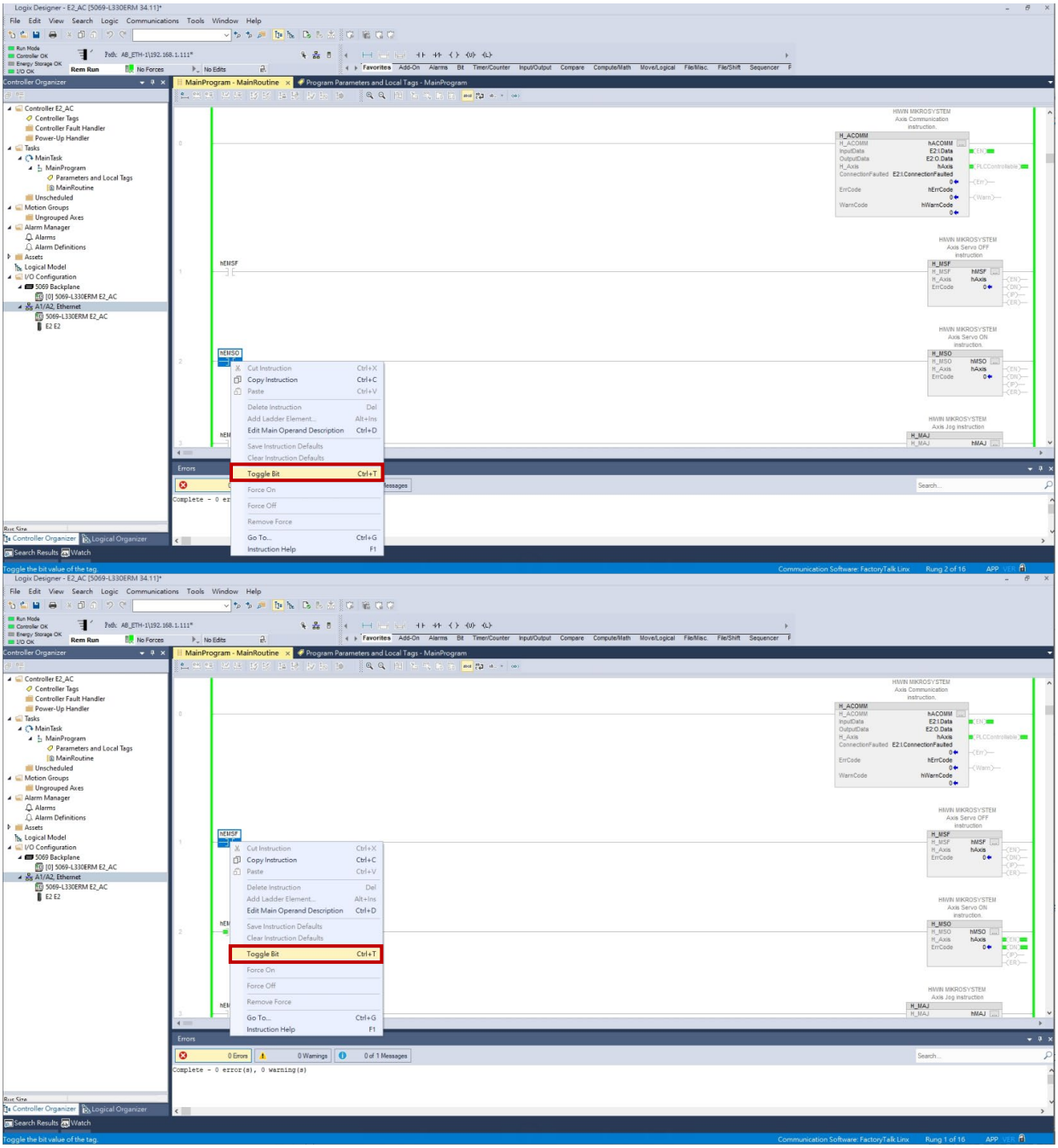


Figure 4.1.2.1

2. Check the **DN** status of function block **H_MSO** or **H_MSF**. If it is output status, it indicates that the axis is successfully enabled or disabled.

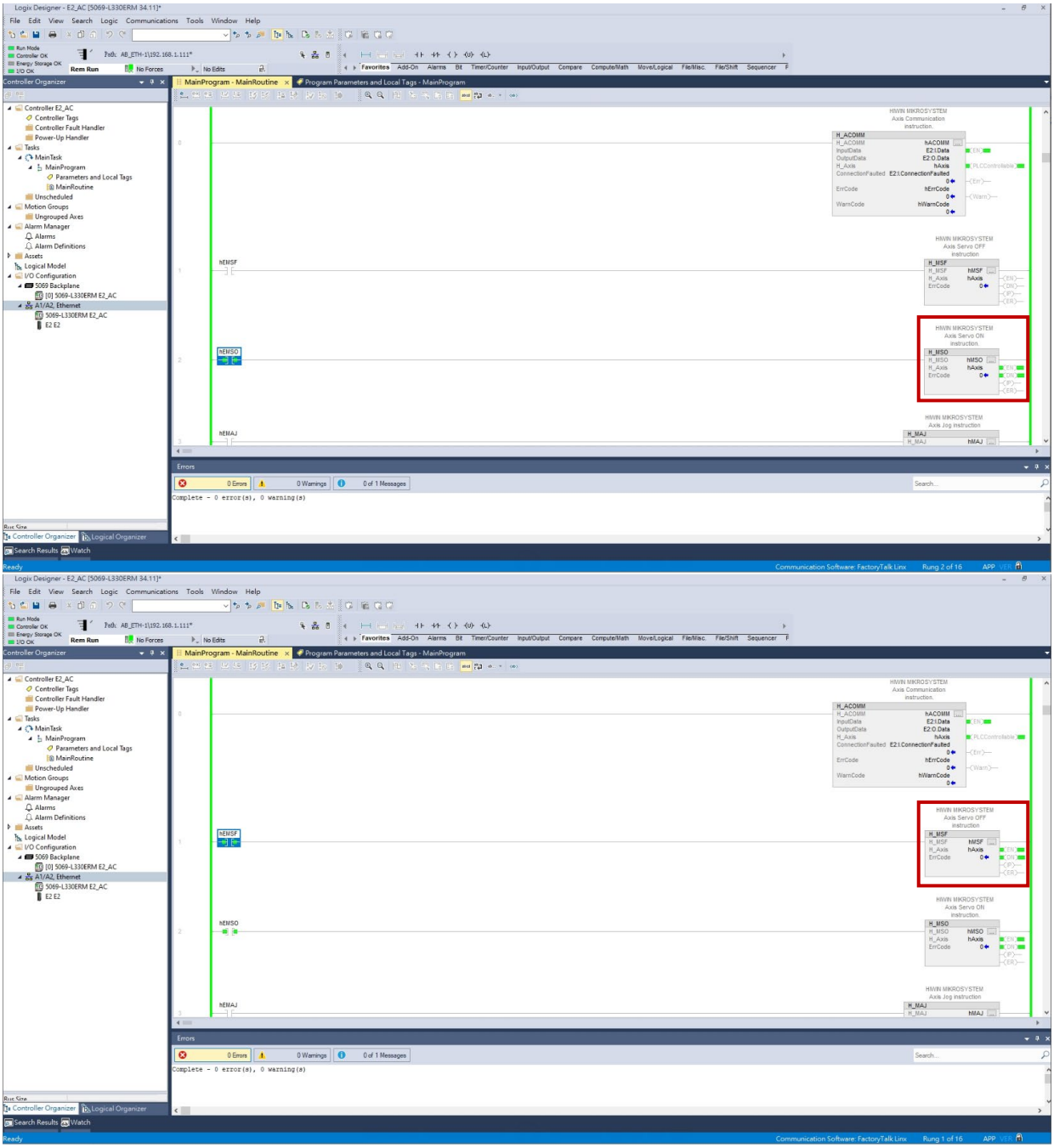


Figure 4.1.2.2

■ Homing

1. Complete the variables setting of **H_MAH** in “Program Parameters and Local Tags” window or the function block interface, including Method, SearchSwitchSpeed, SearchZeroSpeed, Acceleration, and HomeOffset.

   Note:

   Refer to the operation method in section 4.1.1 to open “Program Parameters and Local Tags” window.

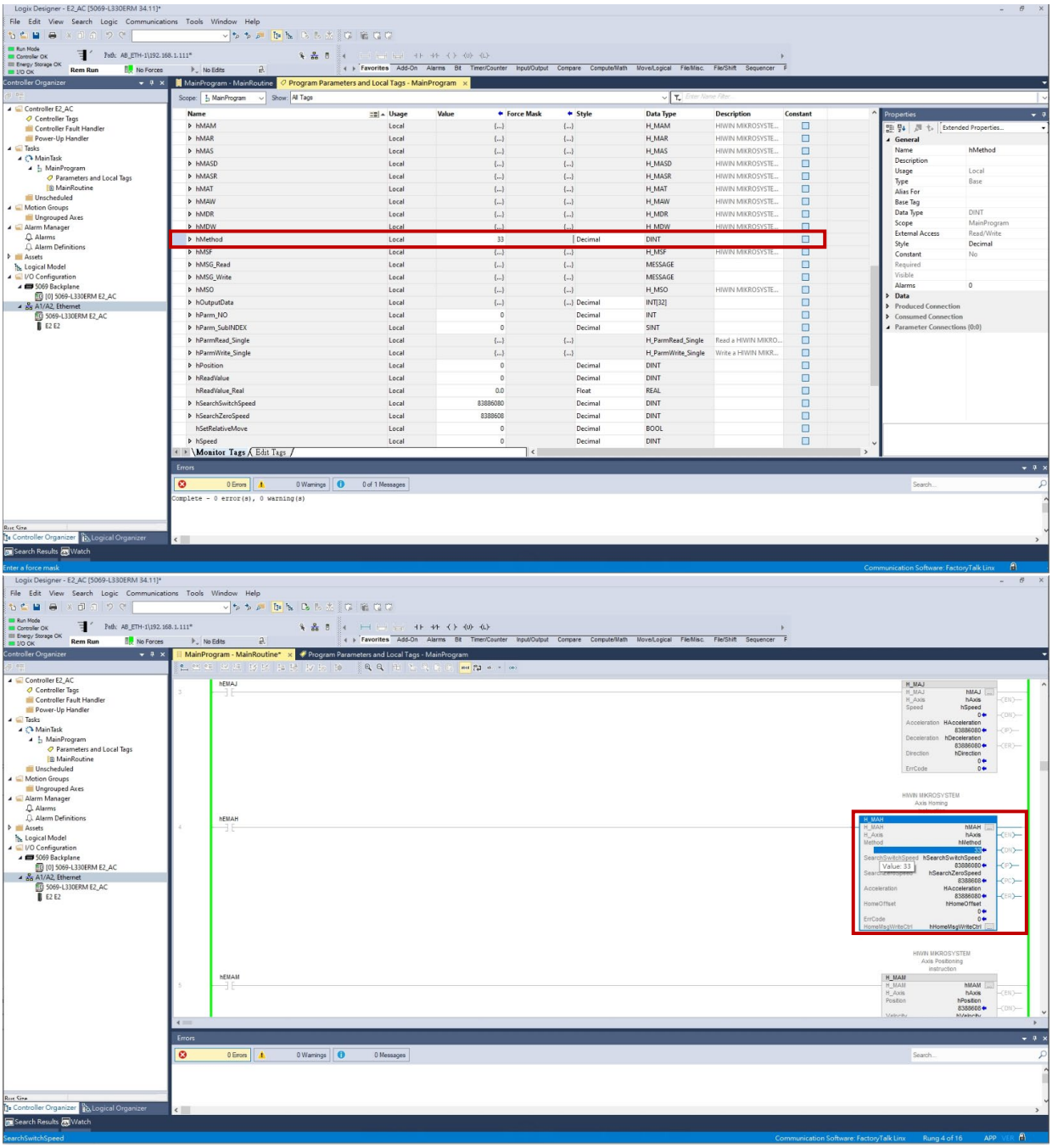


Figure 4.1.2.3

2. In “MainProgram” window, right-click the contact switch of **H_MAH** and select **Toggle Bit** to start executing homing.

   Note:

   Before executing the homing procedure, enable the motor first.

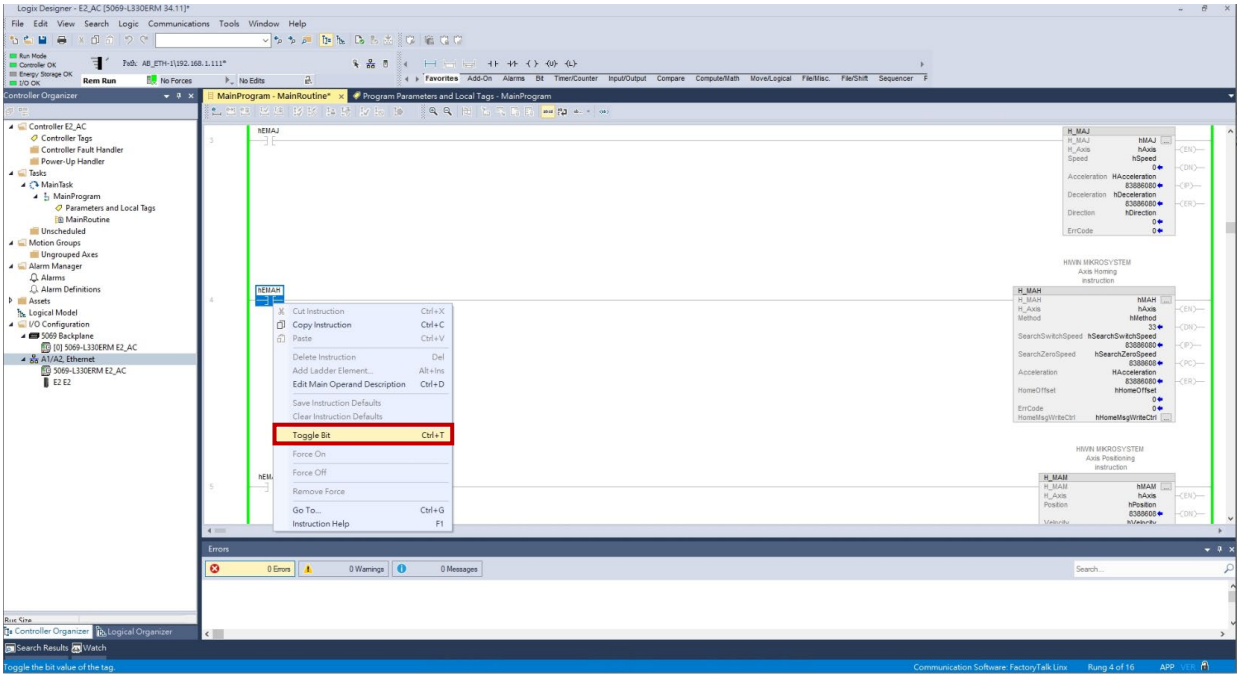


Figure 4.1.2.4

3. Check the **DN** status of function block **H_MAH**. If it is output status, it indicates that the axis successfully returns to the home position.

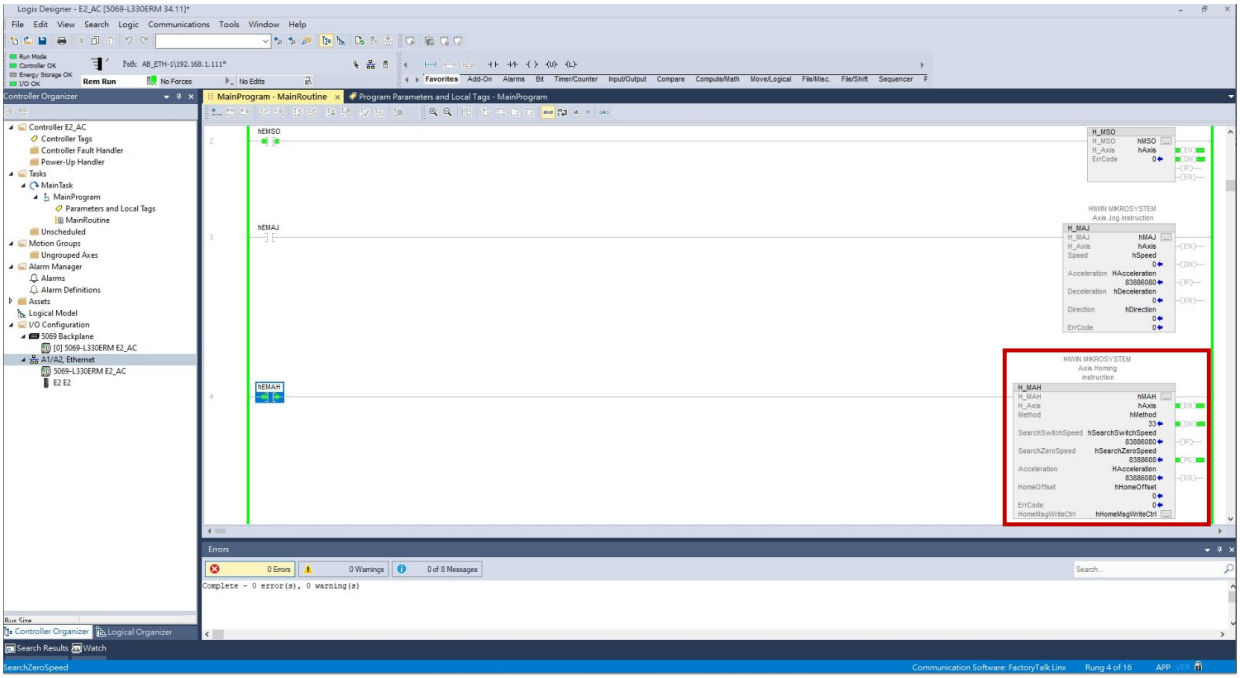


Figure 4.1.2.5

■ Move (Relative / Absolute)

1. Complete the variables setting of **H_MAM** in “Program Parameters and Local Tags” window or the function block interface, including Position, Velocity, Acceleration, Deceleration, and SetRelativeMove.

   Note:

   (1) Refer to the operation method in section 4.1.1 to open “Program Parameters and Local Tags” window.

   (2) Set the move method (Relative / Absolute) via SetRelativeMove.

   (3) To meet the move unit requirements of the mechanism side, set the minimum move amount of the mechanism side to servo drive’s control unit, and set the position, velocity, acceleration and deceleration based on the control unit.

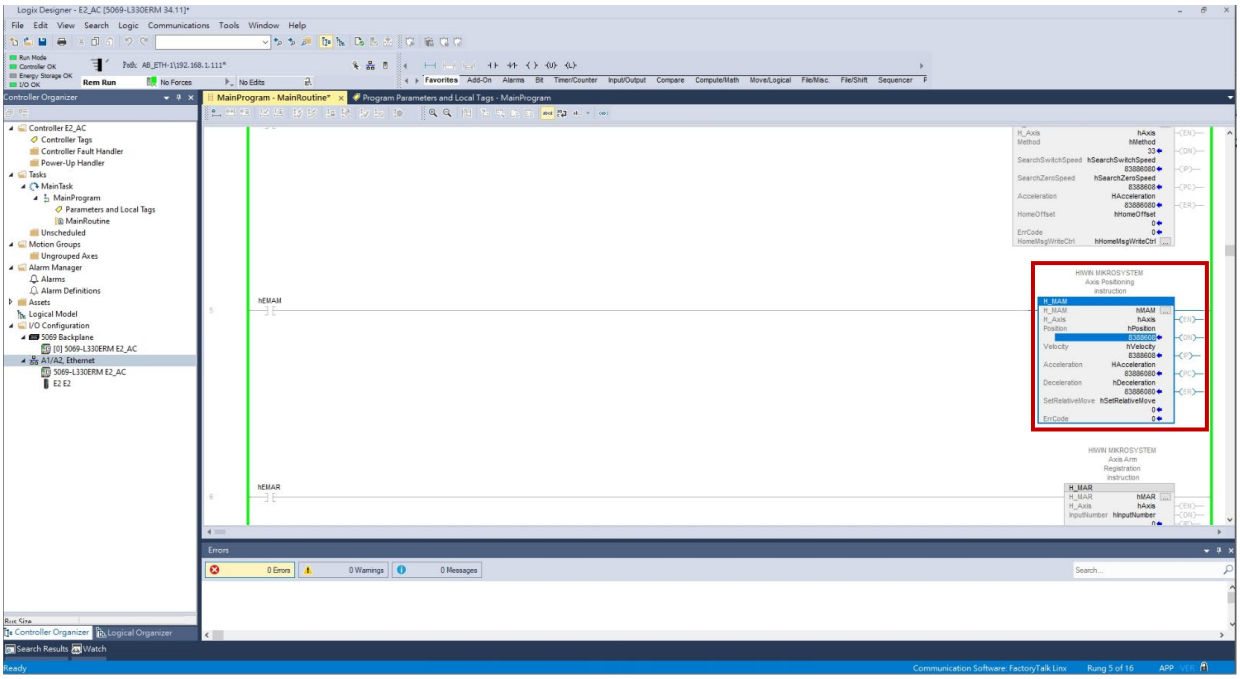


Figure 4.1.2.6

2. In “MainProgram” window, right-click the contact switch of **H_MAM** and select **Toggle Bit** to start executing the move command.

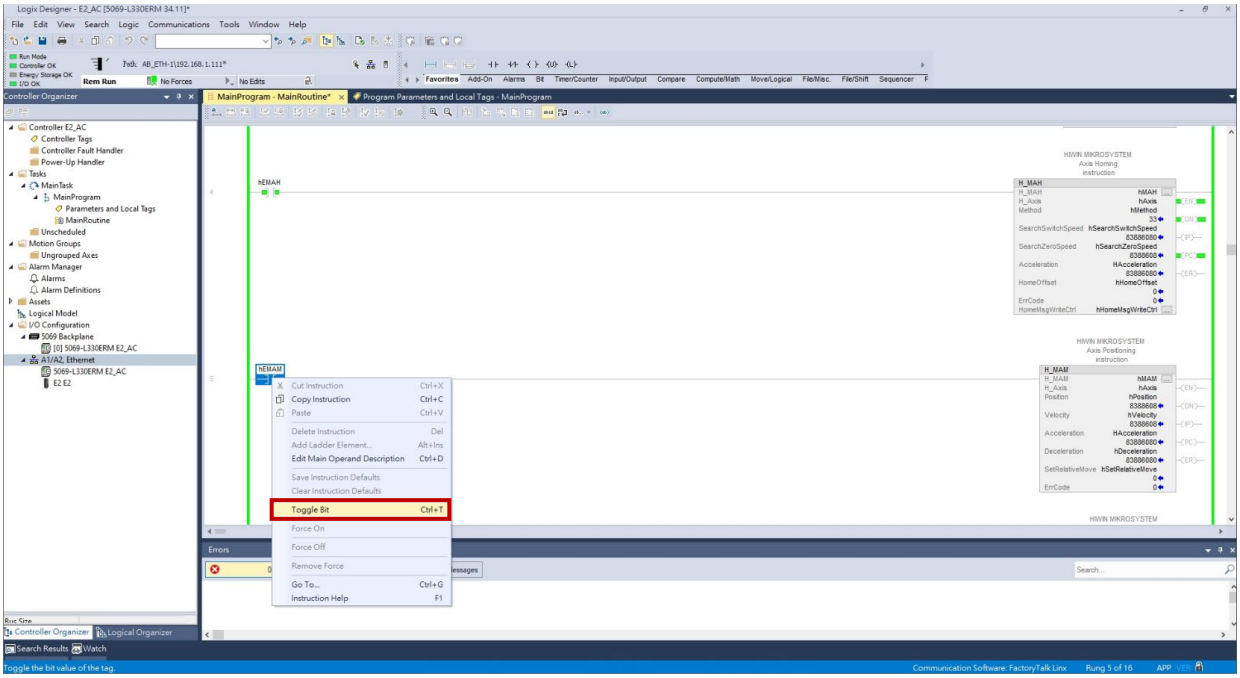


Figure 4.1.2.7

3. Check the **DN** status of function block **H_MAM**. If it is output status, it indicates that the axis successfully executes the move command.

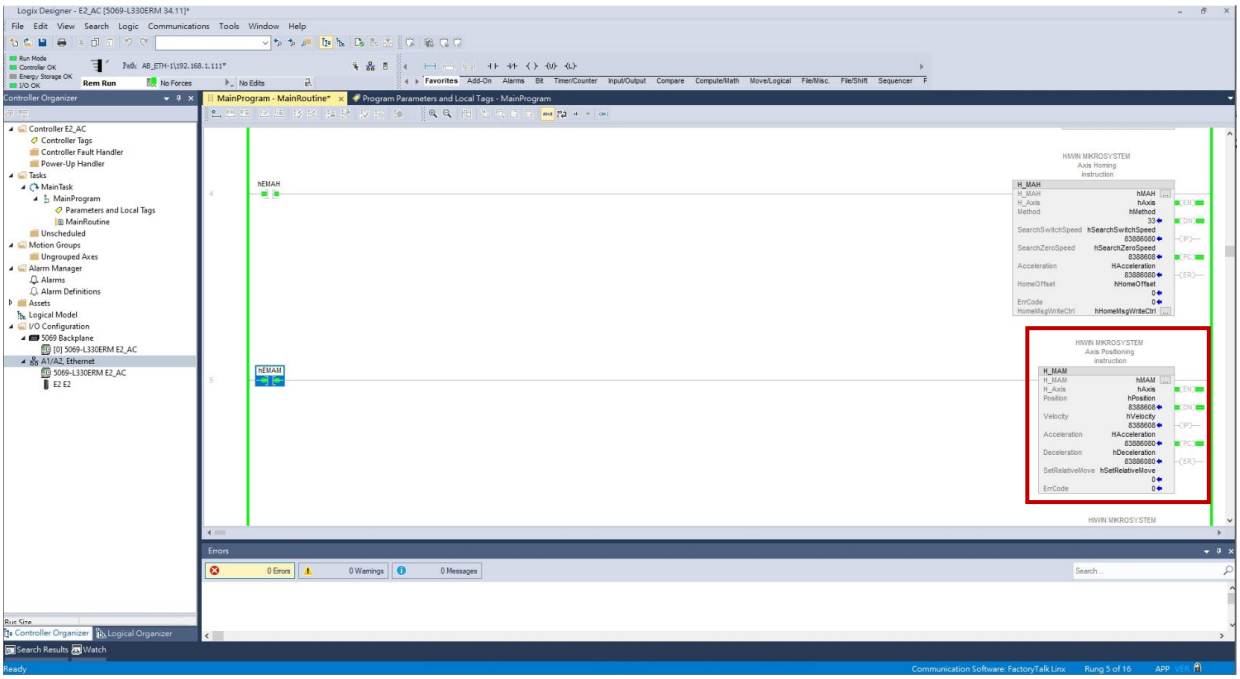


Figure 4.1.2.8

■ Torque control

1. Complete the variables setting of **H_MAT** in “Program Parameters and Local Tags” window or the function block interface, including TargetTorque, TorqueOffset, and TorqueSlope.

   Note:

   (1) Refer to the operation method in section 4.1.1 to open “Program Parameters and Local Tags” window.

   (2) If there is no need for the offset of torque command, set TorqueOffset to 0.

   The calculation formula for torque command can be referred as follows:

   $$\text{Torque command (0.1\% rated torque)} = \text{TargetTorque} + \text{TorqueOffset}$$

   (3) Set the acceleration or deceleration time of torque command with the following calculation formula.

   Do not set TorqueSlope to 0.

   $$\text{Acceleration or deceleration time (s)} = \text{TargetTorque} \,/\, \text{TorqueSlope}$$

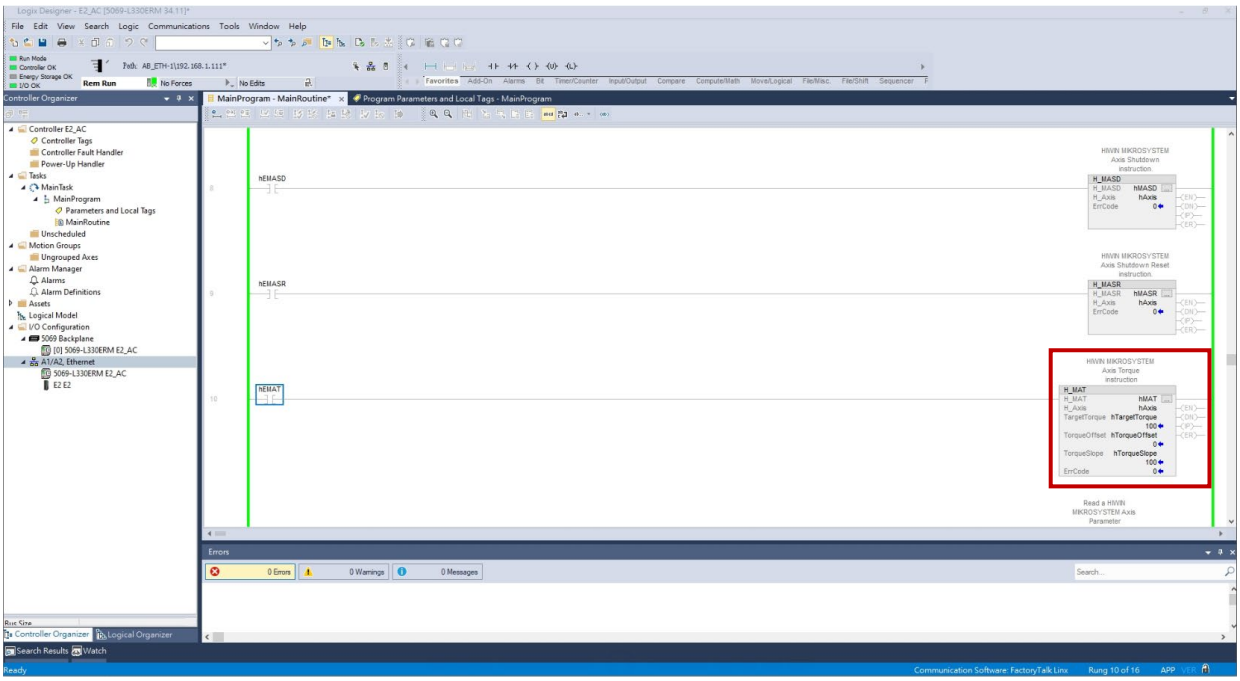


Figure 4.1.2.9

2. In “MainProgram” window, right-click the contact switch of **H_MAT** and select **Toggle Bit** to start executing the torque control command.

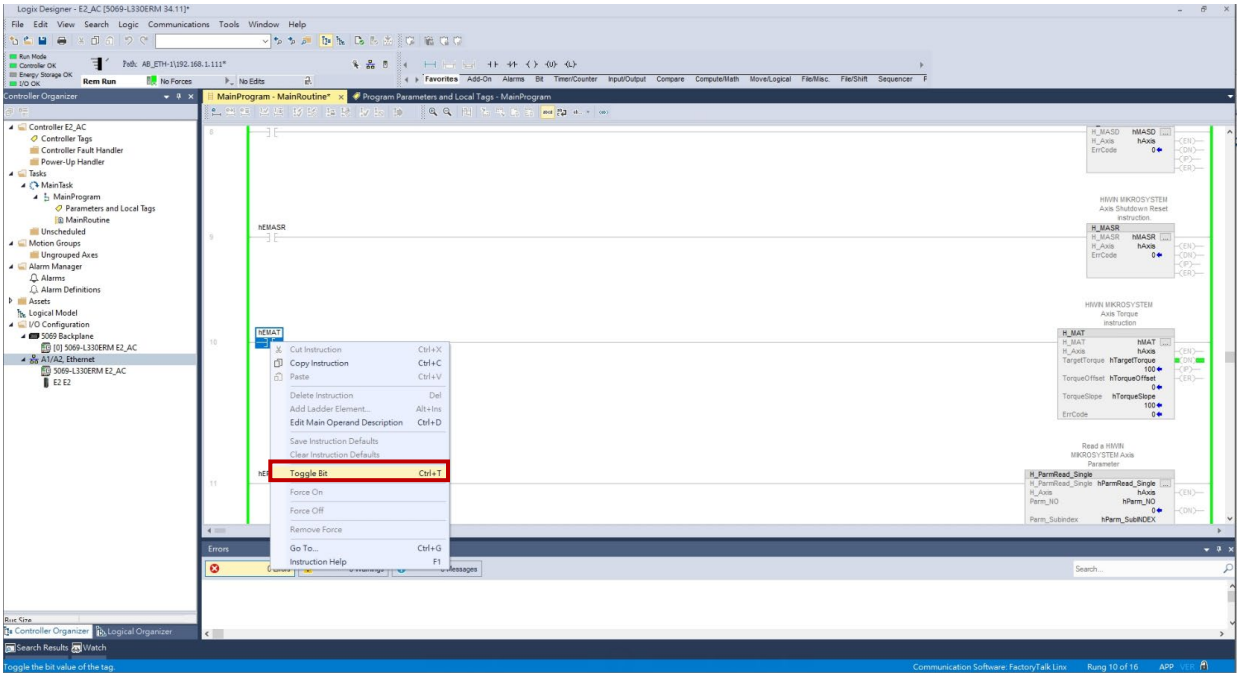


Figure 4.1.2.10

3. Check the **DN** status of function block **H_MAT**. If it is output status, it indicates that the axis successfully executes the torque control command.

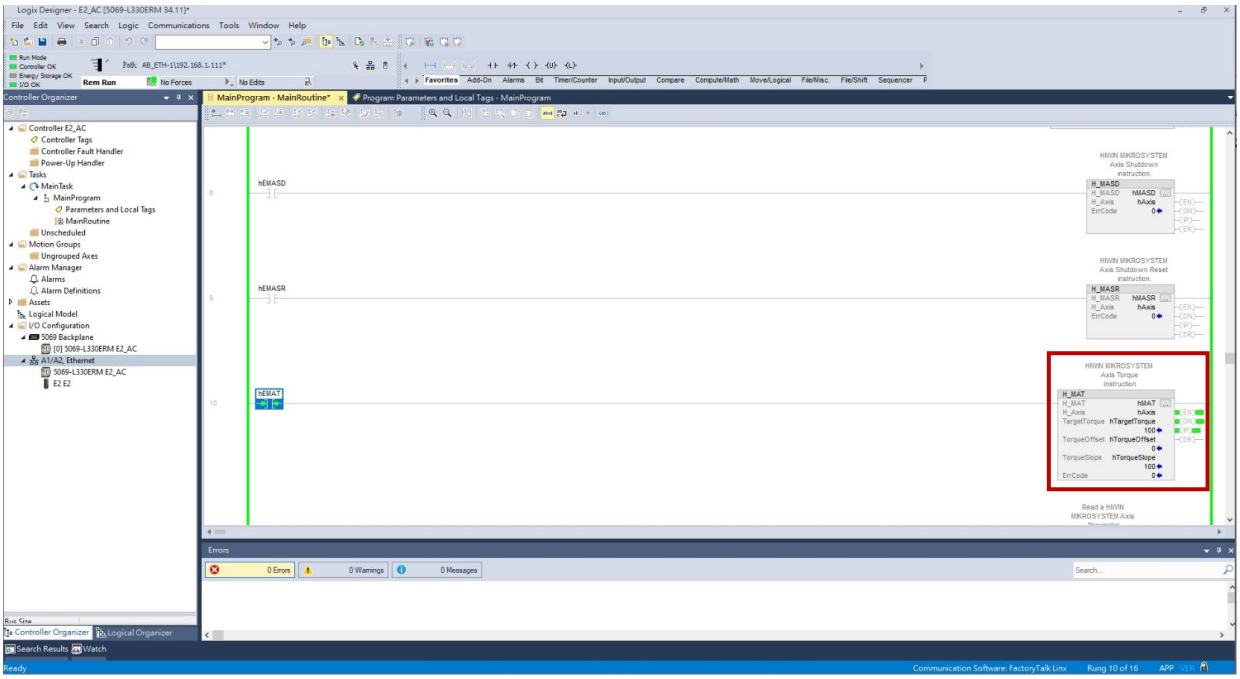


Figure 4.1.2.11

4.1.3 Parameter read/write

■ Parameter reading

1. Right-click **H_ParaRead_Single** and select **Monitor "hParm_NO"** to open "Program Parameters and Local Tags" window.

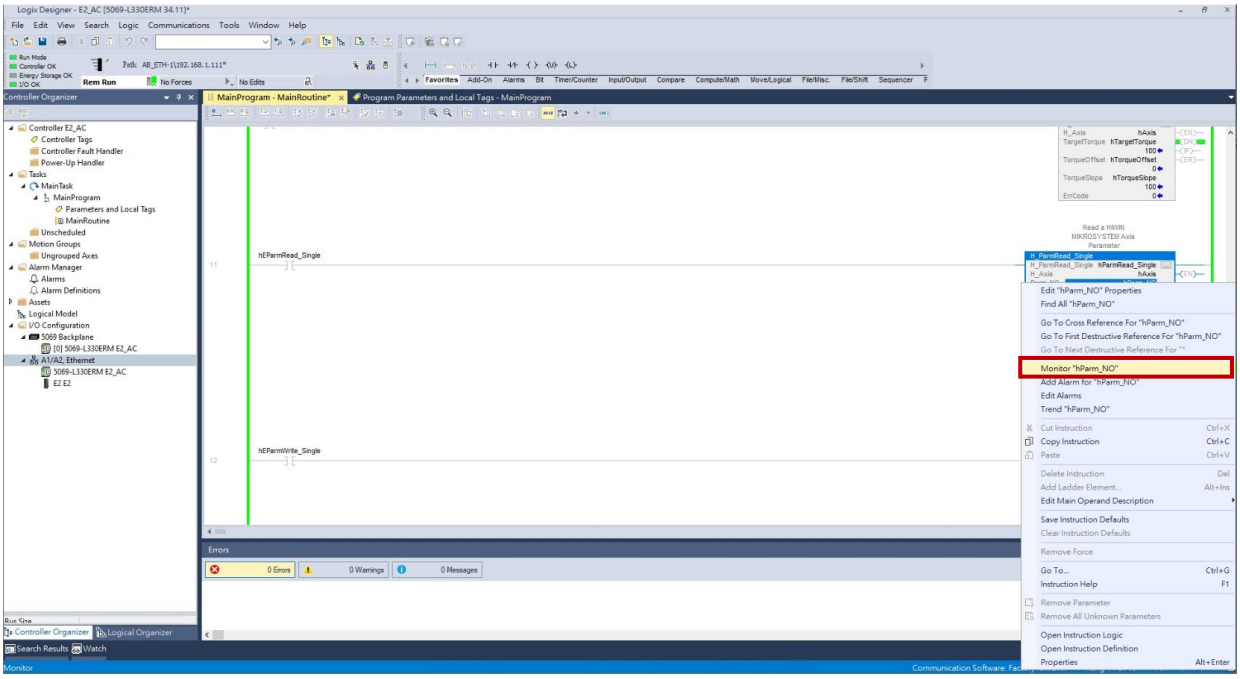


Figure 4.1.3.1

2. In “Program Parameters and Local Tags” window, select **Hex** in “Style” column and enter a value in “Value” column. Here takes communication object 0x2100h as an example.

Note:

Parm_NO can also be set via the function block interface. Convert it to a decimal value or enter 16#xxxx. The function block will display the value in decimal.

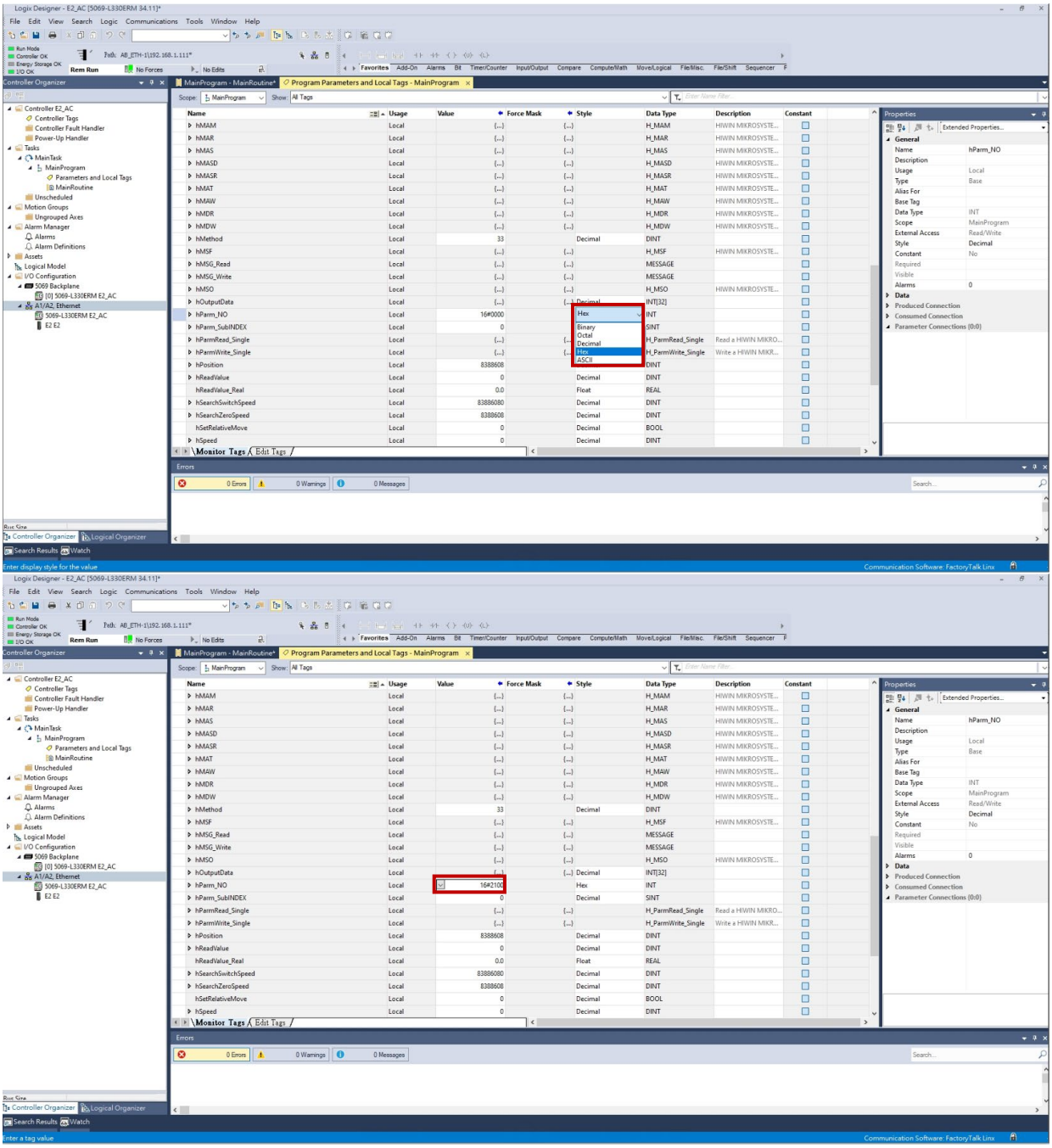


Figure 4.1.3.2

3. In “MainProgram” window, right-click the contact switch of **H_ParaRead_Single** and select **Toggle Bit** to start executing parameter reading.

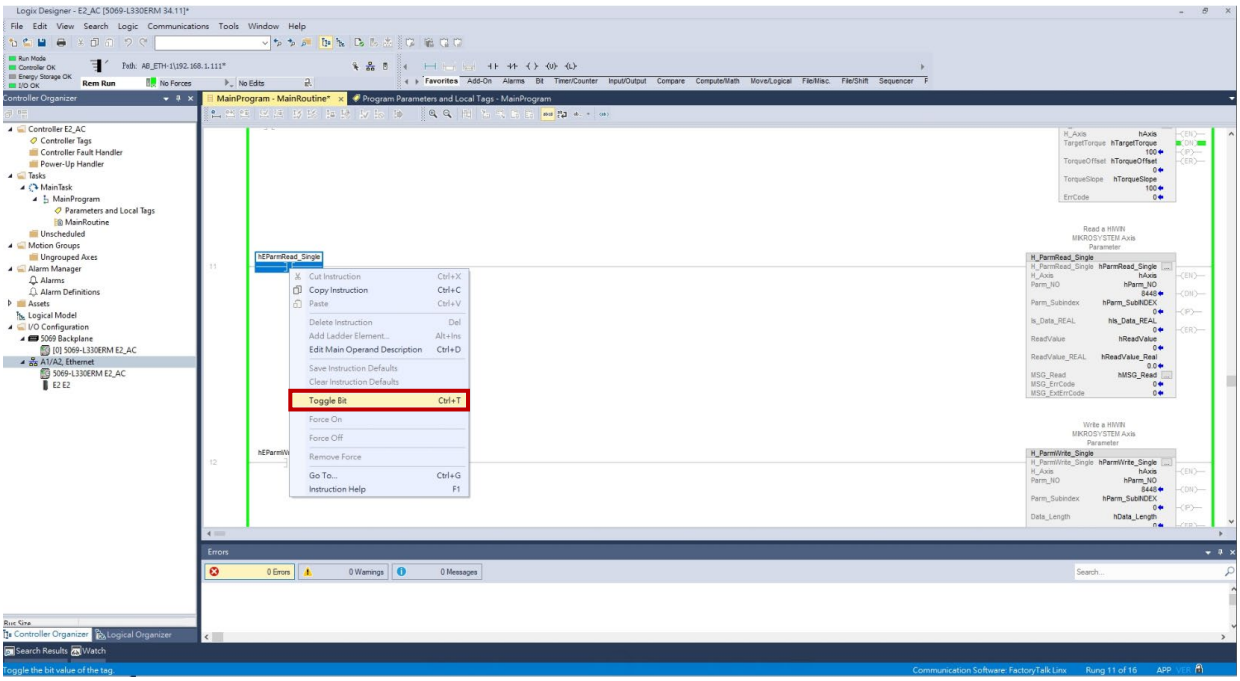


Figure 4.1.3.3

4. Check the **DN** status of function block **H_ParaRead_Single**. If it is output status, it indicates that the axis successfully executes parameter reading. The read value will be displayed in **ReadValue**.

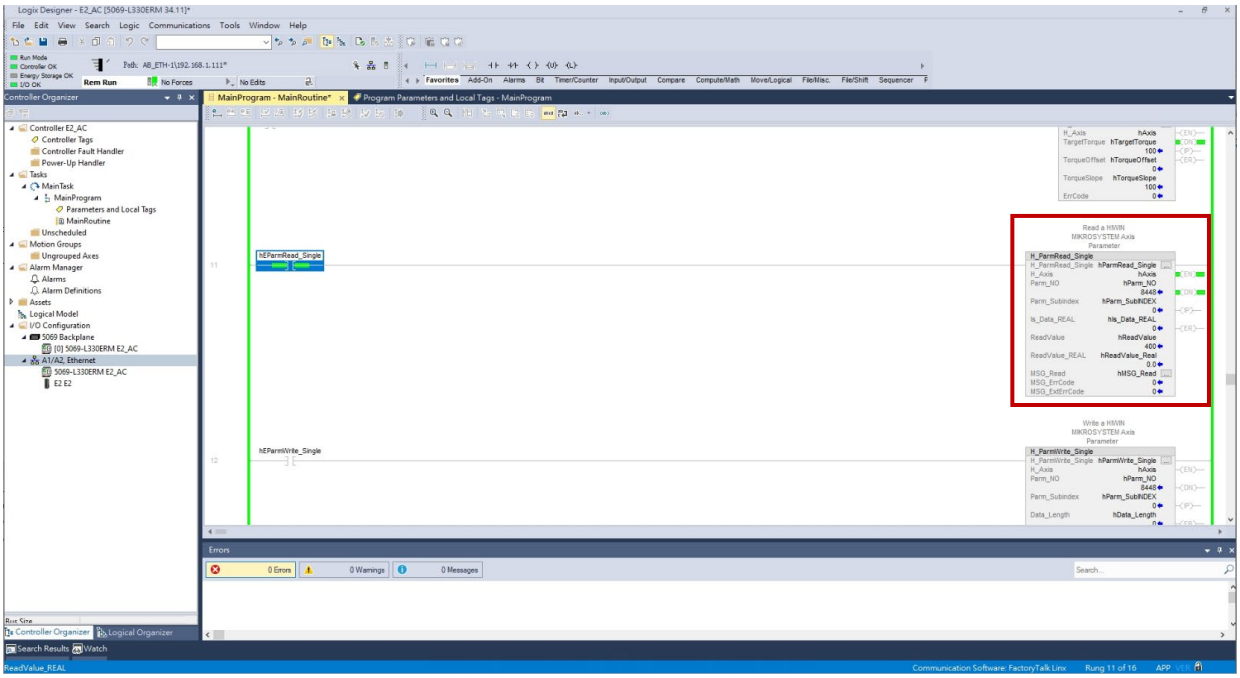


Figure 4.1.3.4

■ Parameter writing

1. Refer to step 1 & 2 in parameter reading to complete the variables setting of **H_ParaWrite_Single**, including Parm_NO, ParmSubIndex, Data_Length, Is_Data_REAL, WriteValue, and WriteValue_REAL. Here takes communication object 0x2100h with the written value 1000 as an example.

   Note:

   (1) Set Data_Length based on the communication object's data type. There are two data types for servo drive's Pt parameter, 2 or 4. Refer to chapter 15 in "E Series Servo Drive User Manual" for details.

   (2) Set ParmSubIndex based on the communication object. If the object does not have SubIndex, set it to 0. Refer to section 3.7 in "E2 Series Servo Drive EtherNet/IP Communication Command Manual" for details.

   (3) Set the written variables based on the communication object format. For integer type, use WriteValue. For REAL type, use WriteValue_REAL and set Is_Data_REAL. Otherwise, the parameter may not be normally written.

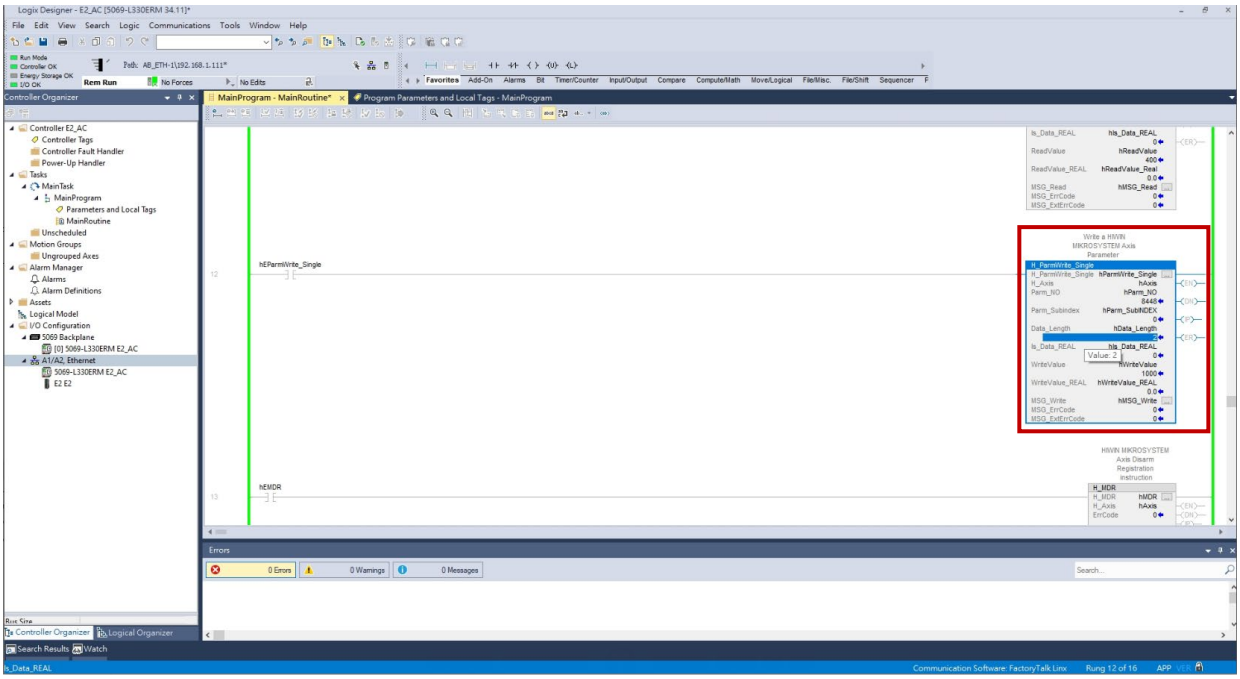


Figure 4.1.3.5

2. In “MainProgram” window, right-click the contact switch of **H_ParaWrite_Single** and select **Toggle Bit** to start executing parameter writing.

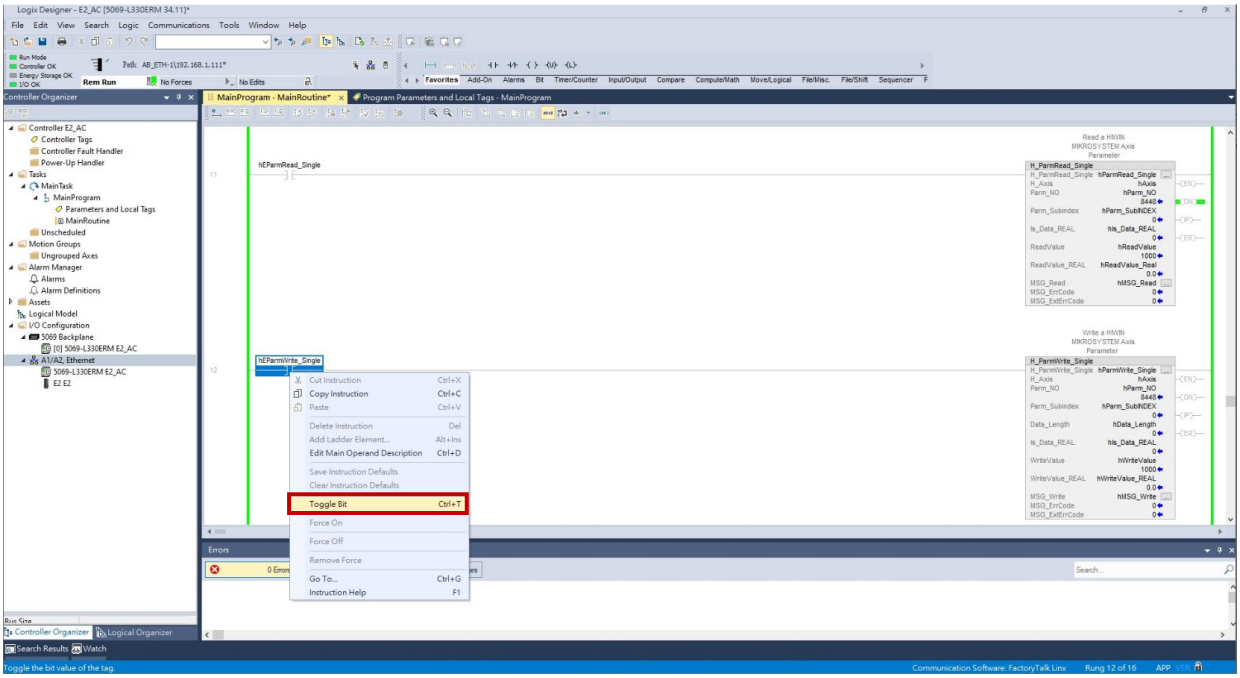


Figure 4.1.3.6

3. Check the **DN** status of function block **H_ParaWrite_Single**. If it is output status, it indicates that the axis successfully executes parameter writing.

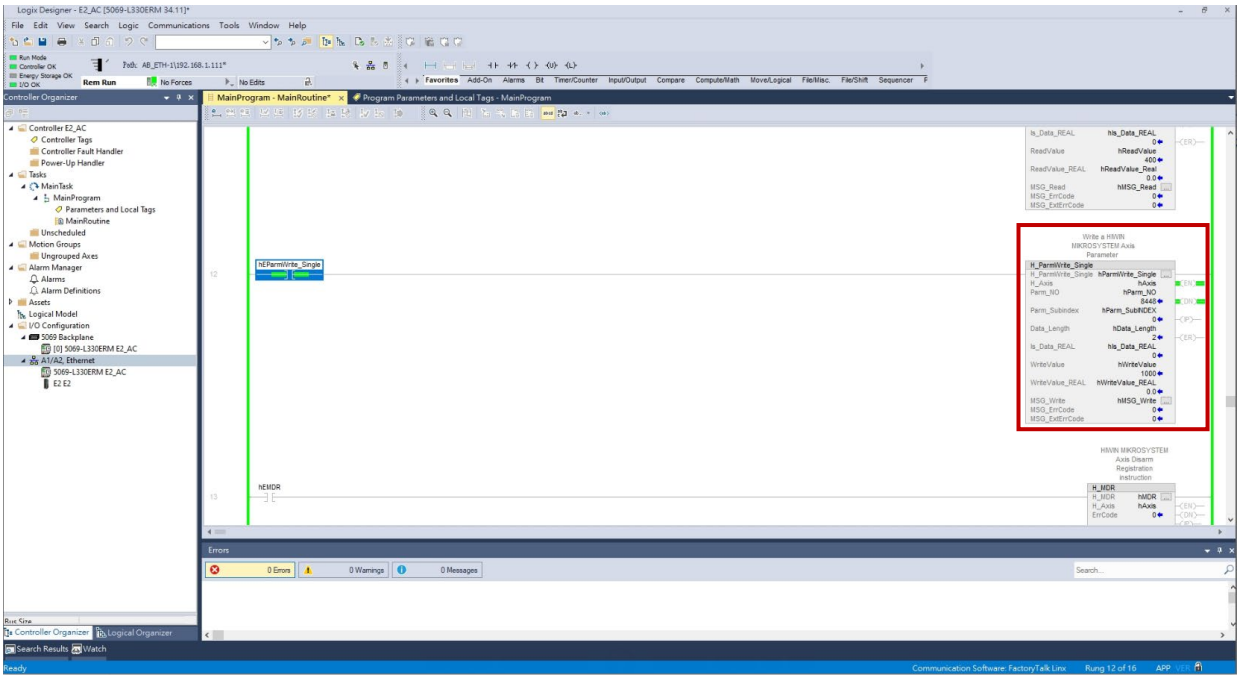


Figure 4.1.3.7